OBJECTIVE

SOIL SCIENCE

T. RAMESH
(Scientist, Soil Science)

BRAJENDRA
(Scientist, Soil Science)

PATIRAM
(Principal Scientist, Soil Science)

A.K. VISHWAKARMA
(Scientist, Agroforestry)

S.V. NGACHAN
(Director)

ICAR RESEARCH COMPLEX FOR NEH REGION,
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PREFACE

The key to success in today's competitive world lies in being informed and up-to-date. In this competitive world, one must prepare thoroughly each and every aspect of the subject in which he/she is facing the examination. For these examinations one has to invest lot of time and energy in the collection of the relevant materials apart from their preparation. The volumeness of the syllabus often taxes the examinee as a result of which he/she has to prepare without consulting adequate materials. Reading their problems in mind, an attempt has been made to compile/constitute the relevant questions in the field of soil science and related subjects to benefit those agricultural graduates, the disciplines who are preparing for the examination like JRF, SRF, ARS, IARI entrance examination, civil service, etc. This question bank gives them adequate hands on experience through practice considering their preparedness and time management. This will also help the students to prepare both intensively and extensively.

This question bank covers all the disciplines in soil science as well as few disciplines in physical chemistry. One particular aim in the present deliberation is to enhance the comprehending capability of the users. Keeping in view of the widening horizons of soil science examinations, various chapters like soil informatics, soil testing, nutritional disorders, and soil pollutions have been framed. Without a solid foundation of chemistry, success in soil science is a distant dream. Therefore, introductory chemistry and basic chemical calculations have been added. The book covers a huge number of questions with answers and will be a perfect workbook for any competitive examination.

Care has been taken to rule out errors and repetitions. But, surely in our maiden attempt, errors are bound to happen. Any such errors if brought to the notice of authors will be highly appreciated and will be incorporated in subsequent editions.

Several model questions have been added for examinees of JRF, SRF, ARS and other competitive examinations. It is hoped that the book will open new horizons in the carrier path of the users.

Wishing all the success in user endeavours.

Dated: December, 2007

Authors

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Authors

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SYLLABUS (ARS/NET) : SOIL SCIENCES

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Unit 3: Soil Chemistry : Chemical composition of soil; Soil colloids - structure, composition, constitution of clay minerals, amorphous clays and other non-crystalline silicate minerals, oxide and hydroxide minerals; Charge development on clays and organic matter; pH-charge relations; Buffer capacity of soils. Elements of equilibrium thermodynamics, chemical equilibria , electrochemistry and chemical kinetics. Inorganic and organic colloids- surface charge characteristics, diffuse double layer theories, zeta potential stability, coagulation/ flocculation, peptization, electrometric and sorption properties of soil colloid. Soil organic matterfractionation, clay-organic interactions. Cation exchange- theories, adsorption isotherms, Donnan-membrane equilibrium concept, clay-membrane electrodes and ionic activity measurement, thermodynamics, anion and ligand exchange- inner sphere and outer-sphere surface complex formation, fixation of oxyanions, hysteresis in sorption-desorption of oxy-anions and anions. Nitrogen, potassium, phosphate and ammonium fixation in soils and management aspects. Chemistry of acid, salt-affected and submerged soils and management aspects.

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Unit 6: Statistics : Experimental designs for pot culture and field experiments; Statistical measures of central tendency and dispersion; Correlation and regression; Tests of significance - t and F tests; Computer use in soil research.

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INTRODUCTORY CHEMISTRY

Questions :

1. Which is the heaviest among the following?
   a. Electron b. Proton
   c. Neutron d. Positron

2. In an atom the number of electrons outside the nucleus is equal to the number of
   a. Electron
   b. Proton
   c. Neutron
   d. Positron in the nucleus

3. As the value of orbit number increases the size of the atom will
   a. Decreases
   b. Increases
   c. Shows no change
   d. Decreases and increases both

4. The number of electrons which each sub–shell can occupy is
   a. 2n b. $2n^2$
   c. 2 (l + 1) d. 2 (2l + 1)

5. The clue for the existence of the particles in the nucleus of an atom was given by
   a. Discharge tube experiment
   b. X–ray analysis
   c. Positive ray analysis
   d. Alpha ray scattering experiment

6. The element of atomic number 6 is likely to have properties similar to those of the element with atomic number of
   a. 2 b. 14
   c. 10 d. 24

7. In which of the following n/p ratio is greater than one?
   a. Na^+ b. Mg^{2+}
   c. O^{2-} d. Al^{3+}

8. Which of the properties of an element is a whole number?
   a. Electron b. Proton
   c. Neutron d. Positron

9. Which of the properties of an element is a whole number?
   a. Atomic weight
   b. Atomic radius
   c. Atomic volume
   d. Atomic number

10. In any given energy level the energy of the orbital increases in the order of
    a. s, p, d b. p, s, d
    c. d, p, s d. s, d, p

11. Unstability of the nucleus is due to
    a. High neutron/proton ratio
    b. Low neutron/proton ratio
    c. High electron/proton ratio
    d. High proton/eleetron ratio

12. Transition of an electron from M level to K level results in
    a. Absorption spectra
    b. Emission spectra
    c. X–ray spectra
    d. Continuous spectra

13. If the value of azimuthal quantum number l is 2 then the sub shell will be denoted by
    a. s b. p
    c. d d. f

14. Which of the following represents E. C. of Cu^{++}?
    a. $1s^2 2s^2 2p^6 3p^6 4s^2 3d^7$
    b $1s^2 2s^2 2p^6 3s^2 3p^6 4s^{10}$
    c. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^6$
    d. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4d^8$

Answers										
	1. c	4. b	7. c	10. a	13. b
	2. b	5. d	8. c	11. a	14. b
	3. b	6. b	9. d	12. b	

15. The azimuthal quantum number determines
    a. The size of the orbit
    b. The ellipticity of the orbit
    c. The orientation of the orbit
    d. None of the above
    e. All the above

16. Spin quantum number indicates
    a. The size of the orbit
    b The orientation of the orbit
    c. Direction in which the electron is spinning
    d. The ellipticity of the orbit

17. Which of the following sub–shell is circular?
    a. *4s* b. *4p*
    c. *4d* d. *4f*
    e. *4p*

18. The electron occupies the available orbital singly before pairing in any one orbit occurs. This is called as
    a. Pauli's exclusion principle
    b. Hund's Rule
    c. Heisenberg's Principle
    d. Prout's Hypothesis

19. Which of the following represents the electronic configuration of a noble gas?
    a. 2, 8, 1 b. 2, 8, 7
    c. 2, 6, 8 d. 2, 8, 6
    e. 2, 8, 8

20. Negative ions are formed from neutral atoms by gain of
    a. Positrons b. Neutrons
    c. Protrons d. Electrons

21. The maximum number of electrons contained in the *s*–sub level is
    a. 2 b. 4
    c. 6 d. 10

22. The maximum number of electrons contained in *d*-sublevel is
    a. 2 b. 4
    c. 6 d. 10

23. Sub-level (orbital) are designated by
    a. Principle quantum number
    b. Azimuthal quantum number
    c. Magnetic quantum number
    d. Spin quantum number

24. For a given value of n (principal quantum number) the energy of electrons in different sub–shells s, p, d and f can be arranged in the order of
    a. f > d > p > s b. s > p > d > f
    c. f > p > d > s d. s > d > p > f

25. How many sub–shells are present in the 'M' shell?
    a. 1 b. 2
    c. 4 d. 4
    e. 5

26. Write the permissible values of *l* when n = 3
    a. 1, 2, 3 b. 0, 1, 2
    c. 0, 1, 3 d. None

27. Variable valence is shown by
    a. $1s^2 2s^2 2p^6$
    b. $1s^2 2s^2 2px^1 py^1$
    c. $1s^2 2s^2 2px^1 py^1 pz^1$
    d. $1s^2 2s^2 2p^4$
    e. None of the above

28. The electronic configuration of oxygen is $1s^2 2s^2 2p^4$, hence oxygen is
    a. s-block element
    b. p-block element
    c. d-block element
    d. f-block element

Answers									
	15. a	18. b	21. a	24. a	27. e
	16. c	19. b	22. d	25. c	28. b
	17. a	20. d	23. b	26. b	

29. For the 2s sublevel
a. $n = 1, l = 2$ b. $n = 1, l = 0$
c. $n = 2, l = 1$ d. $n = 2, l = 0$

30. For the 4f sublevel
a. $n = 4, l = 0$ b. $n = 4, l = 3$
c. $n = 3, l = 0$ d. $n = 1, l = 3$
e. None of the above

31. The K-orbit contains
a. s sublevel
b. s and p sublevel
c. s, p and d sublevel
d. s, p, d and f sublevel

32. For $l = 0$ (s-sublevel), the magnetic quantum number m can have the value(s) of
a. 0 b. 0, 1
c. 0, 1, 2 d. 0, 1, 2, 3
e. None of the above

33. For $l = 2$ (d-sublevel), the magnetic quantum number can have the value(s) of
a. $-3, -2, -1$ b. $-3, +3$
c. $-3, -2, -1, +2, +3$ d. $\pm 0, \pm 1, \pm 2$

34. An oxygen atom contains
a. 8 neutrons and 8 protons
b. 8 protons and two neutrons
c. 8 protons and 16 electrons
d. 8 protons and 8 electrons
e. 16 protons and 8 electrons

35. In chloride ion what is the number of electrons in its outermost orbit?
a. 1 b. 2
c. 4 d. 7
e. 8

36. An element X and 6 electrons in its outermost shell. It probably will
a. Form positive ion
b. Form negative ion
c. Be inert
d. Be relatively unreactive
e. Be neutral in solution

37. An atom has the total electronic configuration as under
a. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^5$
b. $1s^2 2s^2 2p^5 3s^2 3p^6 3d^{12} 4s^2 4p^5$
c. $1s^2 2s^2 2p^7 3s^2 3p^6 3d^5 4s^2 4p^5$
d. $1s^2 2s^2 2p^4 3s^2 3p^6 3d^8 4s^2 4p^5$

38. The most probable valence number for the atom is
a. -1 b. $+1$
c. $+2$ d. -2

39. The divalent zinc ion has mass number 70. The total no. of neutrons in it is
a. 30 b. 40
c. 42 d. 38
e. 28

40. The atomic number of tritium is
a. 1 b. 2
c. 3 d. 4
e. 5

41. In the electronic configuration of the atoms, the energy of the 3d sub–shell is greater than that of which one of the following?
a. 4d sub-shell
b. 4s sub-shell
c. 4f sub-shell
d. 4p sub-shell

42. In an atom of an element contains electrons and 20 neutrons, its mass number would be
a. 35 b. 15
c. 5 d. 20
e. 40

Answers										
	29. d	32. a	35. e	38. a	41. b
	30. b	33. d	36. b	39. e	42. a
	31. a	34. d	37. a	40. a	

43. The particle with 13 protons, 14 neutrons and 10 electrons is
a. Al^{3+} ion b. Al atom
c. Nitrogen isotope d. None

44. The electronic configuration of carbon is
a. $1s^2 2s^2 2p^4$ b. $1s^2 2s^2 2p^2$
c. $1s^2 2s^2 2p^6$ d. $1s^2 2s^2 2p^1$
e. $1s^2 2s^2 2p^3$

45. Carbon has valence 2 in CO, 4 in CO_2 and CH_4. Its valence in C_2H_2 is
a. 1 b. 2
c. 3 d. 4

46. All carbon atoms have
a. 12 neutrons and 6 extranuclear electrons
b. 12 protons and 6 extranuclear electrons
c. 6 neutrons and 6 extranuclear electrons
d. 6 protons and 6 extranuclear electrons
e. 12 protons and 12 neutrons

47. The reason for comparative inertness of element of group zero is
a. Their gaseous nature
b. Their rare occurrence
c. Their extreme lightness
d. Their special electronic configuration
e. Their insolubility in water

48. If you are given the atomic number of an element, which of the following you also know?
a. The atomic weight
b. The number of isotopes
c. The number of electrons in other
d. The number of electrons in other
e. The number of electrons in the nucleus

49. An element X has mass number 32 and an atomic number 16. The symbol of its ion is
a. $X \div$ b. X^{+2}
c. X^{-1} d. X^{-2}
e. Cannot form an ion

50. An element has atomic weight 39 and atomic number 19. The number of electrons, protons and neutrons in it will be
a. 19, 19, 20 b. 20, 19, 19
c. 19, 20, 19 d. 39, 19, 30

51. Which of the following is a d–block element ?
a. Na b. Al
c. Cl d. Cu

52. An element M has atomic number 12 and another element X has atomic number 8. The formula of the compound when M and X combine is
a. MX b. M_2X
c. MX_2 d. M_2X_3
e. M_2X_2

53. In the M–shell of chlorine the maximum number of electrons is
a. 6 b. 7
c. 8 d. 5
e. 4

54. The positron has a charge equal to that of
a. A proton b. An electron
c. An α–particle d. A neutron

55. Electrons have the same value of principal quantum number are said to occupy the same
a. Energy level
b. Sub–shell
c. Orbital
d. Space in energy level

Answers					
	43. a	46. c	49. d	52. a	55. a
	44. b	47. d	50. a	53. b	
	45. a	48. e	51. d	54. a	

56. Positive ions are formed from neutral atoms by the loss of
a. Neutrons
b. Nuclear energy
c. Protons
d. Electrons

57. Which of the following has got the highest size?
a. Chloride ion b. Chloride atom
c. Sulphur atom d. Sulphide ion

58. Two particles have the following compositions
12 protons, 12 neutrons, 10 electrons.
11 protons. 12 neutrons, 10 electrons.
They would best be described as
a. Isotopes
b. Positive ions
c. Anions
d. Atoms of metals

59. The electronic energy levels of the hydrogen atom in the Bohr theory are called as
a. Orbitals b. Orbits
c. Rydberg levels d. Ground states

60. Elements A and B have atomic number 8 and 12 respectively. Their combination will produce compound of the formulae
a. AB_2 b. A_3B
c. A_2B d. AB_3
e. AB

61. The electronic configuration of Fe^{++}
a. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^6$
b. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^4$
c. $1s^2 2p^2 2p^6 4s^2 3d^6$
d. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^6$
e. None of the above

62. The quantum number which is designated by letters s, p, d, f instead of numbers is
a. n b. l
c. ml d. m

63. Which of the following atom has no neutrons in its nucleus?
a. Helium b. Neon
c. Protium d. Deuterium
e. Tritium

64. Which of the following elements have electronic configuration of $1s^2 2s^2 2p^2$?
a. Chlorine b. Sodium
c. Neon d. Oxygen
e. Carbon

65. The electron is identical with
a. A hydrogen atom
b. A positron
c. A β-ray particle
d. α-ray particle
e. Air gap particle

66. A node is a surface on which the probability of finding an electron is
a. 0 b. > 1
c. > 10 d. > 90

67. Bohr's model of an atom is based on
a. Quantum theory
b. Dalton atomic theory
c. Theory of electrolytic dissociation
d. Law of mass action

68. The statement "orbitals of equivalent energy are filled with electrons before spin pairing occurs" is called
a. Uncertainty principle
b. Paulis exclusion principle
c. Zeeman effect
d. Hund's rule

Answers					
56. d	59. b	62. b	65. d	68. d	
57. a	60. e	63. e	66. b		
58. b	61. d	64. e	67. a		

69. 2s orbital is represented by
a. $n = 2.\ l = 1$ b. $n = 2.\ l = 2$
c. $n = 2.\ l = 0$ d. $n = 0.\ l = 0$

70. Azimuthal quantum no. signifies
a. Size of orbit
b. Shape of orbital
c. Orientation of orbital
d. None

71. Two electrons in helium have different
a. Principal quantum number
b. Azimuthal quantum number
c. Magnetic quantum number
d. Spin quantum number
e. None of the above

72. The maximum number of electrons that can be accommodated in a 'p' orbital is
a. 8 b. 4
c. 6 d. 12
e. 18

73. The number of electrons in an atom of an element is equal to its
a. Atomic weight
b. Atomic number
c. Equivalent weight
d. Electron affinity

74. "The principle that no two electrons can have all the four quantum number identical" was enunciated by
a. Davy b. Rutherford
c. Pauli d. Einstein
e. Seaborg

75. Orbital number of an atom also indicates its possible number of
a. Electrons b. Protons
c. Orbitals d. Neutrons

76. The third orbit of any atom of an element contains
a. 3 electrons only b. 3 protons only
c. 3 neutrons only d. 3 orbitals only

77. An element with atomic number 12 has its valence electrons
a. 2 b. 3
c. 4 d. 5
e. 6

78. Two elements A and B are isotonic having atomic masses 40 and 41, respectively. If atomic number of B is 20, then the atomic number of A is
a. 21 b. 20
c. 19 d. 22
e. 25

79. As the atomic number increases, the ratio of the neutron to proton
a. Increases b. Decreases
c. Remains constant
d. Sometimes increases and sometimes decreases

80. Electronic configuration of an element with atomic number 24 is
a. $1s^2 2s^2 2p^6 3s^2 3d^5 4s^1$
b. $1s^2 2s^2 2p63s^2 3p^6 3d^5 4s^1$
c. $1s^2 2s^2 2p^6 3s^6 3d^4 4s^2$
d. $1s^2 2s^3 2p^5 3p^5 3d^5 4s^1$

81. In the M–shell of element with atomic number 20, there are
a. 2 electrons b. 6 electrons
c. 8 electrons d. 18 electrons
e. 10 electrons

82. The electronic configuration of an atom in the ground state is $1s^2 2s^2 2p^6 3s^2 3p^4$. The atom belongs to the element
a. Mg b. Al
c. Si d. S

Answers					
69. c	72. c	75. c	78. a	81. c	
70. b	73. b	76. d	79. a	82. d	
71. a	74. c	77. a	80. b		

83. The Aufbau principle implies that a new electron occupies an orbital for which of the following?
a. n has a lower value
b. *l* has a lower value
c. The value (n+l) is minimum
d. The value (n+l) is maximum

84. The spectrum of He is expected to be similar to that of
a. H b. Li^+
c. Na d. He^+

85. For a hydrogen atom $E_n = -13.6/n^2$ Ev/atom. Therefore minimum energy that an atom of hydrogen in the ground state can absorb is
a. 13.6 eV b. 10.2 eV
c. 3.4 eV d. 1.5 eV

86. Alpha rays are electrically
a. Positively charged
b. Negatively charged
c. Neutral
d. None

87. Radioactive substances emit
a. Hydrogen
b. Helium
c. Nitrogen
d. α, β & γ-rays

88. Natural radioactivity was discovered by
a. Rutherford
b. Henri Becquerel
c. Madame Curie
d. Schmidt

89. Which of the following has the greatest penetrating power?
a. Alpha rays b. Beta rays
c. Gamma rays d. None

90. In a beta ray change
a. An electron from the extra-nuclear electrons of the atom is given out
b. An electron from the nucleus is given out
c. A proton from the nucleus is given out
d. A neutron from the nucleus is given out

91. When a radioactive substance is subjected to a vacuum, rate of disintegration per second
a. Increases considerably
b. Increases only if the products are gaseous
c. Is not affected
d. Suffers a slight decrease

92. The half life of radium is 1600 years. After how much time it will remain 25% of the present?
a. 8000 years b. 1600 years
c. 3200 years d. 4800 years

93. When the quantum of radioactive substance is increased two times, the number of atoms disintegrating per unit time is
a. Doubled
b. Increased by square of two
c. Increased but not to a great extent
d. Not affected

94. A radioactive atom emits a beta ray (an electron) from
a. Its outermost orbit
b. Its nucleus
c. Its innermost orbit
d. None

95. The emission of beta rays produces an
a. Isotope b. Isobar
c. Isotone d. All

Answers									
	83.	c	86.	a	89.	b	92.	c	95.	b
	84.	b	87.	d	90.	a	93.	a		
	85.	a	88.	b	91.	c	94.	a		

96. Which of the following is the isotone of $_{16}S^{32}$?
a. $_{15}P^{31}$ b. $_{8}O^{16}$
c. $_{17}Cl^{35}$ d. $_{6}C^{12}$

97. Alpha rays are
a. He^+ ions b. He^+ ions
c. He atoms d. Electrons
e. Fast moving electrons

98. Isotope differs in
a. The number of protons
b. The valence electrons
c. The chemical activity
d. The number of neutrons

99. Elements having different nuclear charge but the same atomic mass are called as
a. Isotope b. Isobars
c. Isotone d. Isomers

100. The element which is naturally radioactive is
a. Nitrogen b. Oxygen
c. Phosphorus d. Radium
e. Barium

101. Atomic number and atomic mass of Uranium is 92 and 238. During the course of radioactive disintegration it loses 5 α-particles and 4 β-particles. The atomic number and atomic weight of the new element will be
a. At. no. = 90, at. wt. = 233
b. At. no. = 86, at. wt. = 218
c. At. no. = 82, at. wt. = 218
d. At. no. = 88, at. wt. = 228

102. Atomic weight of thorium is 232 and the atomic number is.90. The end product of its disintegration is an isotope of lead (At. wt. = 208, At. no.= 82). The number of α and β-particles emitted is
a. α = 3; β = 3 b. α = 6, α = 4
c. α = 6; β = 0 d. α = 4; β = 6

103. After 2 hours the amount of a radioactive substance is reduced to 1/16 of its original amount. The half-life of the radioactive substance is
a. 15 minutes b. 30 minutes
c. 45 minutes d. 60 minutes

104. A beta ray change results in the production of
a. An isotope b. An isobar
c. An allotrope d. An isomer

105. The first artificial transmutation of elements was carried out by
a. Madame Curie b. Irene Curie
c. Rutherford d. Soddy

106. Artificial radioactive was discovered by
a. Madame Curie
b. Fermi
c. Irene Curie and Federic Joliot
d. Rutherford

107. If radium and chlorine combines to form radium chloride, the compound is,
a. No longer radioactive
b. Half as radioactive as radium content
c. As radioactive as the radium content
d. Twice as radioactive as the radium content

108. Which of the following statements about radioactivity of an element is incorrect?
a. It is a nuclear property
b. It does not involve any rearrangement of electrons
c. Its rate affected by change in temperature and pressure
d. It remains unaffected by the presence of other element chemically combined with it

Answers									
	96.	a	99.	b	102.	c	105.	a	108.	c
	97.	d	100.	d	103.	b	106.	a		
	98.	d	101.	b	104.	b	107.	c		

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109. Atomic weights of carbon, nitrogen and oxygen are 12, 14 and 16 respectively. An atom of atomic weight 14 and nuclear charge + 6 is an isotope of
a. Oxygen b. Carbon
c. Nitrogen d. None

110. Existence of isotope was first established by
a. E. Rutherford b. F.W. Aston
c. J. Chadwick d. W. Rontgen

111. Other isotope of chlorine will have the same
a. Mass number
b. Atomic number
c. Neutron content d. None

112. An alpha particle consists of
a. Helium atom b. Two protons
c. Two neutrons
d. Two protons and two neutrons

113. The phenomenon of radioactivity is associated with
a. Emission of electrons only
b. Emission of protons only
c. Emission of helium ions
d. Decay of nuclei

114. Compared with an atom of atomic weight 12 and atomic number 6, the atom of atomic weight 13 and atomic number 6
a. Contains more neutrons
b. Contains more electrons
c. Contains more protons
d. Is a different element

115. Isotopes differ in
a. The number of protons
b. The valence number
c. The chemical activity
d. The number of neutrons

116. Which of the following statements is incorrect?
a. Isobars possess the same chemical properties
b. Isotopes occupy the same position in the periodic table
c. In isobars the total number of protons and neutrons in the nucleus is same
d. Isotopes possess same atomic number

117. Isotopes of an element have the same
a. Atomic number
b. Atomic weight
c. Number of neutrons in their nucleus
d. Atomic volume

118. $_{17}Cl^{35}$ and $_{17}Cl^{37}$ are
a. Isotopes b. Isomers
c. Isotones d. Isobars

119. Loss of one α-ray followed by two β-rays from a radio element results in the formation of an
a. Isomer b. Isobar
c. Isotone d. Isotope

120. The nucleus of U^{234} and U^{238} contain
a. The same number of neutrons
b. The same number of protons
c. Different number of protons
d. None

121. Atomic nuclei containing the same number of protons but different number of neutrons are called
a. Isobars b. Isotones
c. Isotopes d. Isomer

122. The emission of a α-ray from an atom of $_{90}Th^{234}$ results in the formation of its
a. Isotope b. Isotone
c. Isobar d. Isomer

Answers					
	109. b	112. a	115. d	118. a	121. c
	110. b	113. d	116. c	119. d	122. c
	111. b	114. a	117. a	120. b	

123. $_{14}S^{30}$, $_{15}P^{31}$, $_{16}S^{32}$ are
a. Isotopes b. Isomers
c. Isotones d. Isobars
e. None of the above

124. If an atom of uranium of mass number 238 and atomic number 92 absorbs a neutron and then breaks up emitting an alpha particle, the mass number of the new element will be
a. 236 b. 234
c. 235 d. Unchanged

125. $_1H^1$, $_1H^2$, H^3 are
a. Isotopes b. Isobars
c. Isotones d. Isomers

126. The group displacement law was given by
a. Bohr b. Rutherford
c. Soddy d. Einstein
e. de Broglie

127. Atomic weight of carbon, nitrogen and oxygen are 12, 14 and 16 respectively. An atom of atomic weight 13 and nuclear charge +6 is an isotope of
a. Oxygen b. Carbon
c. Nitrogen d. None

128. Radium is a radioactive element. Its electronic configuration shows than it has only two electrons in the outermost orbit and 86 electrons in the inner orbits. The atomic weight of radium is 226.07. The number of neutrons present in the radium nucleus will be
a. 140.07 b. 140
c. 138 d. 88

129. The half-life of a radioactive element is 35 years. If there are 4×10^6 nuclei at the start, then after how many years they will be left 0.5×10^6?
a. 35 b. 70
c. 105 d. 140

130. If 4 gm. of a radioactive isotope has half-life of 10 days, the half-life of 2 gm. sample is
a. 10 days b. 20 days
c. 30 days d. 5 days

131. The atomic weight of uranium is 238 while its atomic no. is 92. If it emits 8α and 6β particles, then the new element will have
a. At. wt. 206 and at. no. 82
b. At. wt. 206 and at. no. 76
c. At. wt. 224 and at. no. 80
d. At. wt. 230 and at. no. 90

132. The emission of a α ray produces
a. Isobar b. Isotope
c. Isotone d. Isomer

133. α-rays consist of a stream of
a. H b. He^+ ions
c. Only electrons d. Only neutrons

134. Tritium is an isotope of
a. Tellurium b. Tritanium
c. Tentalum d. Hydrogen

135. A device used for the measurement of radioactivity is a
a. Mass spectrometer
b. Cyclotron
c. Nuclear reactor
d. G. M. counters

136. Which of the following is a radioactive inert gas?
a. Ne b. Ar
c. Rn d. Xe
e. Kr

Answers					
	123. c	126. c	129. c	132. a	135. d
	124. b	127. b	130. a	133. b	136. c
	125. a	128. c	131. a	134. d	

137. If a radioactive wastes must be stored for seven half–lives before disposal
a. How long must $_{15}P^{31}$ (t ½ = 14.3 days) be held?
b. What fraction of $_{15}P^{32}$ originally set aside remains after this time?
Ans.
a. 7 half lives of $_{15}P^{32}$ = 7 × 14.3 days = 100 days
b. Mass remaining = original / 2^7 = 1/128 of the original amount.

138. The temperature at which real gas obeys the ideal gas laws over a wide range of pressure is
a. Critical temperature
b. Boyle temperature
c. Inversion temperature
d. Reduced temperature

139. Introduction of the absolute scale of thermometry is the result of
a. Dalton's Law of partial pressure
b. Graham's Law of diffusion
c. Charles Law
d. Hess's Law

140. An ideal gas is one which obeys all the gas laws under
a. A few selected experimental condition
b. All experimental
c. Low pressure alone
d. High temperature alone

141. What is the total pressure exerted by 1 gm of H_2 and 16 gm. of O_2 mixture in one litre container?
a. 1 atm b. 3 atm
c. 2 atm d. 4 atm

142. In the equation of state of an ideal gas PV = nRT, the value of the universal gas constant would depend only on
a. The nature of the gas
b. The temperature of the gas
c. The pressure of the gas
d. The units of measurement

143. At constant pressure the volume of a given mass of a gas is directly proportional to its absolute temperature, is a statement of
a. Graham's law diffusion
b. Dalton's law of partial pressure
c. Boyle's law
d. Charles law
e. Berzelius hypothesis

144. Charles law deals with the relationship of a gas between
a. Pressure and volume
b. Pressure and temperature
c. Volume and temperature
d. Mass and volume

145. A gas that obeys the gas laws is called
a. A real gas b. An ideal gas
c. A noble gas
d. All the above
e. None of the above

146. Which one of these statements is correct?
a. A lighter gas diffuses the molecules of
b. In a gaseous mixture the molecules of the heavier gas settle downward
c. A real gas deviates from gas laws
d. Dalton's law applies to the mixture of gases that do not react with one another

147. The existence of a gas is vanished at
a. N.T.P
b. At any temperature
c. Absolute zero
d. O° C
e. None of the above

Answers				
	137. a	140. a	143. d	146. b
	138. b	141. a	144. c	147. c
	139. c	142. d	145. b	

148. The volume of a gas at O °C is 273 c.c. Its volume at 1 °C will be
a. { 273 + 1/273 } c.c
b. 273 × 1/273 c.c
c. 274 c.c
d. None

149. The pressure of hydrogen in a flask containing 2.016 gm. of H_2 and 16.0 gm. of oxygen is
a. 1/8 of the total pressure
b. 1/6 of the total pressure
c. 1/4 of the total pressure
d. 2/3 of the total pressure

150. One litre of gas collected at N. T. P. will occupy at 2 atmosphere pressure and 27 °C
a. $1 \times \frac{2}{1} \times \frac{300}{273}$ litres
b. $1 \times \frac{1}{2} \times \frac{300}{273}$ litres
c. $1 \times \frac{2}{1} \times \frac{27}{273}$ litres
d. $1 \times \frac{273}{300}$ litres

151. At what temperature will the volume of a gas at O°C double itself, pressure remaining constant?
a. –546 °C b. 273 °A
c. 546 °C d. 546 °A

152. Hydrogen diffuses five times as rapidly as another gas X. The molecular weight of X should be
a. 19 b. 25
c. 50 d. 100
e. 5

153. A certain gas diffuses four times as oxygen, the molecular weight of the gas is
a. 4 b. 8
c. 16 d. 2

154. The rates of diffusion of hydrogen and deuterium is
a. 1 : 2 b. 1 : $\sqrt{2}$
c. $\sqrt{2}$: 1 d. 4 : 1

155. The rates of the diffusion of carbon dioxide and sulphur dioxide are in the ratio
a. 11 : 4 b. 11 : 2
c. v11 : 4 d. 4 : v11

156. The relatives rate of diffusion of a gas (mol. wt. = 98) as compared to hydrogen will be
a. 1/7 b. 1/5
c. 1/3 d. 1
e. 1/2

157. The atomic weight of a metal is 40 and if valence is 2, the equivalent weight will be
a. 10 b. 20
c. 30 d. 40
e. 60

158. The oxide of an element possesses the formula M_2O_3. If the equivalent weight of the metal is 6, then atomic weight of the metal will be
a. 6 b. 12
c. 18 d. 24
e. 30

159. The formula of a metal chloride is MCl_3 and it contains 20.2% of the metal M. The atomic weight of M is about
a. 27 b. 54
c. 60 d. 350
e. 81

Answers				
	148. c	151. d	154. c	157. b
	149. d	152. c	155. d	158. c
	150. b	153. d	156. a	159. a

160. The equivalent weight of element is 8 and its valence is 2. Its atomic weight is
a. 4 b. 16
c. 8 d. 24
e. 32

161. Atomic weight of iron is 5. Its equivalent weight in $FeCl_3$ is
a. 56 b. 28
c. 162.5 d. 168
e. 18.667

162. The oxide of a metal contains 40% oxygen and the valence of the metal is 2. The atomic weight of the metal is
a. 12 b. 24
c. 36 d. 48
e. 60

163. An element X has a valence 2. It is found that 1.4 g. of X displace all the hydrogen from 2.45 g. of sulphuric acid. The atomic weight of X is
a. 28 b. 14
c. 56 d. 70
e. 84

164. When the same electric current is passed through the solution of different electrolytes in series, the amounts of elements deposited on the electrodes are in the ratio of their
a. Atomic numbers
b. Atomic weight
c. Specific gravities
d. Equivalent weights

165. An electrolyte
a. Gives ions only when dissolved in water
b. Gives ions only when electric current is passed
c. Has ion even in the solid state
d. Does not give complex ions in solution

166. In electrolysis of a fused salt, the weight of the deposit on an electrode will not depend on
a. Temperature of the bath
b. Current intensity
c. Electro–chemical equivalent of ions
d. Time for electrolysis

167. The amount of an ion discharged during electrolysis is not directly proportional to
a. Resistance
b. Time
c. Current
d. Chemical equivalent

168. One equivalent of copper is deposited on the cathode when the quantum of electricity passed through the solution is
a. One kilowatt b. 9650 coulomb
c. 96000 coulomb d. 96500 coulomb
e. 9600 coulomb

169. Which of the following is an ionic compound?
a. Alcohol
b. Hydrogen chloride
c. Sugar
d. $NaNO_3$

170. The addition of a polar covalent to a solid results in
a. Polarization
b. Association
c. Ionization
d. Electron transfer

171. The sodium chloride crystal is made up of
a. NaCl molecules
b. Na^+ and Cl^- ions
c. Na and Cl atoms
d. Free radicals

Answers				
	160. b	163. c	166. a	169. d
	161. e	164. d	167. a	170. c
	162. b	165. c	168. d	171. b

172. Which of the following is true for both strongly acidic and strongly alkaline solutions?
a. Turns blue litmus red
b. Tastes sour
c. Is a very good conductor of electricity
d. Reacts with magnesium to liberate hydrogen

173. The substance which conducts electricity with decomposition is known as
a. Conductor b. Insulator
c. Electrolyte
d. Polar compound
e. None of the above

174. In electrolysis the process occurring at the cathode is called
a. Oxidation b. Reduction
c. Deposition d. Dissociation
e. Precipitation

175. In electrolysis the reaction at the anode is called
a. Ionization b. Oxidation
c. Reduction d. Dissociation

176. Which one of the following substances would behave differently than the other three when electric current is passed through their solutions in water?
a. Washing soda b. Alum
c. Sugar d. Common salt

177. The normality of 0.5 M-H_3PO_4 solution will be
a. 1.0 b. 1.5
c. 2.0 d. 3.0

178. 100 ml. of 0.2 M–H_2SO_4 is added to 100 ml. of 0.2 M–NaOH. The resulting solution will be
a. Acidic b. Basic
c. Neutral d. Slightly basic
e. None of the above

179. What is the weight of sodium hydroxide required to neutralize 100 ml. of 0.1N HCl?
a. 4.0 g b. 0.04 g
c. 0.4 g d. 2.0 g
e. 0.2 g

180. 100 ml. of 0.1N HCl is treated with excess of $AgNO_3$. The weight of AgCl precipitated is ($HCl + AgNO_3 \rightarrow AgCl$)
a. 1.435 g b. 14.35 g
c. 7.175 g d. 3.65 g

181. One mole of sulphuric acid will be exactly neutralized by
a. One mole of ammonia
b. One mole of barium hydroxide
c. Two moles of calcium hydroxide
d. Two moles of barium hydroxide
e. None of the above

182. 10 ml. of (N) HCl reacts with 0.12 gram of magnesium. The equivalent weight of magnesium is
a. 8 b. 10
c. 12 d. 14
e. 124

183. In a reaction if ?H is negative, then
a. Heat is absorbed
b. Heat is liberated
c. Heat change is zero
d. None

184. Decomposition of HCl as $2HCl \rightarrow H_2 + Cl_2$ is an example of
a. Photo–chemical reaction
b. Nuclear reaction
c. Exothermic reaction
d. Endothermic reaction

Answers					
	172. c	175. b	178. a	181. b	184. c
	173. c	176. c	179. c	182. c	
	174. b	177. c	180. a	183. b	

185. When water is poured on quick lime the reaction which takes place is
a. Exothermic
b. Neither exothermic nor endothermic
c. Endothermic
d. Explosive

186. An endothermic reaction is one at which
a. Heat is converted into electricity
b. Heat is absorbed
c. Heat is given out
d. Heat is converted into mechanical work

187. Which of following is an endothermic reaction?
a. $2H_2 + O_2 \rightarrow 2H_2O$
b. $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$
c. $N_2+ + O_2 \rightarrow 2NO$
d. $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$

188. The reaction of sodium piece with water is
a. Reversible b. Exothermic
c. Endothermic d. None

189. The heat of combustion of rhombic sulphur and plastic sulphur are 70.960 cals and 71.03 cals respectively. The heat of transition of rhombic to plastic sulphur will be
a. 141990 cals b. 70 cals
c. 70960 cals d. – 70 cals

190. In the reaction $C(s) + O_2(g) = CO_2(g) \rightarrow H = -393.5$ k J mol^{-1}
a. Enthalpy (or heat content) of the product is greater than the enthalpy of the reactants
b. Enthalpy of the product is less than the enthalpy of the reactants
c. Enthalpy of the product is equal to the enthalpy of the reactants
d. Enthalpy of the product is half of that of the reactants

191. Which of the following is the endothermic reaction?
a. Burning of carbon
b. Neutralization of strong acid and strong base
c. KCl is added to water
d. $MgSO_4$ is added to water

192. In heat of combustion
a. ΔH is zero
b. ΔH is negative
c. ΔH is positive d. None

193. The heat content of a system is called
a. Enthalpy b. Entropy
c. Free energy d. Internal energy

194. The calorific value is highest in
a. Protein b. Fats
c. Carbohydrates d. Fruits

195. In a gaseous reaction, $N_2 (g) + O_2 = 2NO (g)$ + heat, if pressure is increased, then the a. Equilibrium constant would be
b. Decreased
c. Increased
d. Unchanged
e. Sometimes increased, sometimes decreased

196. Le-chatelier's principle is applicable only to a
a. System in equilibrium
b. System not in equilibrium
c. Homogeneous reaction
d. Heterogeneous reaction

Answers				
	185. a	188. b	191. c	194. b
	186. b	189. d	192. b	195. c
	187. b	190. b	193. a	196. a

197. For the equilibrium, $2NO_2 (g) = N_2O_4 (g)$ + 14.6 K Cal., increase of temperature could
a. Favour formation of N_2O_4
b. Favour decomposition of N_2O_4
c. Not effect the equilibrium
d. Stop the reaction

198. The unit of rate constant of a zero order reaction is
a. Lit sec^{-1} b. Lit $mol^{-1} sec^{-1}$
c. Lit^{-1} mol sec^{-1} d. Mol sec^{-1}

199. The total number of molecules or atoms whose concentration determines the rate of a reaction is called
a. Molecularity
b. Normality
c. Molality
d. Order of reaction

200. The inversion in cane sugar is
a. Zero order reaction
b. First order reaction
c. Second order reaction
d. Third order reaction

201. The rate constant for second order reaction is
a. Mol^{-1} lit sec^{-1}
b. Litre mol
c. Lit^{-1} mol^{-1} sec^{-1}
d. Lit^{-1} mol^{-1}

202. The factor which affects the rate of reaction is
a. Pressure b. Temperature
c. Concentration d. Catalyst
e. All the above

203. Molarity is expressed as
a. Gram/Litre b. Moles/litre
c. Litre/mole d. Moles/1000 gm

204. The pH of a solution is defined by the expression
a. log $[H^+]$ b. $-\log 1/ [H^+]$
c. log $1/ [H^+]$ d. $1/ \log [H^+]$

205. In a solution the hydrogen ion exists as
a. A proton
b. Either H^+ or H^-
c. A hydrated, H_3O^+
d. H^+ surrounded by several water molecules

206. As the pH value of a solution decreases from 7 towards zero, the solution becomes progressively more
a. Acidic b. Neutral
c. Alkaline d. Dilute

207. The pH of 0.1 M acetic acid is
a. Less than 1 b. One
c. Greater than 1 d. Seven

208. The pH of a 10^{-8} molar solution of HCl in water is
a. 1
b. Between 7 and 8
c. –8
d. Between 6 and 7

209. Addition of solid KCN to water cause
a. An increase in pH
b. Decrease in pH
c. No change in pH
d. None

210. Which of the following is correct?
a. pH + pOH = 14
b. pH × pOH = 14
c. pH – pOH = 14
d. pH/pOH = 14

Answers					
	197. b	200. b	203. b	206. a	209. a
	198. c	201. a	204. b	207. b	210. a
	199. d	202. e	205. b	208. d	

211. The pH of a solution is 5.0. Sufficient acid is added to the solution to decrease the pH to 2.0. The increase in hydrogen ion concentration is
a. 3 times b. 100 times
c. 10 times d. 1000 times

212. At 90 °C, pure water has $[H_3O^+]= 10^{-6}$ mole lit^{-1}. The value of Kw at 90 °C is
a. 10^{-6} b. 10^{-12}
c. 10^{-8} d. 10^{-14}

213. A buffer solution containing
a. A weak acid and one of it salts
b. A weak base and one of its salts
c. Either a weak acid and its salts with a strong base, or a weak base and its salt with a strong acid
d. The salt of a weak acid and weak base

214. An acidic buffer solution can be prepared by mixing solutions of
a. Sodium acetate and acetic acid
b. Ammonium chloride and ammonium hydroxide
c. Sulphuric acid and sod sulphate
d. Sodium chloride and sodium acetate

215. Which one of the following has the highest pH?
a. Distilled water
b. 1 M–NH_3
c. 1 M–NaOH
d. Water saturated with chlorine

216. CH_3COONH_4 is dissolved in water of pH = 7, the pH of the solution will be approximately
a. 3 b. 13
c. 7 d. 10

217. According to Avogadro's hypothesis, under similar condition of temperature and pressure equal volumes of all gases contain
a. Equal number of atoms
b. Equal number of molecules
c. Equal number of charge atoms
d. Equal number of neutrons.

218. The number of molecules present in one gram molecules of a gas is known as
a. The atomic number
b. Molecules weight
c. Avogadro's number
d. Gold number

219. The relationship between moleculus weight and vapour density is
a. Mol. wt. = 4 V.D
b. Mol. wt. = 2 V.D
c. Mol. wt. = V.D/2
d. Mol. wt. = V.D/4

220. The volume of 10 grams of hydrogen at N.T.P. is
a. 0.5 litre b. 112 litres
c. 11.2 litres d. 1.12 litres

221. The volume of 16 grams of oxygen at N.T.P. is
a. 16 litres b. 10 litres
c. 11.2 litres d. 32 litres

222. The weight of 224 c.c oxygen at N.T.P. on liquefaction is
a. 0.16 gm b. 0.32 gm
c. 0.64 gm d. 0.48 gm

223. Vapour density of a mixture containing 4 volumes of nitrogen and volume of oxygen is
a. 14 b. 36
c. 14.5 d. 16
e. 20

Answers					
	211. d	214. a	217. b	220. b	223. c
	212. c	215. c	218. c	221. c	
	213. c	216. c	219. b	222. b	

224. One litre of oxygen gas at N.T.P. will weigh
a. 1.43 gms b. 22.4 gms
c. 11.2 gms d. 20.4 gms

225. The volume of 20 gms. of hydrogen gas at S.T.P. is
a. 224 litres b. 22.4 litres
c. 2.24 litres d. 112 litres

226. A gaseous mixture contains oxygen and nitrogen in the ratio of 1: 4 by weight therefore the ratio of their no. molecules is
a. 1 : 4 b. 2 : 7
c. 7 : 32 d. 3 : 26

227. 2 gms. of H_2 occupies 10 litres at S.T.P., then 16 gms of oxygen will occupy
a. 5 litres b. 10 litres
c. 80 litres d. 160 litres

228. What is the volume occupied by 14 gms of nitrogen at N.T.P.?
a. 22.4 litres b. 11.2 litres
c. 44.8 litres d. 33.6 litres
e. 2.24 litres

229. 22 gms. of CO_2 at N.T.P. will occupy how many litres?
a. 11.2 litres b. 22.4 litres
c. 44.3 litres d. 2.24 litres
e. 4.48 litres

230. If 28 gm. of nitrogen occupies 22.4 litres at N.T.P., 2 gms. of hydrogen will occupy at N.T.P.
a. 5.6 litres b. 11.2 litres
c. 22.4 litres d. 33.6 litres
e. 1.6 litres

231. Gram molecular volume of gas at N.T.P. is
a. 1 litre b. 11.2 litres
c. 22.4 litres d. 22.40 litres
e. 112 litres

232. The element with atomic number 19 belongs to
a. 2nd period b. 3rd period
c. 4th period d. 5th period

233. In the fifth period of the periodic table, there are
a. 2 elements b. 8 elements
c. 18 elements d. 32 elements
e. 50 elements

234. In the fourth period of the periodic table, there are
a. 2 elements b. 8 elements
c. 18 elements d. 32 elements
e. 50 elements

235. There are a few sets of elements given to you. Find out the set which belongs to alkaline metal group.
a. Z (at. no)=2,8,18
b. Z = 3, 11, 19
c. Z = 4, 12, 20
d. None

236. Which of the following elements is kept in water?
a. Carbon b. Sodium
c. White phosphorus d. Chlorine

237. Which of the following is a metalloid?
a. Arsenic b. Gold
c. Copper d. Zinc
e. Sodium

238. Which of the following oxides is only basic in nature?
a. Na_2O b. ZnO
c. CO_2 d. NO

Answers					
	224. a	227. a	230. c	233. b	236. d
	225. b	228. b	231. c	234. c	237. d
	226. c	229. a	232. b	235. c	238. a

239. In the following reaction, $2SO_2$ (g) + O_2 (g) = $2SO_3$ (g) + Q cals., the yield of SO_2 is favoured by
a. Increasing both pressure and temperature
b. Increasing pressure and decreasing temperature
c. Decreasing pressure and increasing temperature
d. Decreasing both temperature and pressure

240. Which of the following will have lowest ionization energy?
a. Neon b. Potassium
c. Calcium d. Magnesium

241. Group number of an element represents the valence respect to
a. Hydrogen b. Oxygen
c. Carbon d. Chlorine
e. Nitrogen

242. The elements with atomic number 58.71 belong to
a. 3rd period and III B Group
b. 4th period and IV B Group
c. 4th period and III B Group
d. 5th period and III B Group
e. 6th period and III B Group

243. Which of the following is a metalloid?
a. Al b. As
c. Ag d. Hg
e. Sn

244. Which of the following oxides behaves differently than the rest?
a. MgO b. Na_2O
c. ZnO d. K_2O
e. FeO

245. Which one of the following is the characteristic property of an element?
a. Atomic weight
b. Atomic number
c. Specific heat
d. Density

246. Elements in the same vertical group of the periodic table have generally the same
a. Atomic number
b. Electronic configuration
c. Number of isotopes
d. Number of electrons in the outer-most shell of their atoms

247. Which of the following statements is false? Elements in the first vertical column of the periodic table
a. Are called alkaline metals
b. Have mobile electrons
c. Have one electron less than the noble gas configuration
d. React vigorously with chlorine

248. The element with atomic number 10 is likely to have similar properties with the element with atomic number of
a. 9 b. 11
c. 16 d. 18
e. 28

249. Diagonal relationship is shown
a. By first few elements of 2nd period only
b. By the elements of 3rd period only
c. By the transition elements only
d. By the alkali metals only

250. Group number of an element represents the valence with respect to
a. Hydrogen b. Oxygen
c. Carbon d. Helium

Answers				
	239. b	242. c	245. b	248. d
	240. a	243. b	246. d	249. a
	241. d	244. c	247. c	250. b

251. Element X is in group IA of the periodic table. It is likely to be
a. A very reactive non-metal
b. An element which forms X^- ions
c. A light soft metal with a low melting point
d. A dense soft metal with a high melting point

252. Most of the man-made (synthetic. elements occur
a. In the actinide series
b. In the lanthanide series
c. Among the metalloids
d. Among the non-metals

253. The most electronegative element in the periodic table is
a. Chlorine b. Sodium
c. Cesium d. Fluorine

254. Electro negativity is a measure of the ability of an atom to
a. Repel electrons
b. Attract electrons
c. Share electrons with another atom
d. Combine with protons

255. An element has the configuration $1s^2$, $2s^2$, $2p^6$, $3s^2$, $3p^2$. To which block in the long form of the periodic table does it belong?
a. s-block b. p-block
c. d-block d. f-block

256. The element with atomic number 58 to 71 is known as
a. Alkali metals
b. Transition elements
c. Lanthanides
d. Actinides

257. Compared to the first ionization potential of an atom the second is
a. The same b. Greater
c. Smaller d. Negligible

258. In outer-transition elements, the electrons are added in
a. s-sub-shell b. p-sub-shell
c. d-sub-shell d. f-sub-shell

259. Ionization potential is the lowest for the
a. Inert gases
b. Halogens
c. Alkaline earth metals
d. Alkali metal

260. In the long form of the periodic table the most electro-positive elements occupy
a. Top left position
b. Top right position
c. Bottom right position
d. Bottom left position

261. The elements are classified in the Mendeleeff's periodic table according to
a. Ascending molecular weight
b. Ascending atomic number
c. Ascending atomic weight
d. Increase in valence
e. None of the above

262. An element belongs to group VIII, the number of electrons in its valence shell is
a. 1 b. 2
c. 4 d. 7
e. 8

263. Which of the following elements will have high ionization energy?
a. Neon b. Potassium
c. Calcium d. Magnesium

Answers					
	251. c	254. b	257. b	260. d	263. a
	252. a	255. b	258. c	261. c	
	253. d	256. c	259. d	262. d	

264. In the sixth period of Mendeleeff's periodic table, fourteen elements are placed in the third group, they are known as
a. Alkali metals
b. Alkaline earth metals
c. Rare gases
d. Rare earths

265. The element with atomic number 6 is likely to have same property as element with atomic number of
a. 10
b. 11
c. 14
d. 16
e. 18

266. Which of the following metals is a liquid at R. T. P.?
a. Ag
b. Hg
c. Al
d. Fe
e. Mg

267. Which of the following non–metals sublimes at room temperature?
a. C
b. P
c. I
d. Cl
e. S

268. Which of the following elements forms a solid acidic oxide at R. T. P.?
a. Na
b. K
c. Mg
d. C
e. P

269. Select from the following list of atomic numbers of the elements which belong to the first group.
a. 3, 18, 32
b. 12, 16, 18
c. 11, 19, 37, 55
d. 5, 10, 15, 20

270. Variable valence is shown by
a. Metallic elements
b. Normal elements
c. Transitional elements
d. Non–metallic elements

271. The zero group contains
a. Inert elements
b. Alkaline earths
c. Rare earths
d. Transitional elements

272. Which one is the inert element?
a. Na
b. Ba
c. He
d. F

273. The metalloid is
a. Na
b. Ag
c. Ni
d. As
e. Au

274. Which element has the highest electronegativity?
a. Mg
b. Fe
c. F
d. Na

275. Diagonal relationship is the relationship between
a. Some elements of the second and third short periods
b. Elements of the zero group
c. Some elements of transitional series
d. Elements of group IA and IB

276. The only element that is radioactive among the alkali metals is
a. Cesium
b. Rubidium
c. Francium
d. Lithium
e. Sodium

277. Which of the following statements is false? The elements in the first vertical table
a. Are called alkali metals
b. React with halogens
c. Have one electron less than the inert gases
d. Are highly electropositive

Answers					
	264. d	267. c	270. c	273. d	276. c
	265. c	268. e	271. a	274. c	277. c
	266. b	269. c	272. c	275. a	

278. Aluminium is
a. An alkali metal
b. An alkaline earth metal
c. An amphoteric metal
d. A halogen
e. A transitional element

279. Which of the following sets of element belong to some group of the periodic table?
a. Z (at. no) = 5, 15, 20
b. Z (at. no) = 6, 14, 23
c. Z (at. no) = 7, 15, 33
d. Z (at. no) = 7, 15, 34

280. Which of the following statements about the alkali metals is incorrect?
a. They are very reactive
b. They are s–block elements
c. They react with chlorine vigorously
d. They have one electron more than inert gases
e. They have one electron less than inert gases

281. The most electronegative element in the periodic table is
a. Chlorine
b. Sodium
c. Cesium
d. Fluorine
e. Potassium

282. Which of the following is an acidic oxide?
a. N_2O
b. NO
c. SO_3
d. Na_2O

283. Which of the following oxides reacts with acid and alkali both?
a. NO_2
b. CO_2
c. ZnO
d. SO_2
e. MnO_2

284. Which of the following metal is a coinage metal?
a. Cu
b. Al
c. Zn
d. Fe

285. Which of the following is an amphoteric metal?
a. Mg
b. Zn
c. Fe
d. K

286. The law of triad was given by
a. Dobereiner
b. Prout
c. Newland
d. Mendeleeff
e. Moseley

287. The number of group in the form of the periodic table is
a. 8
b. 9
c. 12
d. 16
e. 18

288. Lanthanides are
a. *s*–block
b. *p*–block
c. *d*–block
d. *f*–block

289. In the sixth period of the periodic table, there are
a. 8 elements
b. 18 elements
c. 32 elements
d. 48 elements

290. "When the elements are arranged in the order of increasing atomic weight every succeeding 8th element has properties similar to those of the first," This is called
a. Dobereiner Triad
b. Newland's Law of Octaves
c. Mendeleeff's periodic
d. New periodic law
e. All the above

291. Which of the following elements has the lowest ionization potential?
a. F
b. Cl
c. Br
d. I

Answers					
	278. c	281. d	284. a	287. d	290. b
	279. c	282. c	285. c	288. d	291. d
	280. e	283. c	286. a	289. c	

292. Variable valence is exhibited by
a. Transition element
b. Normal element
c. Metallic element
d. Non–metallic elements
e. Typical elements

293. Which of the following is a transitional element?
a. Cl, Br, I
b. Ca, Ba, Sr
c. Fe, Co, Ni
d H, O, N

294. Diagonal relationship is known by
a. Li and Na
b. Li and Mg
c. Be and Hg
d. B and Hg
e. Zn and Cd

295. The alkaline earth metals are
a. Cl, Br, I
b. Zn, Cd, Hg
c. Ca, Sr, Ba
d. Na, K, Rb

296. Select from the following list of those elements which belong to the zero group.
a. Z (atomic number) = 4, 12, 31
b. Z = 12, 15, 28
c. Z = 10, 18, 36
d. Z = 5, 10, 15

297. The zero group element of the periodic table contains
a. Transition elements
b. Inert elements
c. Rare earths
d. Halogens
e. Metalloid

298. Which of the following is a p–block element?
a. Na
b. Mg
c. Al
d. Ca
e. Ba

299. Which of the alkali metal does not occur appreciably in nature?
a. Li
b. Na
c. K
d. Rb
e. Fr

300. Which of the following pair of element suggests anomaly in Mendeleeff's periodic table?
a. Be, B
b. Te, I
c. Fe, Ni
d. Cu, Zn
e. Ca, Ba

301. The number of naturally occurring elements is
a. 83
b. 92
c. 103
d. 104
e 105

302. In the sixth period of Mendeleeff's periodic table fourteen elements are placed in the third group, they are known as
a. Alkali metals
b. Alkaline earth metals
c. Rare gases
d. Rare earths
e. Typical element

303. As the atomic number of the elements in a group increases, generally
a. Their I. P. increases
b. Their I. P. decreases
c. Their atomic size decreases
d. Their electron affinity increases
e. Their electro negativity increases

304. The transitional elements are known as
a. s-block elements
b. p-block elements
c. d-block elements
d. f-block elements

Answers					
	292. a	295. c	298. c	301. b	304. c
	293. c	296. c	299. e	302. d	
	294. b	297. b	300. b	303. b	

305. The element with atomic number 47 belongs to
a. 1st group and 3rd period
b. 2nd group and 3rd period
c. 3rd period and 3rd group
d. 4th period and 1st group
e. 5th period and 1st group

306. The oxide of an element X is represented by X_2O_7. The hydride of the element will be represented by
a. HX
b. H_7X
c. H_4X
d. H_5X
e. H_3X

307. The elements are classified in the periodic table according to
a. Atomic weight
b. Increase in valence
c. Atomic number
d. Electronegativity

308. With respect to chlorine, hydrogen will be
a. Electropositive
b. Electronegative
c. Neutral
d. None

309. The third period begins with
a. Sodium and ends with neon
b. Lithium and ends with argon
c. Sodium and ends with argon
d. Hydrogen and ends with helium

310. Which of the following periods contains 18 elements?
a. Third and fourth
b. Fourth and fifth
c. Fifth and sixth
d. Third, fourth and fifth

311. On moving horizontally across a period
a. Metallic character increases
b. Electronegativity decreases
c. Ionization potential generally increases
d. Size of the atoms increases

312. On descending a vertical group
a. Ionization potential increases
b. Size of the atoms decreases
c. All the atoms have the, same no. of valence electrons
d. Electro negativity remains constant

313. In the periodic table, with the increase in atomic number of elements in a period the ionization energy
a. Generally increases
b. Decreases
c. First increases then decreases
d. First decreases then increases

314. Which of the following elements has the lowest first ionization energy?
a. Na
b. F
c. I
d. Cs

315. Which of the following can accept electron?
a. Na
b. K
c. H
d. Li

316. Which of the following is the biggest atom?
a. F
b. Cl
c. Br
d. I

317. Which may exhibit a basic character?
a. F
b. Cl
c. Br
d. I

318. Which is the most acidic?
a. Al_2O_3
b. Na_2O
c. MgO
d. CaO

319. Which one of the following compounds is the least ionic?
a. KCl
b. $AgCl_2$
c. $BaCl_2$
d. $CaCl_2$

Answers					
	305. e	308. a	311. c	314. d	317. d
	306. a	309. c	312. c	315. c	318. a
	307. c	310. b	313. a	316. d	319. b

320. Which is the best reducing agent?
a. F^- b. Cl^-
c. Br^- d. I^-

321. Which of the following properties would you not expect copper (Cu) to exhibit?
a. High thermal conductivity
b. Low thermal conductivity
c. Ductility
d. Malleability

322. Out of the following one does not exist. The non–existent compound is
a. PH_4I b. As_2O_3
c. $SbCl_2$ d. AsH_3

323. Which of the following is correct?
a. 1st I. P. of Mg is greater than 1st I. P. of Na
b. 2nd I. P. of Mg is greater than 2nd I. P. of Na
c. 1st I. P. of Mg is equal to 1st I. P. of Na
d. None of the above

324. Platinum, palladium, iridium, etc. are called noble metals because
a. Alfred Nobel discovered them
b. They are inert towards many common reagents
c. They are shining, lustrous and pleasing to look at
d. They are found in native state

325. The lightest metal is
a. Li b. Mg
c. Ca d. Na

326. The heaviest atom amongst the following is
a. Na b. Ra
c. Pb d. Hg

327. The noble gas forming the maximum number of compound is
a. Ne b. Xe
c. He d. Ar

328. Among the fluorides listed below the one which does not exist is
a. CF_4 b. SF_4
c. HeF_4 d. XeF_4

329. The strongest base among the following is
a. $Mg(OH)_2$ b. $Ca(OH)_2$
c. $Sr(OH)_2$ d. $Ba(OH)_2$

330. Which of the following would be expected to form ionic solution in water?
a. CCl_4 b. O_2
c. NaBr d. $CHBr_2$

331. A substance has its molecular weight of 342. The molarity of a solution containing 6.84 g. of a substance in 200 ml. of solution is
a. 0.1 M b. 0.2 M
c. 0.3 M d. 0.4 M

332. One gram equivalent of potassium hydroxide is 56 g. Therefore, weight of KOH present in 500 ml of decinormal solution is
a. 5.6 g b. 2.8 g
c. 28 g d. 11.2 g

333. 100 ml. 0.3 M solution of NaOH was mixed with 200 ml. of 0.3 M–H_2SO_4 solution. The normality of H_2SO_4 in the resulting solution is
a. 0.9 N b. 0.3 N
c. 0.6 O d. 0.4 N
e. 3.45 N

Answers					
	320. d	323. a	326. d	329. d	332. b
	321. b	324. b	327. b	330. c	333. e
	322. c	325. a	328. c	331. a	

334. How much N/5 HCl solution would be required to neutralize 2 gms. of $CaCO_3$ (Ca = 40, C = 12)
a. 100 ml b. 200 ml
c. 50 ml d. 90 ml
e. 25 ml

335. 5.3 gm. of pure and anhydrous sodium carbonate reacts with 100 c. c. N/10 HCl. After the reaction is over
a. Excess of HCl is left
b. Unreacted sodium carbonate is left
c. Neither of HCl nor sodium carbonate is left
d. None of the above

336. The normality of 73% HCl (density 1.2) by weight would be
a. 12 b. 18
c. 24 d. 36
e. 48

337. When 10 ml. of 1 M–KOH solution is mixed with 10 ml. of M–H_2SO_4 solution, the resulting mixture will be
a. Acidic b. Alkaline
c. Neutral
d. Strongly alkaline
e. None of the above

338. 0.45 g of a dibasic acid required 200 ml of N/20 NaOH solution for neutralization. The molecular weight of the dibasic acid is
a. 45 b. 60
c. 70 d. 80
e. 90

339. 0.84 g of metal carbonate reacts exactly with 40 ml of N/2 H_2SO_4 solution. The equivalent weight of the metal carbonate is
a. 21 b. 30
c. 40 d. 42
e. 60

340. The amount of HCl required to neutralize 20 ml. of 0.5 N-NaOH is
a. 20 ml. of 1.0 N-HCl
b. 10 ml. of 1.0 N-HCl
c. 40 ml. of 0.5 N-HCl
d. 40 ml. of 0.1 N-HCl
e. None of the above

341. How much water should be added to 100 c. c. of semi–normal HCl solution to make it decinormal?
a. 100 c. c. b 500 c. c.
c. 300 c. c. d. 400 c. c.

342. 2 N-NaOH solution means that
a. 2 gm. of NaOH is dissolved in 100 c. c. of water
b. 2 gm. of NaOH is dissolved in 100 c. c. of solution
c. 8 gm. of NaOH is dissolved in 100 c. c. of water
d. 8 gm. of NaOH is dissolved in 100 c. c. of solution

343. 25 ml. of HCl liberates 10 ml. of CO_2 at N. T. P., when treated with excess of $CaCO_3$. The normality of HCl is
a. 0.03 b. 0.04
c. 0.0357 d. 0.057
e. 0.05

344. 1.0 g. piece of metal was allowed to react with 25 ml. of 4 N–HCl. When the reaction was over 100 mg. of the metal remained unreacted. The equivalent weight of the metal is
a. 9 b. 12
c. 18 d. 24
e. 30

Answers					
	334. b	337. a	340. d	343. c	
	335. b	338. e	341. d	344. a	
	336. c	339. d	342. d		

345. A sample of $Na_2CO_3.H_2O$ washing 0.62gm is added to 100 ml. of 0.1 N–H_2SO_4 solutions. The resulting solution is
a. Acidic b. Basic
c. Neutral d. Slightly acidic
e. Slightly basic

346. The normality of a 26% wt./vol. solution of ammonia (density – 0.855) is approximately
a. 1.5 b. 4.0
c. 0.4 d. 15.3

347. 4 gms. of solid NaOH (mol. wt. = 40) were dissolved in water and the solution was made to 1000 c.c. the whole of this will neutralize completely
a. 100 c.c. of M–H_2SO_4
b. 50 c.c. of 10 M–H_2SO_4
c. 20 c.c. of 2.5 M–H_2SO_4
d. 30 c.c. of 5 M–H_2SO_4

348. The volume of water which must be added to 40 ml. of 0.25 N oxalic acid solution in order to make it exactly decinormal is
a. 40 ml b. 30 ml
c. 20 ml d. 25 ml
e. 60 ml

349. 25 ml. of N-solution of an acid was diluted to 250 ml. 10 ml. of the solution was titrated with 0.05 N alkali solution. The volume of alkali solution required for complete neutralization would be
a. 100 ml b. 20 ml
c. 5 ml d. 10 ml

350. What is the normality 7.3% (wt./vol) hydrochloric acid solution (mol. wt. of HCl = 36.5)?
a. 1.5 b. 3.0
c. 4.0 d. 2.0
e. 1.9

351. 1 g. of the carbonate of a metal was dissolved in 25 ml. of N–HCl. The resulting liquid required 5 ml. of N–NaOH for neutralization. The equivelent of metal carbonate is
a. 5 b. 30
c. 20 d. 40
e. 90

352. 1 g. of a mixture of calcium carbonate and sodium chloride reacts completely with 1000 c.c. N/10 HCl. The percentage of $CaCO_3$ in the mixture is
a. 40% b. 50%
c. 60% d. 80%
e. 90%

353. If 200 c.c. of N/10 were added to 1 gm. of calcium carbonate, what would remain after the reaction?
a. $CaCO_3$ b. HCl
c. Neither of the above two
d. Part of the both
e. 100 c.c. N/10 HCl

354. An example of a reversible reaction is
a. $Pb(NO_3)_2$ (aq) + 2*NaI* (aq) = PbI_2 (s) + $2NaNO_3$ (aq)
b. *AgNO* (s) + *HCl* (aq) = *AgCl* (s) + $NaNO_3$ (aq)
c. 2*Na* (s) + H_2O (l) = 2*NaOH* (aq) + O_2(g)
d. KNO_2 (aq) + *NaCl* (aq) = *KCl* (aq) + $NaNO_2$ (aq)

355. A catalyst is a substance which
a. Increases equilibrium concentration of the products.
b. Changes the equilibrium constant of the reaction.
c. Shorten the time to reach equilibrium.
d. Supplies energy to the reaction.

Answers				
	345. c	348. e	351. a	354. d
	346. d	349. b	352. b	355. c
	347. c	350. d	353. c	

356. The favourable conditions for maximum yield by Haber's process are
a. High pressure, high temperature and high concentration of the reactants.
b. Low pressure, low temperature and low concentration of the reactants.
c. Low temperature, high pressure and high concentration of hydrogen.
d. All the above

357. In the synthesis of NH_3 by Haber's process, increase in pressure at equilibrium
a. Increases the yield of NH_3
b. Reduces the yield of ammonia
c. Has no effect on the yield of NH_3
d. Converts the reactants and products into liquids

358. In the reaction $N_2 + 3H_2 \rightarrow 2NH_3 + 24$ Kcals. The theoretical conditions which are most favourable for the production of NH_3 are
a. High temperature and high pressure
b. Low temperature and high pressure
c. High temperature and low pressure
d. All the above

359. According to Le-Chatelier's principle, application of high pressure to the reaction $PCl_5 \rightarrow PCl_3 + Cl_2$ will favour the formation of
a. Products b. Reactions
c. Both a and b d. None

360. According to Le–Chaterlier's principle, application of high pressure to the reaction $H_2 + I_2 \rightarrow 2HI$ will favour the formation of
a. Reactants b. Products
c. Both a and b d. None

361. According to Le–Chaterlier's principle the application of high pressure to the reaction $N_2 + 3H_2 \rightarrow 2NH_3$ at equilibrium will favour the formation of
a. Reactants b. Product
c. Both a and b d. None

362. The catalyst used in the manufacture of NH_3 by Haber's process is
a. Mg b. Pt
c. Fe d. Mo

363. A catalyst
a. Changes equilibrium
b. Causes more products to form
c. Causes fewer products to form
d. Change rate of reaction

364. In which of the following reactions products are favourably obtained at low pressure?
a. $N_2 + 3H_2 \rightarrow 2NH_3$
b. $2SO_2 + O_2 \rightarrow 2SO_3$
c. $PCl_5 \rightarrow PCl_3 + Cl_2$
d. None

365. Which of the following is a chemical equilibrium?
a. A block of wood floating on water
b. A balloon filled with air and having a few drops of water in equilibrium with water vapour inside the balloon
c. Formation of NH_3 from N_2 and H_3 in accordance with the equilibrium $N_2 + H_2 \rightarrow 2NH_3$

366. Which of the following equations will have no effect of change of pressure on it?
a. $2HI \rightarrow H_2 + I_2$
b. $N_2 + 3H_2 \rightarrow 2NH_3$
c. $PCl_5 \rightarrow PCl_3 + Cl_2$
d. $2SO_2 + O_2 \rightarrow 2SO_3$

Answers				
	356. c	359. b	362. c	365. c
	357. a	360. d	363. d	366. a
	358. b	361. b	364. c	

367. In which of the following reaction the product is favoured at low temperature?
a. $N_2 + O_2 \rightarrow 2NO - Q_1$k. cals
b. $PCl_5 \rightarrow PCl_3 + Cl_2 - Q_2$k. cals
c. $N_2 + 3H_2 \rightarrow 2NH_3 + Q_3$k. Cals
d. All the above

368. Which of the following is a reversible reaction?
a. $CuCO_3 = CuO + CO_2$
b. $2PB(NO_3)_2 = 2PbO + 4NO_2 + O_2$
c. $N_2 + 3H_2 = 2NH_3$
d. All the above

369. In a chemical reaction at equilibrium
a. The concentration of the reactants changes
b. Concentration of the reactants and products remain constant
c. Concentrations of the products change
d. All the above

370. The chemical equilibrium is a
a. Dynamic equilibrium
b. Static equilibrium
c. Physical equilibrium
d. All the above

371. In the manufacture of H_2SO_4 by contact process, the catalyst used is
a. Platinum gauge
b. Plantinised asbestos
c. Platinum wire
d. All the above

372. V_2O_5 catalyst is used in the manufacture of
a. HNO_3 from air
b. H_2SO_4 by lead chamber process
c. H_2SO_4 by contact process
d. All the above

373. In the manufacture of HNO_3 by Oswald process from NH_3, the catalyst used is
a. Fe b. Mo
c. Platinum gauge d. All the above

374. The migration of colloidal piratical particles under the influence of electric field is known as
a. Electrophoresis
b. Dialysis
c Electroosmosis
d. Electrodialysis

375. Examples of colloids is in the state of liquid in solid dispersion medium are
a. Curd and milk
b. Milk and whipped cream
c. Cheese and curd
d. White of egg and milk

376. Coagulation occurring while colloidal solution is prepared by chemical methods is due to
a. Inadequate impurities
b. Presence of soluble impurities
c. Stabilization of lyophobic sols
d. Excess amount of soluble impurities

377. The process of passing a precipitate into colloidal solution on adding an electrolyte is called
a Dialysis
b. Peptization
c. Electroosmosis
d. Cataphoresis

378. In electrophoresis
a. Particles move and medium rests
b. Particles rest and medium moves
c. Either a or b
d Neither a nor b

Answers				
	367. c	370. a	373. c	376. c
	368. c	371. b	374. a	377. a
	369. b	372. c	375. b	378. c

379. Colloidal gold is prepared by
a. Mechanical disintegration
b. Peptisation
c. Bredig's arc method
d. Hydrolysis

380. Scattering of light by colloidal particles is called
a. Brownian movement
b. Tyndall effect
c. Electrophoresis
d. Electroosmosis

381. The coagulating agent in the purification of water is
a. Ca^{2+} b. Al^{3+}
c. K^+ d. Na^+

382. Point out the false statement of the following.
a. Colloidal sols are heterogeneous
b. Colloids carry positive and negative changes
c. Colloidal sols show Tyndall effect
d. Size of colloidal particle is from 10^{-6} to 10^{-2} m

Answers		
	379. c	382. a
	380. b	
	381. a	

2

Basic Chemical Calculations

Questions :

1. The equivalent weight of which metal is not determined by hydrogen displacement method?
   a. Cu b. Zn
   c. Mg d Al

2. If A, E, M and V are atomic weight, equivalent weight, molecular weight and valency, respectively, then the correct relationship is given by which of the following equation?
   a. $A = E \times M$ b. $E = M \times V$
   c. $M = E \times A$ d $A = E \times V$

3. The equivalent weight of oxygen in hydrogen peroxide is
   a. 8 b. 16
   c. 32 d. 40
   e. 50

4. The equivalent weight of bivalent element 'X' is 20. Its gram equivalent weight will be
   a. 10 g b. 2 g
   c. 20 g d. None

5. The equivalent weight of copper in cuprous oxide (Cu_2O) is
   a. 63.5 b. 31.75
   c. 8 d. 16
   e. 30

6. In acid medium $KMnO_4$ (Mol. weight 158) reacts as follows
   $2KMnO_4 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 3H_2O + 5'O'$
   Therefore, its equivalent weight will be
   a. 51.6 b. 158
   c 31.6 d. 15.8

7. One gram equivalent of a metal will displace from acids
   a. 2g of hydrogen
   b. 22.4 litres of H_2 at N.T.P.
   c. 11.2 litres of H_2 at N.T.P.
   d None

8. 32 g of a metal liberated 2g of hydrogen when treated with excess of dilute sulphuric acid. The equivalent weight of the metal is
   a. 32 b. 16
   c. 64 d. 48
   e. 24

9. Four grams of an oxide of metal contain 3.2 g of metal. The equivalent weight of the metal is
   a. 64 b. 32
   c. 8 d. 16
   e. 24

10. In alkaline condition $KMnO_4$ (Mol. weight.158) reacts as follows
    $2KMnO_4 + 2KOH \rightarrow 2K_2MnO_4 + H_2O + 'O'$
    Therefore, its equivalent weight will be
    a. 31.6 b. 52.7
    c. 79 d. 158

11. One gram equivalent of chlorine will combine with
    a. 54 g of silver b. 108 g of Silver
    c. 1g of silver d. 35.5 g of silver

12. 1.03 g of zinc separates 1g of copper sulphate solution. If the equivalent weight of zinc is 32.5, the equivalent weight of copper is
    a. 32.5/1.03 b. 32.5×1.03
    c. 32.5 d. 40
    e. 50

Answers												
	1.	a	4.	c	7.	c	10.	d
	2.	d	5.	a	8.	b	11.	b
	3.	b	6.	c	9.	b	12.	a

13. 4g of a metallic oxide contains 0.8g of oxygen. Its equivalent weight is
a. 32 b. 0.8
c. 8 d. 64
e. 16

14. 3.5g of iron combines with sulphur forming 5.5g of iron sulphide. If the equivalent weight of sulphur is 16, then equivalent weight of iron will be
a. $3.5 \times \frac{16}{5.5} - 3.5$ b. 3.5×16
c. $5.5 \times \frac{16}{2}$ d. $3.5 \times \frac{16}{5.5}$
e. None of the above

15. The equivalent weight of phosphoric acid (H_3PO_4) in the following reaction–
$NaOH + H_3PO_4 \rightarrow NaH_2PO_4 + H_2O$ is
a. 59 b. 98
c. 49 d. 25
e. 40

16. The atomic weight of a metal is 30, its valency is 2 therefore the equivalent weight of this metal will be
a. 15 b. 20
c. 45 d. 60
e. 65

17. A metallic element has a valency of 2 and its equivalent weight is 32.7. The molecular weight of its chloride is
a. 68.2 b. 136.4
c. 103.27 d. 206.4
e. 114.2

18. A m_1 g of a metal produces m_2 g of its chloride, then its equivalent weight is
a. $m_2 \times 35.5/m_1 - m_2$
b. $m_1 \times 35.5 \times 8/m_2 - m_2$
c. $m_1 \times 35.5/m_2 - m_1$
d. $m_1/(m_2 - m_1) \times 35.5$

19. If A_1 g of a metal produces A2 g of its oxide, then its equivalent weight is
a. $A_1/(A_1-A_2) \times 8$
b. $A_1/(A_2-A_1) \times 16$
c. $A_1/(A_2-A_1) \times 8$
d. $A_2/(A_3-A_1) \times 8$

20. Atomic weight of Sn = 119 and Cl = 35.5, the equivalent weight of $SnCl_2$ in the following reaction is,
$SnCl_2 + Cl_2 \rightarrow SnCl_4$,
a. 95 b. 190
c. 70 d. 47.5

21. The equivalent weight of sodium thiosulphate ($NaS_2O_3.5H_20$ mol. wt. 248) in the reaction is,
$2Na_2S_2O_3 + I_2 \rightarrow 2NaI + Na_2S_4O_6$,
a. 248 b. 124
c. 596 d. 62
e. 400

22. A non-metallic oxide is found to contain 36.36% of oxygen. The equivalent weight of this non–metal would be
a. 36.35 b. 28.04
c. 63.64 d. 14.0
e. 42.06

23. The molecular weight of an acid is w. Its basicity is 2. What is the equivalent weight?
a. 2w b. $\sqrt{w}$
c. w/2 d. w^2
e. $\sqrt{2w}$

Answers							
	13. a	16. a	19. c	22. d
	14. a	17. b	20. a	23. c
	15. b	18. c	21. a	

24. What is the equivalent weight of iron in the equation? (At. Wt. of Fe = 55.8)
$2FeSO_4 + H_2SO_4 + 'O' = Fe(SO_4)_3 + H_2O$
a. 111.6 b. 27.9
c. 55.8 d. 13.9
e. 7.0

25. 2.00g of a metal yielded 2.656 g of its chloride. The equivalent weight, on calculation agrees with the value of
a. 54.15 b. 108.23
c. 162.35 d. 216.46
e. 300

26. 4 g of copper are dissolved in nitric acid and resulting nitrate decomposed by heat, yielded 5g of the oxide. The equivalent weight of copper is
a. 4 b. 32
c. 16 d. 48
e. 80

27. A metal oxide is reduced in a stream of hydrogen.3.15 g of the oxide yielded 1.05 g of the metal. The equivalent weight of the metal is
a. 16 b. 80
c. 4 d. 2

28. 1.40 g of iron precipitated 1.60 g of copper from copper sulphate solution. If the equivalent weight of iron is 28, the equivalent of copper is
a. 64 b. 16
c. 32 d. 48
e 60

29. A metal × (at. wt. =197) forms a chloride which contains 35% chlorine. The molecular formula of the chloride is
a. XCl b. XCl_2
c XCl_3 d. XCl_4

30. 11.2 litre of chlorine at N.T.P. is equivalent to
a 1 mole of chlorine
b 2 mole of chlorine
c. Half mole of chlorine
d. 3 moles of chlorine

31. An oxide contains 25% oxygen. The equivalent weight of the metal is
a. 8 b. 12
c. 24 d. 32
e 36

32. What will be the molecular weight of the compound having the formula MO, if the equivalent weight of M is 100?
a. 116 b. 108
c. 216 d. 208

33. 2.08 g of Zinc displayed 3.456 g of silver from a solution of silver nitrate. If the equivalent weight of silver is 108, the equivalent weight of zinc is
a. 32.5 b. 65
c. 69.5 d. 104.5
e. 110.5

34. 1.11 g of the chloride of a metal dissolved in water was treated with an excess of silver nitrate solution. The weight of the precipitated silver chloride after washing and drying was found to be 2.87 g. The equivalent weight of the metal is
a. 20 b. 40
c. 60 d. 80
e. 100

35. 58.5 g of a metal chloride contains 35.5 g of chlorine. The equivalent weight of the metal is
a. 55.5 b. 94.0
c. 23.0 d. 46.0
e. 50.0

Answers							
	24. c	27. c	30. c	33. b
	25. b	28. c	31. c	34. a
	26. b	29. c	32. c	35. c

36. 0.54 g of silver dissolved in nitric acid, gave on addition of a solution of common salt 0.7175 g of silver chloride. The equivalent wt. of silver is
a. 54 b. 100
c. 108 d. 210
e. 220

37. 1.05 g of metallic carbonate left on ignition 0.5 g of oxide .The equivalent weight of the metal is
a. 6 b. 12
c. 18 d. 24
e 30

38. A metal is burnt in oxygen and all the products on combustion are weighed. It is found that the weight seems to have increases by 24%. The equivalent weight of the above metal is
a. 25 b. 24
c. 33.33 d. 76
e. 100

39. The molecular formula of a metal chloride is MCl and molecular weight is 74.5. The equivalent weight of the metal will be
a. 74.5 b. 39
c 110 d. 88

40. 0.09 g of an element combines with 56 ml of oxygen at N.A.P. The equivalent weight of the metal will be
a. 9 b. 18
c. 27 d. 36
e. 45

41. The oxide of an element possesses the formula M_2O_3. If the equivalent weight of the metal is 9, then atomic weight of the metal will be
a. 9 b. 18
c. 27 d. 36
e. 45

42. The equivalent weight of NaOH is
a. 20 b. 40
c. 30 d. 50

43. 0.78 g of metal reacts with 0.224 litre of chlorine at N.T.P, to yield chloride of the metal. The equivalent weight of the metal is
a. 13 b. 26
c. 39 d. 52
e. 65

44. The volume of hydrogen at S.T.P. obtained from an acid by the action of one gram equivalent of metal is
a. 22.4 litres b. 11.2 litres
c. 5.6 litres d. 8 litres

45. The equivalent weight of carbon in carbon monoxide is
a. 3 b. 6
c. 9 d. 12
e 1

46. 100 ml of 0.5 N–NaOH solution is added to 20 ml of N–HCl solution and 10 ml of 3 N-H_2SO_4 solution. The solution will be
a. Strongly acidic b. Alkaline
c. Neutral d. Faintly acidic

47. 100 ml of 0.2 M-H_2SO_4 is added to 100 ml of 0.2 M–NaOH. The resulting solution will be
a. Acidic b. Basic
c. Neutral d. Slightly basic
e. None of the above

48. What is the weight of sodium hydroxide required to neutralize 100ml of 0.1N–HCl?
a. 4.0 g b. 0.04 g
c. 0.4 g d. 2.0 g

Answers								
	36. c	39. b	42. b	45. b	48. c			
	37. b	40. a	43. c	46. c				
	38. c	41. c	44. b	47. a				

e. 0.2 g

49. 100 ml of 0.4 N–HCl is mixed with 100 ml of 0.6 N-H_2SO_4. What is the total acid normality of the resulting solution?
a. 0.5 g b. 0.2 g
c. 0.3 g d. 0.4 g
e. 1.0

50. The formula weight of metallic hydroxide (equivalent wt. = 150) is $M(OH)_2.X\ H_2O$. If the atomic wt. of the metal is 176, then the value of × is
a. 5 b. 8
c. 4 d. 10

51. 500 ml of a 0.1 N solution of $AgNO_3$ are added to 500 ml of 0.1 N solution of KCl. The concentration of nitrate ion in the resulting mixture is
a. 0.05 N b. 0.01 N
c 0.2 N d. 0.1 N

52. A solution containing 98 g of H_2SO_4 (formula wt = 98) per litre will be
a. Normal b. Molar
c. Centi-normal d. Deci-normal

53. One gram of a metal carbonate neutralizes 200 ml of 0.1N–HCl. The equivalent weight of the metal will be
a. 50 b. 40
c. 20 d. 100

54. 75 ml of N/5 H_2SO_4, 10 ml of N/2 HCl and 30 of N/10 HNO_3 are mixed together. The strength of the resulting acid mixture is
a. 0.1 N b. 0.2 N
c. 0.3N d. 0.4N

55. What is the amount of NaOH required to neutralize 100 ml of 0.1N-H_2SO_4?
a. 5.0 g b. 4.0 g
c. 0.8 g d. 2.0 g

56. 40 ml of 0.1 N–HCl are mixed with 20 ml of 0.1 M–H_2SO_4. The strength of the resulting solution will be
a. 0.4N b. 0.3 N
c. 2N d 0.1N

57. The normality of 0.5 M-H_2SO_4 solution is
a. 0.5 b. 1.0
c. 2.0 d. 2.5

58. How many millilitres of 0.02 M sodium hydroxide solution are needed to react completely with 100 ml of 0.01 M sulphuric acid?
a. 200 ml b. 150 ml
c. 50 ml d. 250 ml

59. Oxalic acid is a dibasic acid having molecular formula – $(COOH)_2.2H_2O$. What weight of oxalic acid is required to prepare 500 ml of 0.1 M solution?
a. 12.6 g b. 6.3 g
c 4.5g d. 9g

60. 4 g of solid sodium hydroxide was dissolved in 100 ml of water. The whole of this solution neutralizes completely
a. 10 ml of 5 N–H_2SO_4
b. 20 ml of 2.5 M– H_2SO_4
c 30 ml of 5 M– H_2SO_4
d. 40 ml of 10 M– H_2SO_4

61. 100 ml of 0.1 N–HCl is treated with excess of $AgNO_3$. The weight of AgCl precipitated is
a. 1.435 g b. 14.35 g
c. 7.175 g d. 3.65g

Answers								
	49. a	52. b	55. c	58. c	61. a			
	50. a	53. c	56. c	59. b				
	51. a	54. b	57. b	60. b				

62. 2.5 g of sodium hydroxide was dissolved in water and the volume was made to 50 ml. The volume of 5N–H_2SO_4 required to neutralize the above alkali completely is
a. 12.5 ml b. 25 ml
c. 30 ml d. 15 ml
e 10 ml

63. One mole of sulphuric acid will be exactly neutralized by
a. One mole of ammonia
b. One mole of barium hydroxide
c. Two mole of calcium hydroxide
d. Two moles of barium hydroxide
e. None of the above

64. 30 ml of 0.2 N–NaOH solution is completely neutralized by 60 ml of hydrochloric acid. The normality of HCl is
a. 0.8 N b. 0.4 N
c. 0.3 N d. 0.2 N
e. 0.1 N

65. The normality of a solution of sodium hydroxide 100 ml of which contains 4 g sodium hydroxide is
a. 0.1 b. 1.0
c. 4.0 d. 0.4
e. 0.5

66. The weight of H_2SO_4 in 2.5 litres of 2 M–H_2SO_4 is
a. 400 g b. 450 g
c. 490 g d. 500 g

67. 1.0 g of a mixture of sodium chloride and anhydrous sodium carbonate is exactly neutralized by 50 ml of N/5 solution of an acid. The percentage of sodium chloride in the mixture is
a. 53 b. 47
c. 80 d. 70
e. 60

68. 10 ml of (N) HCl reacts with 0.12 g of magnesium. The equivalent weight of magnesium is
a. 8 b. 10
c. 12 d. 14
e. 24

69. 100 ml of 0.6 N–H_2SO_4 is mixed with 200 ml of 0.3 N–HCl acid solution, the normality of the resulting solution would be
a. 0.9 N b. 0.3 N
c. 1.2 d. 0.6 N
e. 0.4 N

70. A substance has its molecular weight 342. The molarity of a solution containing 6.84 g of a substance in 200 ml of solution is
a. 0.1 M b. 0.2 M
c. 0.3 M d. 0.4 M

71. One litre of a cold drink contains 17.1 g cane sugar (mol. wt. =342). The molarity of sugar in the cold drink is
a. M b. M/10
c. M/20 d. M/40
e. M/200

72. One g-equivalent of potassium hydroxide is 56 g. Therefore, weight of KOH present in 500 ml of decinormal solution is
a. 5.6 g b. 2.8 g
c. 28 g d. 11.2 g

73. 100 ml 0.3 N solution of NaOH was mixed with 200 ml of 0.3 M-H_2SO_4 solution. The normality of H_2SO_4 in the resulting solution is
a. 0.9 N b. 0.3 N
c. 0.6 N d. 0.4 N
e. 0.45 N

Answers							
	62. a	65. b	68. c	71. c
	63. b	66. b	69. e	72. b
	64. e	67. b	70. a	73. b

74. How much N/5 HCl solution would be required to neutralize 2g of $CaCO_3$ (Ca = 40, C = 12)?
a. 100 ml b. 200 ml
c. 50 ml d. 90 ml
e. 25 ml

75. 5.3 g of pure and anhydrous sodium carbonate reacts with 100 ml N/10 HCl. After the reaction is over
a. Excess of HCl is left
b. Untreated sodium carbonate is left
c. Neither of HCl nor of sodium carbonate is left
d. None of the above

76. The normality of 73% HCl (density 1.2) by weight would be
a. 12 b. 18
c. 24 d. 36
e. 48

77. When 10 ml of 1 M–KOH solution is mixed with 10 ml of M–H_2SO_4 solution, the resulting mixture will be
a. Acidic b. Alkaline
c. Neutral
d. Strongly alkaline
e. None of the above

78. The normality of a sodium hydroxide solution containing one gram sodium hydrogen per litre would be
a. 0.025 b. 0.25
c. 0.50 d. 0.75
e. 1.0

79. The amount of sodium carbonate to prepare 100 ml of 0.1N solution is
a. 0.53 g b. 0.62 g
c. 1.24 g d. 5.8 g
e. 53 g

80. 0.45 g of a dibasic acid required 200 ml of N/20 NaOH solution for neutralization. The molecular weight of the dibasic acid is
a. 45 b. 60
c. 70 d. 80
e. 90

81. 0.84 g of metal carbonate reacts exactly with 40 ml of N/2 H_2SO_4 solution. The equivalent weight of the metal carbonate is
a. 21 b. 30
c. 40 d. 42
e. 60

82. The normality of a sodium hydroxide solution containing 10 g sodium hydroxide per litre would be
a. 0.025 N b. 0.25N
c. 0.50 N d. 0.75N
e. 1 N

83. The amount of HCl required to neutralize 20 ml of 0.5 N–NaOH is
a. 20 ml of 1.0 N–HCl
b. 10 ml of 1.0 N–HCl
c. 40 ml of 0.5 N–HCl
d. 10 ml of 0.1 N–HCl
e. None of the above

84. 20 ml of a solution containing 6.5 g of a dibasic acid per litre neutralized 22.18 ml of a solution of NaOH. The same volume (20 ml) of N/10 HCl neutralized 21.5 ml of the same sodium hydroxide solution. The molecular weight of the acid is
a. 120 b. 126.0
c. 128.02 d. 100.32
e. 140.02

Answers							
	74. b	77. a	80. e	83. b
	75. b	78. a	81. b	84. b
	76. c	79. a	82. b	

85. 2 N-NaOH solution means that
a. 2g of NaOH is dissolved in 100 ml in water
b. 2g of NaOH is dissolved in 100 ml in solution
c. 8g of NaOH is dissolved in 100 ml of water
d. 8g of NaOH is dissolved in 100 ml of solution

86. 1.0 g of a piece of metal was allowed to react with 25 ml of 4 N-HCl. When the reaction was over, 100 mg of the metal remained unreacted. The equivalent weight of metal is
a. 9 b. 12
c. 18 d. 24
e. 30

87. A sample of $Na_2CO_3.H_2O$ weighing 0.62 g is added to 100 ml of 0.1 N–H_2SO_4 solution. The resulting solution is
a. Acidic b. Basic
c. Neutral d. Slightly acidic
e. Slightly basic

88. Two litres of ammonia at 30°C and at 0.20 atm. pressure neutralized 134 ml of a solution of sulphuric acid. The normality of the acid is
a. 0.1 N b. 0.11 N
c. 0.12 N d. 0.14 N
e. 0.15 N

89. One gram of solid tribasic acid was dissolved in water and the solution was made to 250 ml.19.2 ml of this solution required 10 ml of 1.1 N/10 NaOH solution for complete neutralization. The molecular weight of the acid is
a. 210 b. 310
c. 420 d. 220
e. 850

90. The normality of a 26% wt./vol. solution of ammonia (density = 0.855) is approximately
a. 1.5 b. 4.0
c. 0.4 d. 15.3

91. 4g of solid NaOH (mol wt. = 40) were dissolved in water and the solution was made to 1000 ml. The whole of this will neutralize completely
a. 100 ml of M-H_2SO_4
b. 50 ml of 10M-H_2SO_4
c. 20 ml of 2.5 M-H_2SO_4
d. 30 ml of 5 M-H_2SO_4

92. Commercial hydrochloric acid is 12 N. If 8.3 ml of this acid is dissolved in 991.7 ml of water, the normality of the resulting solution will be about
a. 0.05 b. 0.5
c. 0.1 d. 0.45

93. The formula weight of $Al_2(S0_4)_3$ is 342. A solution of 342 g of $Al_2(SO_4)_3$ in
a. 1 litre of solution is 1 molar
b. 1 litre solution is 2 normal
c. 1 litre solution is 3 molar
d. 0.5 litre of the solution is 0.5 molar

94. The volume of water which must be added for 40 ml of 0.25 N oxalic acid solution in order to make it exactly decinormal is
a. 40 ml b. 30 ml
c. 20 ml d. 25 ml
e. 60 ml

95. 25 ml of N solution of an acid was diluted to 250 ml. 10 ml of the solution was titrated with 0.05 N alkali solution. The volume of alkali solution required for complete neutralization would be
a. 100 ml b. 20 ml
c. 5 ml d. 10 ml

Answers					
	85. d	88. c	91. c	94. e	
	86. a	89. a	92. c	95. b	
	87. c	90. d	93. a		

96. What volume of 0.2 N oxalic solution can be prepared from 63 g of oxalic acid
a. 0.2 litre b. 0.5 litre
c. 2.5 litre d. 5 litre

97. 1.575 of $H_2C_2O_4 \cdot \times H_2O$ crystals are dissolved in water and the volume was made to 250 ml with water. 8.34 ml of this solution are required for complete neutralization 10 ml of N/12 KOH solution. The value of X is
a. 2 b. 4
c. 6 d. 5
e. 7

98. The equivalent weight of an unknown compound is 53. If 1.325 g of it be dissolved to make 250 ml aqueous solution of the compound, the normality of the solution is
a. 0.1 N b. 0.2 N
c. 0.3 N d. 0.4 N
e. 0.5 N

99. 0.12 g of pure Mg ribbon completely reacts with 100 ml H_2SO_4. The normality of H_2SO_4 is
a. N/10 b. N/15
c. N/20 d. N/25
e. N/30

100. Suppose that 0.099 mole of solid sodium hydroxide is added to 100 ml of 1.0 M–HCl. The excess of mole HCl present in solution than NaOH is
a. 0.1 mole b. 0.01 mole
c. 0.001 mole d. 0.02 mole
e. 0.0001 mole

101. Oxalic acid is a dibasic acid, having molecular formula $(COOH)_2.2H_2O$. What weight of oxalic acid is required to prepare 500 ml of 0.1 molar solution?
a. 12.6 g b. 6.3 g
c. 4.5 g d. 9 g

102. What weight of oxalic acid ($H_2C_2O_4 \cdot 2H_2O$) is required to prepare 1000 ml of N/10 solution?
a. 9 g b. 12.6 g
c. 6.3 g d. 4.5 g
e. 9 g

103. What volume of CO_2 at NTP will be liberated by the action of 100 ml of 0.2 N–HCl on $CaCO_3$?
a. 112 ml b. 224 ml
c. 448 ml d. 1120 ml

104. What is the normality of 7.3 % (wt/vol) hydrochloric acid solution (mol. wt. of HCl = 36.5)
a. 1.5 b. 3.0
c. 4.0 d. 2.0
e. 1.9

105. 1 g of the carbonate of a metal was dissolved in 25 ml of N–HCl. The resulting liquid required 5 ml of N. NaOH for neutralization. The equivalent weight of metal carbonate is
a. 5 b. 30
c. 20 d. 40
e. 50

106. 5 ml of N-HCl, 20 ml of N/2 H_2SO_4 and 30 ml of N/3-HNO_3 are mixed together and the volume made to 1 litre. The strength of the resulting solution is
a. N/5 b. N/10
c. N/20 d. N/40
e. N/50

107. 5 ml of N-HCl, 20 ml of N/2 H_2SO_4 and 30 ml of N/3 HNO_3 are mixed together and the volume made to 1 litre. The weight of pure sodium hydroxide required to neutralize the acid mixture is
a. 10 g b. 2 g
c. 1 g d. 2.5 g
e. 2 g

Answers					
	96. d	99. a	102. c	105. e	
	97. a	100. c	103. b	106. d	
	98. a	101. b	104. d	107. c	

108. 1 g of pure magnesium ribbon reacts with 100 ml N/10 HCl. After the reaction is over
a. Excess of HCl left
b. Excess of magnesium left
c. Neither of magnesium nor of HCl is left
d. None of the above

109. 1 g of a mixture of calcium carbonate and sodium chloride reacts completely with 100 ml N/10 HCl. The percentage of $CaCO_3$ in the mixture is
a. 40% b. 50%
c. 60% d. 80%
e. 90%

110. 1.00 g of pure calcium carbonate was found to require 50 L of dilute HCl for complete reaction. The strength of HCl solution is given by
a. 4.0 N b. 20 N
c. 0.4 N d. 0.2 N

111. If 200 ml of N/10 HCl was added to 1 g of calcium carbonate. What would remain after the reaction?
a. $CaCO_3$
b. HCl
c. Neither of the above two
d. Part of the both
e. 100 ml N/10 HCl

112. Certain weight of zinc reacts with 100 ml HCl to give 112 ml of H_2 at NTP. The normality of HCl is
a. N b. N/5
c. N/10 d. N/15
e. N/20

113. 50 ml of 0.2 M-CH_3 COOH are mixed with 50 ml of 0.2 M–NaOH. What is the nature of the resulting solution?
a. Highly acid b. Highly basic
c. Neutral d. Slightly acidic
e. Slightly basic

114. 100 ml of 2.2 M-H_2SO_4 is added to 100 ml of 0.3 M-NaOH. The resulting solution will be
a. Acidic b. Basic
c. Neutral d. Slightly basic
e. None of these

115. 100 ml of 0.4 M - HCl is mixed with 100 ml of 0.6 N-H_2SO_4. What is the total normality of the resulting solution?
a. 0.5 b. 0.2
c. 0.3 d. 0.4
e. 1.0

116. Amount of sodium carbonate in 100 ml of its N/10 solution is
a. 5.3 g b. 0.53 g
c. 0.053 g d. 53 g

117. 100 ml of an N/10 acid will exactly neutralize
a. 40 ml of N/4 alkali
b. 50 ml of N/10 alkali
c. 20 ml of N/5 alkali
d. 30 ml of N/6 alkali

118. The amount of NaOH (mol. wt. 40) required to prepare 250 ml of 0.1 N solution will be
a. 1 g b. 0.1 g
c. 10 g d. 0.4 g

119. 100 ml of 10% NaOH is mixed with 100 ml of 10% H_2SO_4. The resulting solution is
a. Acidic b. Basic
c. Neutral d. None

Answers				
	108. b	111. c	114. a	117. a
	109. b	112. c	115. a	118. a
	110. c	113. e	116. b	119. b

120. How much water should be added to 400 ml of N/8 HCl to make it exactly N/12?
a. 100 ml b. 200 ml
c. 300 ml d. 400 ml
e. 500 ml

121. Molecular weight of oxalic acid is 126. The weight of oxalic acid required to neutralize 1000 ml of normal solution of NaOH is
a. 6.3 g b. 126 g
c. 530 g d. 63 g

122. To neutralize 25 ml of N/20 sodium carbonate, the volume of N/10 sulphuric acid required is
a. 20 ml b. 25 ml
c. 15 ml d. 12.5 ml
e. 40 ml

123. How much of copper sulphate $CuSO_4.5H_2O$ (mol. wt. 249.5) is required to prepare 500 ml of 0.2 M solution?
a. 24.95 G b. 249.5 g
c. 2.495 g d. 125 g

124. What weight of anhydrous oxalic acid is required to prepare 100 ml of a normal solution?
a. 9 g b. 12.6 g
c. 6.3 g d. 4.5 g
e. None of the above

125. What volume of 0.5 N–HCl is required for the complete decomposition of 10 g of $CaCO_3$?
a. 50 ml b. 400 ml
c. 500 ml d. 1000 ml

126. 100 ml of 0.5 N-NaOH solution is added to 20 ml of 1 N-HCl solution and 10 ml of 3 N-H_2SO_4 solution. The solution will be
a. Strongly acidic b. Alkaline
c. Neutral d. Faintly acidic

127. 25 ml of 0.5 M-H_2SO_4 is mixed with 30 ml of M-NaOH solution. The volume of N/10 H_2SO_4 which will just neutralize the excess of alkali will be
a. 5 ml b. 50 ml
c. 10 ml d. 20 ml

128. Which of these solutions has the highest normality?
a. 8 g of KOH per 100 ml
b. 0.5 M-H_2SO_4
c. N-phosphoric acid
d. 6 g of NaOH per 100 ml

129. To prepare 300 ml of 2 M solution, the weight in grams of sodium chloride required is
a. 117 b. 35.1
c. 58.5 d. 5.85
e. 2.425

130. 100 ml of N/10 (Sp. Gr. =1.08) HCl is diluted with distilled water to produce exactly decinormal solution. The volume of water required for the same is
a. 108 ml b. 100 ml
c. 8.0 ml d. 80 ml
e. 120 ml

131. A solution containing 12 g of H_2SO_4 in 200 ml will have its strength represented by
a. 1 N b. 0.5 N
c. 1.22 N d. 2 N
e. 3 N

132. 100 ml of 10% KOH is mixed with 100 ml 10% H_2SO_4. The resulting solution is
a. Acidic b. Basic
c. Neutral d. None

Answers					
	120. b	123. a	126. c	129. b	132. a
	121. d	124. d	127. b	130. c	
	122. d	125. b	128. d	131. c	

133. 100 ml 1M-CH_3COOH is mixed with 100 ml of M-NaOH. The resulting solution is
a. Acidic b. Basic
c. Neutral d. None

134. The amount of sodium carbonate present in a litre of 0.1 N solution is
a. 53 g b. 5.3 g
c. 0.53 g d. 10.6 g
e. 106 g

135. The volume of 0.5 (N) sulphuric acid required to neutralize 200 ml of 0.2 (N) sodium carbonate is
a. 23 ml b. 40 ml
c. 80 ml d. 100 ml
e. 60 ml

136. A solution is called normal if one gram equivalent of solute is present in
a. 1000 g water b. 1000 ml water
c. 1000 ml solution e 1000 g solution

137. The molarity of phosphoric acid is 0.5. It reacts with $Ca(OH)_2$ as
$Ca(OH)_2 + H_3PO_4 = CaHPO_4 + 2H_2O$.
Its strength is
a. 05 N b. 1 N
c. 1.5 N d. 3 N
e. 2 N

138. To 100 ml M/10 HCl, 100 ml M/10 Na_2CO_3 was added. The solution after the reaction is
a. Acidic b. Basic
c. Neutral d. None

139. 4 g of NaOH was dissolved in 50 ml water. The volume of (N) H_2SO_4 required for its complete neutralization is
a. 100 ml b. 50 ml
c. 200 ml d. 10 ml
e. 500 ml

140. The volume of HCl having concentration 18.25 % by weight and specific gravity 1.2 for the preparation of 100 ml (N) solution is
a. 18.25 ml b. 33.3 ml
c. 21.6 ml d. 16.66 ml
e. 20.66 ml

141. 1.2 g of $CaCO_3$ was allowed to react with 10 ml 2N–HCl. The amount of substance left after reaction is
a. 5 ml HCl
b. 1 g $CaCO_3$
c. 0.2 g $CaCO_3$
d. 1 ml HCl
e. None of the above

142. 1 g marble when reacted with (N) HCl acid required 19 ml for complete reaction leaving behind some sandy materials. The percentage purity of $CaCO_3$ in the marble is
a. 0.95 b. 95
c. 5 d. 19
e. 20

143. 10 ml N/10 solution of a dibasic acid will completely neutralize N/10 solution of a monobasic acid if its volume added is
a. 10 ml b. 20 ml
c. 30 ml d. 50 ml
e. 5ml

144. When excess of zinc reacts with 10 ml of H_2SO_4, 224 ml of H_2 is liberated at S.T.P. The strength of H_2SO_4 is
a. 10 N b. 1 N
c. 2N d. 4N
e. 5N

Answers				
	133. b	136. c	139. a	142. b
	134. b	137. b	140. d	143. a
	135. c	138. b	141. c	144. c

3

Soil Physics

QUESTIONS :

1. Who is the Father of soil physics ?
   a. Hillel b. Richards
   c. Dokuchaiev d. Thomas Way

2. Organic matter in soil can be decomposed by
   a. Hydrogen peroxide
   b. Sodium carbonate
   c. Sodium hydroxide
   d. Sulphuric acid

3. What is the number of classifications in size groups of soil particles by International Society of Soil Science (ISSS) ?
   a. Three b. Four
   c. Six d. Seven

4. What is the size of silt particles in ISSS classification of soil texture ?
   a. $< 2\ \mu$ b. $2 - 20\ \mu$
   c. $20 - 500\ \mu$ d. $50 - 100\ \mu$

5. What is the size of fine sand particles in USDA classification of soil texture ?
   a. $0.02 - 0.1\ \mu$ b. $0.05 - 0.1\ \mu$
   c. $0.1 - 0.25\ \mu$ d. $0.02 - 0.25\ \mu$

6. What is the size of fine clay particles in USDA classification of soil texture ?
   a. < 2 mm b. < 0.2 mm
   c. < 0.02 mm d. < 0.002 mm

7. Surface area of spheroid can be calculated by which of the following formula?
   a. πr^3 b. $4/3\ \pi r^3$
   c. $2\ \pi r$ d. $\pi r^2 h$

8. Particle smaller than _____ microns cannot be separated by sieving.
   a. $< 2\ \mu$ b. $< 20\ \mu$
   c. $< 50\ \mu$ d. $< 100\ \mu$

9. What is the unit of viscosity ?
   a. cm sec^{-1} b. g cm^{-3}
   c. g sec cm^{-1} d. cm sec^{-2}

10. What is the unit of gravity ?
    a. cm sec^{-1} b. g cm^{-3}
    c. g sec cm^{-1} d. cm sec^{-2}

11. The equation, $v = K. r^2$ is called as
    a. Stoke's law
    b. Ratio law
    c. Liebig law
    d. Mitcherlich equation

12. In Stoke's law 'η' denotes
    a. Density b. Gravity
    c. Viscosity d. Velocity

13. Textural analysis of all soils except calcareous and organic soils can be done by
    a. Hydrometer method
    b. International pipette method
    c. Aggregate method
    d. All

14. More accurate analysis of soil texture can be done by
    a. Hydrometer method
    b. International pipette method
    c. Aggregate method
    d. All

15. What is the value of particle density in Stoke's law ?
    a. 1.1-1.8 g cm^{-3} b. 2.25 g cm^{-3}
    c. 2.45 g cm^{-3} d. 2.65 g cm^{-3}

16. Soils that have 60 % clay, 20 % sand and 20 % silt can be grouped in to the textural class of
    a. Clay b. Silty clay
    c. Silt d. Silty clay loam

Answers															
	1.	a	4.	b	7.	b	10.	d	13.	a	16.	a			
	2.	a	5.	c	8.	b	11.	a	14.	b					
	3.	b	6.	d	9.	c	12.	c	15.	d					

17. Plasticity and stickiness are high in
    a. Sandy soils b. Loamy soils
    c. Clay soils d. All

18. At the same water content, water availability is more in which of the following soils ?
    a. Clay soils b. Sandy soils
    c. Loamy soils d. All

19. In which of the following soils, water infiltration is more rapid?
    a. Sandy soils b. Loamy soils
    c. Clay soils d. All

20. Of the following, which is/are the primary soil particles ?
    a. Clay b. Silt
    c. Sand d. All

21. The arrangement of primary and secondary soil particles is called as
    a. Soil structure b. Soil texture
    c. Soil consistency d. Soil plasticity

22. The relative proportion of soil particles is called as
    a. Soil structure b. Soil texture
    c. Soil consistency d. Soil plasticity

23. Wet bulk density (g cm^{-3}) =
    a. $\frac{\text{Weight of soil}}{\text{Volume of soil}}$
    b. $\frac{\text{Weight of dry soil}}{\text{Volume of soil}}$
    c. $\frac{\text{Weight of dry soil}}{\text{Volume of soil particles}}$
    d. $\frac{\text{Volume of soil}}{\text{Weight of moist soil}}$

24. Dry bulk density (g cm^{-3}) =
    a. $\frac{\text{Weight of soil}}{\text{Volume of soil}}$
    b. $\frac{\text{Weight of dry soil}}{\text{Volume of soil}}$
    c. $\frac{\text{Weight of dry soil}}{\text{Volume of soil particles}}$
    d. $\frac{\text{Volume of soil}}{\text{Weight of moist soil}}$

25. Particle density (g cm^{-3}) =
    a. $\frac{\text{Weight of soil}}{\text{Volume of soil}}$
    b. $\frac{\text{Weight of dry soil}}{\text{Volume of soil}}$
    c. $\frac{\text{Weight of dry soil}}{\text{Volume of soil particles}}$
    d. $\frac{\text{Volume of soil}}{\text{Weight of moist soil}}$

26. What is the bulk density of fine textured soils ?
    a. 1.1 – 1.3 g cm^{-3}
    b. 2.65 g cm^{-3}
    c. 1.4 – 1.8 g cm^{-3}
    d. 2.4 – 2.6 g cm^{-3}

27. What is the bulk density of coarse textured soils ?
    a. 2.4 – 2.6 g cm^{-3}
    b. 2.65 g cm^{-3}
    c. 1.1 – 1.3 g cm^{-3}
    d. 1.4 – 1.8 g cm^{-3}

Answers									
	17.	c	20.	d	23.	a	26.	a	
	18.	b	21.	a	24.	b	27.	d	
	19.	a	22.	b	25.	c			

28. Value of bulk density is
a. Higher than particle density
b. Lower than particle density
c. Equal to particle density
d. Unity

29. Percentage of pore space =
a. [1–Bulk density/Particle density] × 100
b. [10–Bulk density/Particle density] × 100
c. [1–Particle density/Bulk density] × 100
d. [10–Particle density/Bulk density] × 100

30. Volume wetness = Mass wetness × ____
a. Bulk density
b. Particle density
c. Weight of soil
d. Pore space

31. What is the depth of plough layer of soil?
a. 0 – 10 cm b. 0 – 15 cm
c. 0 – 20 cm d. 0 – 25 cm

32. What is the weight of a hectare of surface soil?
a. 2.25×10^6 kg ha^{-1}
b. 2×10^6 kg ha^{-1}
c. 2.4×10^6 kg ha^{-1}
d. 2.6×10^6 kg ha^{-1}

33. Element essential for the flocculation of soil particles is
a. Sodium b. Potassium
c. Calcium d. Magnesium

34. Element essential for the deflocculation of soil particles is
a. Potassium b. Calcium
c. Magnesium d. Sodium

35. Zeta potential of soil particles is reduced by
a. Potassium b. Calcium
c. Sodium d. Magnesium

36. Increase in zeta potential of soil particles leads to
a. Flocculation
b. Deflocculation
c. Aggregation
d. Both a and b
e. Both a and c

37. Cementation of soil particles may be caused by
a. Cations
b. Oxides of iron and aluminium
c. Anions
d. Humus substances
e. All

38. Theory of bonding of clay – clay particles was given by
a. E.J. Russell
b. R.D. Jenny
c. Juston von Leibig
d. Waag and Guldberg

39. Anion responsible for soil aggregation is
a. Nitrate b. Phosphate
c. Sulphate d. Molybdate

40. Hydroxides of iron and aluminium on _____ may form stable aggregates in laterite soils.
a. Oxidation b. Reduction
c. Hydration d. Dehydration

41. More stable aggregates are formed by
a. Humus substances
b. Earthworms
c. Plant roots decay
d. All

Answers												
	28.	b	31.	b	34.	d	37.	e	40.	d		
	29.	c	32.	a	35.	b	38.	a	41.	c		
	30.	a	33.	c	36.	b	39.	b				

42. Extent and stability of soil aggregates can be measured by
a. Direct methods of soil structure evaluation
b. Indirect methods of soil structure evaluation
c. Both a and b
d. All the above

43. Direct methods of soil structure evaluation characterize the
a. Shape, size and arrangement of soil aggregates
b. Extent and stability of soil aggregates
c. Properties related to soil structure
d. All the above

44. Direct methods of soil structure characterization and evaluation include
a. Microscopic methods
b. Macroscopic methods
c. Wet and dry sieving methods
d. Both a and b
e. All the above

45. Indirect methods of soil structure characterization and evaluation include
a. Wet and dry sieving methods
b. Mean weight diameter and GMD
c. Stability index and structural co-efficient
d. All the above

46. In puddled soil, the soil particles are
a. Cohesive b. Massive
c. Non-cohesive d. Both a and b
e. All the above

47. The soil structural classification followed in India is/are
a. ISSS classification
b. USDA classification
c. Atterberg classification
d. All

48. Which soil structure is most desirable for agriculture?
a. Platy b. Blocky
c. Crumb d. Granular

49. Which one of the following is spherical and porous soil structure?
a. Columnar b. Prismatic
c. Granular d. Crumb

50. What is the total number of soil structural classes?
a. Four b. Five
c. Six d. Seven

51. The method of soil structure characterization and evaluation that was described by Chepil is
a. Stability index
b. Wet sieving
c. Dry sieving
d. Mean weight diameter

52. The method of soil structure characterization and evaluation that was described by Yodder is
a. Stability index
b. Wet sieving
c. Dry sieving
d. Mean weight diameter

53. For better soil structure, the value of cumulative mean weight diameter should be
a. Lower b. Higher
c. Unity d. Zero

54. For better soil structure, the value of structural co-efficient should be
a. Lower b. Higher
c. Unity d. Zero

Answers												
	42.	b	45.	d	48.	c	51.	c	54.	b		
	43.	a	46.	d	49.	d	52.	b		–		
	44.	d	47.	b	50.	a	53.	a				

55. The physical condition of soil in relation to plant growth is called as
a. Soil tilth b. Tillage
c. Coherence d. Adherence

56. Which of the following is an optimum soil condition for the tillage operation to produce aggregates of suitable sizes ?
a. Dry b. Plastic
c. Friable d. Sticky

57. Crops conducive for the formation of well structured soils
a. Grasses b. Cereals
c. Millets d. Oilseeds

58. Which of the following fertilizers improve soil structure ?
a. Nitrogenous fertilizers
b. Phosphatic fertilizers
c. Potassic fertilizers
d. Sulphate fertilizers

59. The process of water entry into soil through the surface may be either downward or lateral or both is called as
a. Percolation b. Infiltration
c. Seepage d. All

60. The distance traveled by water through soil column is called as
a. Infiltration rate
b. Percolation rate
c. Seepage rate
d. Run-off loss

61. The most important factor(s) that influences the infiltration of water is/are
a. Soil structure b. Soil texture
c. Porosity d. All

62. Infiltration rate is influenced by
a. Soil texture
b. Soil structure
c. Porosity
d. Initial soil water content
e. All the above

63. The value of atmospheric pressure is
a. 1.013×10^6 dynes cm^{-2}
b. 1.013 bars
c. 101.3 kPa
d. All

64. 1 bar =
a. 100 kPa b. 106 kPa
c. 103 Pa d. 10^3 dynes cm^{-2}

65. 1 bar or 100 kPa is equal to pressure exerted by
a. 100 cm of water column
b. 1000 cm of water column
c. 10000 cm of water column
d. 1 cm of water column

66. In soil water column, pressure head increases linearly from the surface downwards (True/False).

67. In soil water column, gravity head increases linearly above the reference level (True/False).

68. Total head drop ($\Delta H/L$) per unit distance in the soil water column is called as
a. Flux
b. Flux density
c. Hydraulic gradient
d. Hydraulic conductivity

69. Rate of flow of liquid through a porous medium under unit hydraulic gradient is called as
a. Darcy's law
b. Hydraulic conductivity
c. Flux density
d. Stoke's law

Answers									
	55.	a	58.	c	61.	c	64.	a	67.	T
	56.	c	59.	b	62.	e	65.	b	68.	c
	57.	a	60.	a	63.	d	66.	T	69.	b

70. The formula $q = k \cdot \Delta H/L$ is
a. Darcy's law
b. Hydraulic gradient
c. Flux density
d. Fick's law

71. Hydraulic conductivity of soil is found to increase in which of the following order?
a. Na – soil > K – soil > Ca – soil
b. Ca – soil > K – soil > Na – soil
c. Ca – soil > Na – soil > K- soil
d. Na – soil > Ca – soil > K – soil

72. Permeability classification of soil was given by
a. O 'Neal'
b. Atterberg
c. Schofield
d. Chepil and Woodruff

73. What is the total permeability class of soil given by O 'Neal'?
a. Four b. Five
c. Six d. Seven

74. What is the unit of hydraulic conductivity?
a. cm sec^{-2} b. m sec^{-1}
c. cm sec^{-1} d. m sec^{-2}

75. In the laboratory, hydraulic conductivity is measured by
a. Piezometer
b. Constant head permeameter
c. Auger hole method
d. Both a and b

76. In the field, hydraulic conductivity is measured by
a. Piezometer
b. Constant head permeameter
c. Auger hole method
d. Both a and b

77. What is the unit of surface tension ?
a. dynes cm^{-1}
b. cm sec^{-1}
c. g cm^{-3}
d. Poise

78. What is the hydraulic conductivity of the permeability class 'rapid' given by O 'Neal' ?
a. 60 – 70 x cm sec^{-1}
b. 170 – 650 x cm sec^{-1}
c. 350 – 700 x cm sec^{-1}
c. > 700 x cm sec^{-1}

79. When soil water potential is at hydrostatic pressure greater than atmospheric pressure, the pressure potential is
a. Unity
b. Positive
c. Negative
d. Zero

80. Capillary rise of water is measured by the formula h = _____.
a. 0.15 / r b. 0.25 / r
c. 0.35 / r d. 0.5 / r

81. The potential results from adsorptive and capillary forces of the soil matrix acting on soil water is called as
a. Gravitational potential
b. Matric potential
c. Osmotic potential
d. Solute potential

82. The potential results form the earth's gravitational force is called as
a. Gravitational potential
b. Matric potential
c. Osmotic potential
d. Solute potential

Answers									
	70.	a	73.	d	76.	d	79.	b	82.	a
	71.	b	74.	c	77.	a	80.	a		
	72.	a	75.	b	78.	c	81.	b		

83. The potential results from the presence of solutes in soil water is called as
a. Solute potential
b. Osmotic potential
c. Matric potential
d. Gravitational potential
e. Both a and b

84. At all points above the reference level, the gravitational potential will be
a. Unity b. Zero
c. Positive d. Negative

85. With increase in solute content in soil water, the vapour pressure is
a. Increased b. Decreased
c. Unaltered d. All

86. What is the unit of soil water potential on mass basis ?
a. Joules kg^{-1} b. Dynes cm^{-2}
c. cm or m d. Newtons

87. What is the unit of soil water potential on volume basis ?
a. Joules kg^{-1} b. Dynes cm^{-2}
c. Newtons d. Both b and c
e. All the above

88. What is the unit of soil water potential on weight basis ?
a. Joules kg^{-1} b. Dynes cm^{-2}
c. cm or m d. Newtons

89. 1 bar =
a. 10 KN m^{-2} b. 100 KN m^{-2}
c. 10 Nm^{-2} d. 100 Nm^{-2}

90. 1 Joule =
a. 10^5 ergs b. 10^6 ergs
c. 10^7 ergs d. 10^9 ergs

91. What is the soil water potential at saturation in soil ?
a. −15 bars b. 0 bars
c. −31 bars d. −1 bar

92. What is the soil water potential at air dryness ?
a. −15 bars b. 0 bars
c. −31 bars d. −1 bar

93. What is the soil water potential at field capacity ?
a. 10-33 kPa b. 33 kPa
c. 1500 kPa d. 33-1500 kPa

94. What is the soil water potential at permanent wilting point ?
a. 10-33 kPa b. 33 kPa
c. 1500 kPa d. 33-1500 kPa

95. What is the soil water potential at plant available water ?
a. 10-33 kPa b. 33 kPa
c. 1500 kPa d. 33-1500 kPa

96. Which instrument is used for the measurement of negative soil water pressure (suction) ?
a. Hydrometer b. Piezometer
c. Tensiometer d. Infiltrometer

97. Tensiometer can be used to measure soil water pressure up to
a. 700-800 cm b. 800-900 cm
c. 900-1000 cm d. 1500 cm

98. The pF scale was given by
a. Sorenson b. Atterberg
c. White and Beckett d. Schofield

99. All parts of tensiometer are filled with which of the following ?
a. Water b. Mercury
c. HCl
d. Lead/silver chloride

Answers									
	83. e	86. a	89. b	92. c	95. a	98. d			
	84. c	87. d	90. c	93. b	96. c	99. a			
	85. b	88. c	91. b	94. c	97. b				

100. For the measurement of soil water potential beyond 900 cm by tensiometer, _____ can be use in tensiometer instead of water.
a. HCl
b. Mercury
c. Platinum
d. AgCl

101. Soil water potential in field can be measured by
a. Tensiometer
b. Porous cup apparatus
c. Pressure plate apparatus
d. Both b and c
e. All the above

102. In the laboratory, soil water potential can be measured by
a. Porous cup apparatus
b. Pressure plate apparatus
c. Tensiometer
d. Both a and b
e. All the above

103. In the laboratory, soil water potential can be measured by porous cup apparatus up to
a. 10 bars b. 5 bars
c. 1 bar d. 15 bars

104. In the laboratory, soil water potential can be measured by pressure plate apparatus up to
a. 15 bars b. 10 bars
c. 5 bars d. 1 bar

105. In the field, tensiometer can be used to measure soil water suction up to
a. 0.75 bars b. 0.85 bars
c. 0.95 bars d. 1.0 bar

106. Water held in the pores and drained by 100 cm of suction is called as
a. Partially available water
b. Available water
c. Drainage water
d. Both a and b

107. Percentage of pores which is drained by 100 cm of suction is called as
a. Aeration porosity
b. Porosity
c. Water holding capacity
d. Wilting point

108. What is the size of the macro or non-capillary pores ?
a. $> 6\mu$ b. $> 10\mu$
c. $> 15\mu$ d. $> 20\mu$

109. What is the size of micro or capillary pores?
a. $> 6\mu$ b. $> 10\mu$
c. $> 15\mu$ d. $> 20\mu$

110. What is the suction of partially available water in soil ?
a. 33-1500 kPa b. 10-33 kPa
c. 10 – 100 kPa d. 33-100 kPa

111. Arrange the following soil texture in the order of decreasing water retention capacity.
a. Loam > Clay > Sandy
b. Sandy > Loam > Clay
c. Clay > Loam > Sandy
d. Sandy > Clay > Loam

112. Arrange the following soils in decreasing order of water retention capacity.
a. Laterite > Alluvial > Black
b. Alluvial > Laterite > Black
c. Black > Laterite > Alluvial
d. Black > Alluvial > Laterite

Answers					
	100. b	103. c	106. c	109. a	112. d
	101. a	104. a	107. a	110. b	
	102. d	105. b	108. c	111. c	

113. In-situ measurement of soil water can be done by
a. Electrical resistance method
b. Neutron scattering method
c. Gamma-rays attenuation technique
d. All the above

114. Which of the following blocks is/are used in electrical resistance method of soil water estimation ?
a. Gypsum b. Nylon
c. Fibre glass d. All

115. What is the source of gamma radiation in gamma-ray scanner used for soil water estimation ?
a. Cesium 137 b. Strontium
c. Lanthanum d. Silver

116. What is the percentage of N_2 in atmospheric air ?
a. 25.0 b. 79.0
c. 20.97 d. 72.0

117. What is the percentage of carbon dioxide in atmospheric air ?
a. 0.03 b. 0.3
c. 0.003 d. 3

118. What is the percentage of carbon dioxide in soil air ?
a. 0.03 b. 0.003
c. 0.3 d. 3

119. More than 90 per cent of gaseous exchange in soil takes place by
a. Mass flow b. Diffusion
c. Partial diffusion d. All

120. Diffusion of gases under total gas pressure gradient takes place by
a. Mass flow b. Diffusion
c. Partial diffusion d. All

121. Heat capacity (on oven dry basis) = Specific heat × _____
a. Bulk density
b. Volume
c. Weight
d. Particle density

122. Heat capacity (on volume basis) = Specific heat × _____
a. Bulk density b. Volume
c. Weight d. Particle density

123. What is the unit of heat capacity on volume basis ?
a. cal cm^{-3} b. cal g^{-1}
c. kcal cm^{-3} d. kcal g^{-1}

124. What is the unit of heat capacity on weight basis ?
a. cal cm^{-3} b. cal g^{-1}
c. kcal cm^{-3} d. kcal g^{-1}

125. What is the unit of specific heat ?
a. kcal g^{-1} b. kcal cm^{-3}
c. cal cm^{-3} d. cal g^{-1}

126. What is the unit of thermal gradient ?
a. J kg^{-1} $^oC^{-1}$
b. J sec^{-1} $^oC^{-1}$
c. cal cm^{-1} sec^{-1} $^oC^{-1}$
d. cal sec^{-1} $^oC^{-1}$

127. Thermal conductivity follows the order of
a. Peat > Clay > Loam > Sand
b. Sand > Loam > Clay > Peat
c. Loam > Peat > Clay > Sand
d. Peat > Loam > Clay > Sand

128. The heat absorbed by soil during day on sunny days is lost during night by
a. Radiation b. Conduction
c. Convection d. Transmission

Answers						
	113. d	116. b	119. b	122. a	125. d	128. a
	114. d	117. a	120. a	123. a	126. c	
	115. a	118. c	121. c	124. b	127. b	

129. The soil temperature regimes classification followed in India is/are
a. ISSS classification
b. USDA classification
c. Russian classification
d. Both a and b

130. The dominant spectral colour in Munsell colour chart indicates
a. Hue b. Value
c. Chroma d. All

131. In soil colour determination, Hue is related to
a. Quality of light
b. Intensity of light
c. Wavelength of light
d. All

132. Relative purity or strength of spectral colour in Munsell colour chart indicates
a. Hue b. Value
c. Chroma d. All

133. In soil colour determination, Chroma is related to
a. Quality of light
b. Intensity of light
c. Wavelength of light
d. All

134. In soil colour determination, Value is related to
a. Quality of light
b. Intensity of light
c. Wavelength of light
d. All

135. What is the total number of primary colours available in Munsell colour chart ?
a. Two b. Three
c. Four d. Five

136. What is the range of Hue in Munsell colour chart ?
a. 0 – 10 b. 1 – 10
c. 0 – 9 d. 1 – 9

137. What is the range of Value in Munsell colour chart ?
a. 1 – 10 b. 0 – 9
c. 0 – 10 d. 1 – 9

138. In Munsell colour chart, Hue number zero denotes
a. Absolute white
b. Absolute block
c. Absolute yellow
d. Absolute red

139. In Munsell colour chart, Hue number 10 denotes
a. Absolute white
b. Absolute block
c. Absolute yellow
d. Absolute red

140. In Munsell colour chart, Value number zero denotes
a. Absolute white
b. Absolute block
c. Absolute yellow
d. Absolute red

141. In Munsell colour chart, Value number 10 denotes
a. Absolute white
b. Absolute block
c. Absolute yellow
d. Absolute red

142. What is the range of Chroma in Munsell colour chart ?
a. 0 – 10 b. 0 – 8
c. 1 – 10 d. 0 – 9

Answers						
	129. b	132. c	135. b	138. d	141. a	
	130. a	133. b	136. a	139. c	142. b	
	131. c	134. a	137. c	140. b		

143. Diffusion of gases under the concentration gradient takes place by
a. Mass flow b. Diffusion
c. Root interception d. All

144. Water content at which soil will start to crumble when it is rolled into a thread under the palm of the hand and this limit is called as
a. Lower limit
b. Liquid limit or upper plastic limit
c. Sticky limit
d. Plastic limit or lower plastic limit

145. Water content above which a mixture of soil and water flow as a viscous liquid and below which the material is plastic and this limit is called as
a. Liquid limit or upper plastic limit
b. Sticky limit
c. Plastic limit or lower plastic limit
d. Lower limit or shrinkage limit

146. Water content above that a mixture of soil and water will adhere to a steel spatula and this limit is called as
a. Liquid limit or upper plastic limit
b. Plastic limit or lower plastic limit
c. Sticky limit
d. Lower limit or shrinkage limit

147. Below the shrinkage limit of soil consistency, the soil is
a. Moist and friable
b. Dry and hard
c. Wet and plastic
d. Moist and plastic

148. Between the shrinkage limit and the lower plastic limit of soil consistency, the soil is
a. Moist and friable
b. Dry and hard
c. Wet and plastic
d. Moist and plastic

149. Between the lower plastic limit and upper plastic limit of soil consistency, the soil is
a. Moist and friable
b. Dry and hard
c. Wet and plastic
d. Moist and plastic

150. Difference between the lower plastic limit and upper plastic limit of soil consistency is called as
a. Sticky limit
b. Shrinkage limit
c. Plastic limit
d. Plasticity index

151. Swelling and shrinkage properties of soil can be determined by
a. Co-efficient of linear extensibility (COLE)
b. Potential volume change (PVC)
c. Swell index
d. All the above

152. Significant swelling and shrinkage of soil is expected when co-efficient of linear extensibility (COLE) exceeds the value of
a. 0.03 b. 0.06
c. 0.09 d. 1.32

153. The value of co-efficient of linear extensibility (COLE) higher than _____ indicates the presence of a significant amount of montmorillonite or swelling clay.
a. 0.09 b. 0.03
c. 1.32 d. 0.06

Answers				
	143. b	146. c	149. c	152. c
	144. d	147. b	150. d	153. b
	145. a	148. a	151. d	

154. In soil, water pressure head or hydraulic head at saturated condition is measured by
a. Porus cup apparatus
b. Pressure plate apparatus
c. Piezometer
d. Tensiometer

155. In soil, water pressure head or hydraulic head under unsaturated condition is measured by
a. Porus cup apparatus
b. Pressure plate apparatus
c. Piezometer
d. Tensiometer

156. At high soil moisture suction, water potential is measured by
a. Porus cup apparatus
b. Pressure plate apparatus
c. Piezometer
d. Tensiometer

157. At low soil moisture suction, water potential is measured by
a. Porus cup apparatus
b. Pressure plate apparatus
c. Piezometer
d. Tensiometer

158. At high water potential, water retention in soil is mainly controlled by
a. Soil consistency
b. Soil porosity
c. Soil structure
d. Soil texture

159. At low water potential, water retention in soil is mainly controlled by
a. Soil consistency
b. Soil porosity
c. Soil structure
d. Soil texture

160. Chemical(s) used as a detector in neutron moisture meter in the estimation of soil moisture
a. Ba and Ra
b. Americium and Beryllium
c. BF_3
d. Both a and b

161. Which is/are the neutron emitter or source of neutron in neutron moisture meter in the estimation of soil moisture ?
a. Ba and Ra
b. Americium and Beryllium
c. BF_3
d. Both a and b

162. What is the apparent dielectric constant for dry state in soil moisture determination?
a. 3 – 6 b. 10 – 15
c. 15 – 20 d. 20 – 30

163. What is the apparent dielectric constant for wet state in soil moisture determination?
a. 3 – 6 b. 10 – 15
c. 15 – 20 d. 20 – 30

164. Pressure potential/hydrostatic pressure in soil is estimated by
a. Porus cup apparatus
b. Pressure plate apparatus
c. Piezometer
d. Tensiometer

165. The equation, $V = \sqrt{2}\,gz$ is called as
a. Reynold's equation
b. Torricelli's equation
c. Poiseuille's equation
d. Furier's equation

166. In dry condition, gas diffusion is more in coarse textured soil (True/False)

Answers					
	154. c	157. b	160. d	163. d	166. F
	155. d	158. c	161. c	164. c	
	156. a	159. d	162. a	165. b	

167. In wet condition, gas diffusion is more in coarse textured soil (True/False)

168. What is the unit of Oxygen Diffusion Rate (ODR)?
a. $g/cm^2/min$ b. cm/g/min
c. min/cm/g d. None

169. The value of diffusion co-efficient in soil is
a. 0.2 – 0.4 b. 0.4 – 0.6
c. 0.6 – 0.8 d. 0.8 – 1.0

170. The Land Capability Classification (LCC) based on the physical characteristics of soil was developed by
a. USDA b. Russia
c. ISSS d. India

171. Bulk density of organic matter is
a. 0.3 g/cc b. 0.5 g/cc
c. 0.6 g/cc d. 1.0 g/cc

172. Percentage of organic matter in soil (on volume basis) is
a. 5 b. 10
c. 25 d. 50

173. Percentage of organic matter in soil (on weight basis) is
a. 5 b. 10
c. 25 d. 50

174. The bulk density of a soil must consider the _____.
a. Total soil volume and oven dry soil weight
b. Volume of soil and volume of pore space
c. Pore volume and weight of soil particles
d. Volume of soil particles and weight of soil particles

175. The weight of a graduated cylinder is 54 grams, the cylinder is filled with 85 ml of oven dry field soil. The weight of soil and cylinder is 186 grams. The bulk density of the soil is _____g/cc.
a. 0.65 b. 1.15
c. 1.35 d. 1.55

176. Diffusion in soil is
a. The movement of ions down a concentration gradient
b. PO_4 moving with water via gravity flow
c. Movement of ions by electrostatic attraction
d. Evapotranspiration in plants

177. Matric potential is always negative (True/False)

178. During puddling macropores will be more while micropores will be less (True/False)

179. Which of the following structure is mostly influenced by the practical methods of soil management ?
a. Platy and columnar
b. Prism and columnar
c. Granular and crumby
d. Prism and platy

180. Which of the following process is the starting process of aggregate formation?
a. Flocculation
b. Deflocculation
c. Compaction
d. All

181. What is the percentage of air in soil below which mostly plant suffer ?
a. 10% b. 10-12%
c. 10-15% d. 15-20%

Answers					
	167. T	170. a	173. a	176. a	179. c
	168. a	171. b	174. a	177. T	180. a
	169. c	172. c	175. d	178. T	181. b

182. Of the several agroclimatic elements, the broad distribution of crop in India is mainly governed by
a. Rainfall pattern
b. Mean daily temperature
c. Solar energy received
d. Relative humidity

183. What is the upper limit of available water in soil ?
a. Permanent wilting point
b. Hygroscopic point
c. Field capacity
d. All

184. Run-off occurs in soil when the infiltration capacity is high (True/False).

185. In which of the following soils maximum loss of soil is caused by saltation type of wind erosion ?
a. Loamy soils b. Clayey soils
c. Sandy soils d. None

186. One cusec is equal to how many litres of water ?
a. 27. 32 b. 28.32
c. 29.32 d. 30.32

187. Soil surface area _____ as soil particle size _____.
a. Increases; Increases
b. Increases; Decreases
c. Decreases; Increases
d. Decreases; Decreases

188. Three types of soil structure includes
a. Prisms, Blocky, Granular
b. Columnar, Porus, Brittle
c. Fine, Medium and Coarse
d. Brittle, Firm and Friable
e. Sand, Silt and Clay

189. Stoke's law was given by G.G. stokes in
a. 1851 b. 1861
c. 1871 d. 1891

190. What is the unit of thermal diffusivity ?
a. cm/°C/sec b. cm^2/ sec
c. cm/sec^2 d. sec/°C/cm

191. What is the size of medium pores in soil ?
a. < 10 m b. 10 - 20 m
c. 20 - 200 m d. 2 - 20 m

192. What is the size of fine pores in soil ?
a. < 10 m b. 10 - 20 m
c. 20 - 200 m d. 2 - 20 m

193. What is the unit of Oxygen Diffusion Rate (ODR) ?
a. cm/°C/sec b. $g/cm^2/min$
c. sec/°C/cm d. $cm^2/g/min$

194. What is the critical limit of Oxygen Diffusion Rate ?
a. 20×10^{-8} $g/cm^2/min$
b. 22.9×10^{-8}
c. 3.9×10^{-8}
d. 25×10^{-8}

195. What is the amount of energy required to evaporate one gram of water ?
a. 560 cal b. 570 cal
c. 580 cal d. 590 cal

196. What is the unit of specific heat ?
a. Jules/gram b. Jules/kg
c. cal/g d. cal/kg

197. What is the unit of thermal conductivity?
a. J/°C/cm/sec b. °C/J/cm/sec
c. °C/J/sec/cm d. J/cm/S/°C

198. What is the unit of viscosity ?
a. cm^2/sec b. cm/sec^2
c. Poise d. mg/m^3

Answers						
	182. a	185. c	188. a	191. c	194. a	197. a
	183. c	186. b	189. a	192. d	195. c	198. c
	184. F	187. b	190. c	193. b	196. c	

199. Finer is the soil texture, lower will be bulk density. (True/False)

200. Which soil has more porosity/or pore space?
a. Clayey soils
b. Sandy soils
c. Loamy soils
d. Sandy loamy soils

201. With the increase in compactness and wetness of the soils, thermal conductivity will be
a. Increased b. Decreased
c. No change d. None

202. Specific heat of soil is
a. 1 cal/g b. 0.38 cal/g
c. 0.2 cal/g d. 0.44 cal/g

203. What is the amount of energy released during the decomposition of one mole organic matter ?
a. 580 cal/mol b. 478 KJ/mol
c. 478 cal/mol d. 580 KJ/mol

204. Specific heat of minerals is
a. 1 cal/g b. 0.44 cal/g
c. 0.11 cal/g d. 0.38 cal/g

205. What is the specific heat of organic matter?
a. 1 cal/g b. 0.44 cal/g
c. 0.11 cal/g d. 0.38 cal/g

206. The pF scale was given by
a. Sorenson b. Schofield
c. Chepil and Woodruff
d. White and Beckett

207. 10 cm of water column is equal to the pF scale of
a. One b. Two
c. Three d. Four

208. The value of pF scale at saturated condition in soil is
a. Zero b. 2.53
c. 4.18 d. 7.0

209. What is the value of pF scale at field capacity ?
a. Zero b. 2.53
c. 4.18 d. 7.0

210. What is the value of pF scale at oven dry condition ?
a. 2.53 b. 4.18
c. 4.50 d. 7.0

211. What is the value of pF scale at hygroscopic point ?
a. 2.53 b. 4.18
c. 4.50 d. 7.0

212. What is the value of pF scale at wilting point ?
a. 4.50 b. 4.28
c. 4.18 d. 4.89

213. Salt water potential is less than pure water potential.(True or False)

214. Soils containing _____ of colloids exhibits plasticity.
a. > 5 % b. > 10 %
c. > 15 % d. > 20 %

215. Arrange the cations based on their flocculating power in decreasing order.
a. Al > Ca and H > Mg > K > Na
b. Ca and H > Al > Ms > K > Na
c. Ca and H > Mg > Al > K > Na
d. Na > K > Mg > Ca and H > Al

216. Soil compaction, increases the
a. Bulk density
b. Hydraulic conductivity
c. Macrospores
d. Water intake rate

Answers									
	199. T	203. b	207. a	211. c	215. a
	200. a	204. c	208. a	212. c	216. a
	201. a	205. b	209. b	213. T	
	202. c	206. b	210. d	214. c	

217. By soil compaction, which one of the following is decreased ?
a. Microspores
b. Thermal conductivity
c. Thermal diffusivity
d. Hydraulic conductivity

218. Soils that has _____ % of clay prone to puddling.
a. > 10 b. > 20
c. > 25 d. > 30

219. Puddling increases the aggregated structure in soils (True/False).

220. Volume wetness = Mass wetness × _____
a. Bulk density
b. Particle density
c. 1/ Bulk density
d. 1/ Particle density

221. _____ and _____ are called as the "skeleton" of the soil.
a. Clay..... Silt
b. Clay..... Sand
c. Sand..... Silt
d. None

222. Which of the following is called as the "flesh" of the soil ?
a. Sand b. Silt
c. Clay d. None

223. The larger limit of particles exhibiting Brownian movement is approximately _____.
a. 0.002 mm b. 0.0002 mm
c. 0.02 mm d. 0.05 mm

224. Columnar structure are mostly found in
a. Salt affected soils
b. Sodic soils
c. Black soils
d. Both a and b
e. All

225. In the wet sieving technique of soil structures measurement, _____ is more satisfactory as the lower limit of the size of the aggregates.
a. 0.1 mm b. 0.25 mm
c. 0.01 mm d. 0.5 mm

226. Of the following soils, _____ is occupied by 50 % solid, 25 % air and 25 % water.
a. Silt loam soils
b. Loam soils
c. Sandy clay loam soils
d. Silt lay loam soils

227. What is the unit of bulk density/particle density ?
a. g/cm^3 b. Mg/m^3
c. Mg/cm^3 d. g/m^3
e. Both a and b

228. The ratio of total volume of soil to the total mass of dry soil is called as
a. Dry bulk density
b. Wet bulk density
c. Specific volume
d. Porosity
e. Particle density

229. Specific volume of soil is expressed as
a. cm^3/g b. cm^2/g
c. g/cm^3 d. g/cm^2

230. Specific volume of coarse textured soils varies from
a. 0.55 to 0.70 cm^3/g
b. 0.65 to 0.70 cm^3/g
c. 0.50 to 0.720 cm^3/g
d. 0.55 to 0.75 cm^3/g

Answers									
	217. d	220. a	223. b	226. a	229. a
	218. b	221. c	224. d	227. e	230. a
	219. T	222. c	225. b	228. c	

231. Specific volume of fine textured soils varies from
a. 0.75 to 0.95 cm^3/g
b. 0.70 to 0.95 cm^3/g
c. 0.75 to 0.90 cm^3/g
d. 0.70 to 0.90 cm^3/g

232. The ratio of total volume of pores spaces to the total volume of soil is called as
a. Capillary porosity
b. Non-capillary porosity
c. Porosity
d. Void ratio

233. The capillary porosity of soil is determined by finding the volume of water retained in the soil at _____ tension.
a. 40 cm b. 45 cm
c. 50 cm d. 60 cm

234. The ratio of total volume of pores to the total volume of soil solids is called as
a. Capillary porosity
b. Non-capillary porosity
c. Porosity
d. Void ratio

235. _____ is an index of the relative volume of soil pores.
a. Capillary porosity
b. Non-capillary porosity
c. Porosity
d. Void ratio

236. The volume of void ratio in soil usually varies between
a. 0.5 and 2.0 b. 0.3 and 2.0
c. 1.0 and 2.0 d. 1.5 and 2.0

237. The ratio of total volume water occupied in the pore spaces at a specific time to the total volume of soil is called as
a. Gravimetric water content
b. Mass wetness
c. Volume wetness
d. Degree of saturation

238. The ratio of the volume of water present in the soil at a particular time to the volume of pores is called as
a. Gravimetric water content
b. Mass wetness
c. Volume wetness
d. Degree of saturation

239. The ratio of volume of air space to the total volume of soil is called as
a. Capillary porosity
b. Non-capillary porosity
c. Air-filled porosity
d. Porosity

240. _____ is a measure of the relative air content of the soil.
a. Capillary porosity
b. Non-capillary porosity
c. Air-filled porosity
d. Porosity

241. In USDA classification of soil texture, what is the size of medium sand ?
a. 0.05 – 0.10 mm
b. 0.10 – 0.25 mm
c. 0.25 – 0.5 mm
d. 0.5 – 1.0 mm

242. In USDA classification of soil texture, what is the size of silt ?
a. 0.05 – 0.10 mm
b. 0.10 – 0.25 mm
c. 0.25 – 0.5 mm
d. 0.002 – 0.02 mm

Answers							
	231. d	234. d	237. c	240. c
	232. c	235. d	238. d	241. c
	233. c	236. b	239. c	242. a

243. Arrange the soil texture based on their textural orders.
a. Sandy loam → Loamy-sand → Silty loam → Loam
b. Loamy sand → Sandy loam → Silty loam → Loam
c. Loamy sand → Sandy loam → Loam → Silty loam
d. Sandy loam → Loamy sand → Loam → Silty loam

244. Soils containing more than _____ % of organic matter are classified as peats.
a. 20 b. 30
c. 40 d. 50

245. Soils containing more than _____ % of organic matter are classified as mucks.
a. 20 – 30 b. 20 – 40
c. 20 – 50 d. 30 – 50

246. Clay-to-clay particle interaction, particularly under dry condition, takes place due to
a. Electrostatic forces
b. Van-der Waal's forces
c. Cementing agents
d. Both a and b
e. All the above

247. Of the following, which soil texture is highly susceptible to crusting ?
a. Clay loam b. Silty clay
c. Silty clay loam d. Loam

248. Which mineral imparts black colour to the soil ?
a. Glauconite
b. Manganese oxide
c. Lepidocrosite
d. Hematite

249. Which mineral imparts green colour to the soil ?
a. Glauconite
b. Manganese oxide
c. Lepidocrosite
d. Hematite

250. What is the viscosity of water at 25 °C ?
a. 0.0089 poise b. 0.089 poise
c. 0.89 poise d. 8.9 poise

251. The soil moisture characteristic can be determined with the help of pressure plate apparatus in the broad range of suction _____.
a. From 0 to 15 bar
b. From 1 to 15 bar
c. Up to 1 bar
d. Up to – 0.9 bar

252. Porus cup apparatus can be used for the determination of
a. Saturation water content
b. Non-capillary water
c. Drainable pore volume
d. Both a and b
e. All the above

253. Pressure plate can be used for the determination of
a. Field capacity
b. Wilting point
c. Non-capillary water
d. Both a and b
e. All the above

254. Of the following which soil property is more important in controlling water retention at low potentials (<–1 bar) ?
a. Structure
b. Texture
c. Consistency
d. Colour

Answers							
	243. c	246. d	249. a	252. e
	244. d	247. c	250. a	253. d
	245. c	248. b	251. a	254. b

255. The volume of pore space filled with air when the soil is under a tension of _____ milli bar is called as air capacity or non-capillary porosity.
a. 30 b. 40
c. 50 d. 60

256. The diffusion of gases through dry soils of fine texture is higher than that through dry soils of coarse texture (True/False)

257. The air-filled porosity in soil can be evaluated by
a. Air-space pycnometer
b. Air permeameter
c. Gasometer
d. None

258. Air permeability of soil under field and laboratory conditions can be determined by
a. Air permeameter
b. Gasometer
c. Air-space pycnometer
d. Both a and b
e. All the above

259. Unit of volumetric heat capacity is
a. J/m/sec/°C b. m^2/sec
c. $J/m^3/°c$ d. J/kg/°c

260. Black soils cover almost ____ % of the geographical area of India.
a. 9 b. 20
c. 21 d. 22

261. Red soils cover almost _____ % of the geographical area of India.
a. 9 b. 20
c. 21 d. 22

262. Plants generally start wilting at relative leaf water content of (RLWC) _____.
a. 50-60 % b. 60-75 %
c. 75-85 % d. 80-90 %

263. Soil texture influences
a. Cohesion b. Adhesion
c. Plasticity d. All

264. Soil texture if assessed by feel method is done by
a. Ball formation
b. Ribbon formation
c. Staining
d. All

265. Of soil feels very gritty by fingers and no ball is formed also no ribbon and stains are found then it is
a. Sand by texture
b. Loam by texture
c. Clay by texture
d. All

266. Of a soil feels very gritty, forms very easily broken wall stechiness is little and no ribbon is formed then its texture is
a. Sand b. Loamy sand
c. Sandy loam d. Loam

267. Of a soil feels moderately gritty, forms fairly firm ball which is easily broken, and it deficiency stains the finger with no ribbon formation it, texture is
a. Sand b. Loamy sand
c. Sandy loam d. Loam

268. Of a soil feels neither very gritty nor very smooth and it forms firm ball, with stains is the fingers its texture is
a. Sand b. Loamy sand
c. Sandy loam d. Loam

Answers					
	255. c	258. d	261. b	264. d	267. c
	256. T	259. c	262. c	265. a	268. d
	257. a	260. d	263. d	266. b	

269. Of a soil feels smooth or stick buttery feel, forms firm ball stains in the fingers and has slight tendency to ribbon with flaky surface its texture is
a. Loam b. Silt loam
c. Clay loam d. Clay

270. Of a soil feels slightly gritty, forms moderately hard ball when dry and stains in the finger and ribbons out on squeezing which also breaks easily it, texture is
a. Loam b. Silt loam
c. Clay loam d. Clay

271. Of a soil feels very smooth, forms moderately hard ball when dry, stains in the finger and shows some fluking on ribbon surface similar to silt loam it, texture is
a. Silt loam b. Silty clay loam
c. Clay d. Loam

272. Of a soil feels very smooth, forms hard ball which when dry cannot be crushed by fingers and stains definitely and when squared forms out into long ribbons, it, texture is
a. Clay loam b. Loam
c. Sand d. Clay

273. Oxidation of organic carbon in soil sample can be obtained by treatment with
a. 10% H_2O_2 b. 20% H_2O_2
c. 30% H_2O_2 d. 50% H_2O_2

274. H_2O_2 additions in soils result into
a. Frothing
b. Evolution of gas
c. Change in soil Coles
d. All

275. Which of the following is a soil dispersing agent ?
a. Sodium fluoride
b. Sodium chloride
c. Sodium phosphate
d. Sodium hexameta phosphate

276. The removal of free iron oxides requires use of which of the following reducing agent ?
a. Sodium dithionate b. Sodium nitrate
c. Both a and b d. None

277. Present of $CaCO_3$ in soils makes dispersion
a. Easy b. Difficult
c. Same d. No effect

278. The soil water suspension treated with sodium hexametaphosphate should be homogenized
a. For longer period
b. For shorter period
c. Not affected with time period
d. None of the above

279. Use of water compared to non-polar liquids gives
a. Higher particle density value
b. Lower particle density values
c. Same particle density values
d. None

280. Which of the following is/are non-polar liquid ?
a. Toluene
b. Xylene
c. Carbon tetrachloride
d. All

281. Bulk density in soils can be estimated by
a. Core method
b. Excavation method
c. Both
d. None

Answers					
	269. b	272. d	275. d	278. b	281. c
	270. c	273. c	276. a	279. a	
	271. b	274. d	277. b	280. d	

282. Soil core samples should not be taken from
a. Dry soils b. Wet soils
c. Both d. None

283. Bulk density of a soil is influenced by
a. Green measuring
b. Soil conditioners
c. Tillage
d. All

284. Which of the following is a simple notation of per cent total pore space ?
a. 100 – % Solid space
b. 100 – % Air space
c. 100 – % liquid space
d. All

285. Per cent solid space is soil is expressed by
a. Bulk density / Particle density × 100
b. Particle density / Bulk density × 100
c. (Particle density / Bulk density) × 100
d. (Bulk density – Particle density) × 100

286. Per cent total pore spaces in soils are
a. Micro pores is soil
b. Macro pores is soil
c. Sum of micros macro pores is soil
d. None

287. Who gave definition of air capacity of soil by field method ?
a. Kopecky b. Block
c. Single d. None

288. Per cent capillary water can be estimated by
a. % Moisture in the soil at field capacity – % Moisture at hygroscopic co-efficient
b. Mass of capillary water / Density of water
c. % Capillary water × Moisture of oven dry soil / 100
d. Volume of capillary water × 100 / Volume of soil

289. Per cent moisture of capillary water can be estimated by
a. % Moisture in the soil at field capacity – % Moisture at hygroscopic co-efficient
b. Mass of capillary water / Density of water
c. % Capillary water × Moisture of oven dry soil / 100
d. Volume of capillary water × 100 / Volume of soil

290. Per cent volume of capillary water can be estimated by
a. % Moisture in the soil at field capacity – % Moisture at hygroscopic co-efficient
b. Mass of capillary water / Density of water
c. % Capillary water × Moisture of oven dry soil / 100
d. Volume of capillary water × 100 / Volume of soil

291. Per cent capillary pore space can be estimated by
a. % Moisture in the soil at field capacity – % Moisture at hygroscopic co-efficient
b. Mass of capillary water / Density of water
c. % Capillary water × Moisture of oven dry soil / 100
d. Volume of capillary water × 100 / Volume of soil

Answers				
282. c	285. a	288. a	291. d	
283. d	286. c	289. c		
284. a	287. a	290. b		

292. Air capacity of soil should be greater than _____ for all the crops except paddy.
a. 10% b. 20%
c. 30% d. 40%

293. The requirement of optimum air capacity of the soil by crops vary with
a. Types of plants
b. Stages of plant development
c. Types of soil
d. All

294. The soil strength of a soil is positively related to its
a. Bulk density
b. Moisture content
c. Both a and b
d. None

295. The soil strength is inversely related to
a. Bulk density
b. Moisture content
c. Both a and b
d. None

296. The bulk density is a direct measure of
a. Soil strength
b. Soil compaction
c. Moisture content
d. Soil solids

297. The bulk density of entire soil profile can be mapped by
a. Co – 65 radiation
b. UV radiation
c. α – rays d. β – rays

298. Mineral particles in close contact with seeds other are held together by
a. Cohesion b. Ligands
c. Iron oxides d. $CaCO_3$
e. All the above

299. Aggregate size distribution affects
a. Air capacity
b. Water reduction
c. Water movement d. All

300. Aggregate size of soils are affected by
a. Tillage b. Cropping
c. Cultural practices d. All

301. Soils having higher proportion of large size aggregate are
a. Less productive
b. More productive
c. Neither more nor less productive
d. None

302. Soils with higher water stable aggregate will have a high proportion of
a. Small pores b. Large pores
c. Very small pore d. All

303. High infiltration in soils is influenced by
a. Small pores b. Large pores
c. Very small pore d. All

304. Effect of tillage, cultural and manorial practices on soil aggregate can be evaluated by determining
a. MWD b. GMD
c. log GMD d. % Aggregate
e. All the above

305. The hydraulic conductivity of soil is affected by
a. Temperature b. Pressure
c. Both d. None

306. Intrinsic permeability to water is related to
a. Hydraulic conductivity
b. Infiltration
c. Bulk density
d. Particle density

Answers					
292. a	295. b	298. e	301. b	304. e	
293. d	296. b	299. d	302. b	305. a	
294. a	297. a	300. d	303. b	306. a	

307. When a soil is having hydraulic conductivity > 25.0 cm hr^{-1}, it, permeability will be
a. Slow b. Moderate
c. Rapid d. Very rapid

308. Field capacity soil moisture constant signifies the
a. Upper level of plant available water
b. Lower level of plant available water
c. Both a and b
d. None of the above

309. Which of the following is a close approximation of field capacity ?
a. Moisture equivalent
b. Capillary conductivity
c. Capillary volume
d. Hygroscopic coefficient

310. Which of the following notation is used to relate field capacity with moisture equivalent ?
a. FC = 2.62 + MC × 0.865
b. WC = ME/1.84
c. HC = WC × 0.684
d. None

311. Which of the following notation is used to relate water content with moisture equivalent ?
a. FC = 2.62 + MC × 0.865
b. WC = ME/1.84
c. HC = WC × 0.684
d. None

312. Which of the following notation is used to relate hygroscopic coefficient with water content ?
a. FC = 2.62 + MC × 0.865
b. WC = ME/1.84
c. HC = WC × 0.684
d. None

313. The concept of incipient wilting was first described by
a. Furr and Reeve
b. Veihmeyers Hendrickson
c. Milk d. Bouyoucos

314. A plant having larges top/root ratio will be
a. Less affected by moisture stress
b. More affected by moistures stress
c. Not affected
d. None of the above

315. There permanent wilting percentage vary with
a. Soil texture
b. Soil structure
c. Mineralogical composition
d. All

316. Plant available water is the difference between
a. Field capacity and Permanent wilting point
b. Permanent wilting point and Field capacity
c. Hydraulic conductivity and Permanent wilting point
d. Permanent wilting point and Hydraulic conductivity

317. Soil moisture tension increase with the
a. Increase in soil moisture content
b. Decrease in soil
c. Both a and b
d. None of the above

318. If tensiometer is installed in the evening, when one can take measurement on soil moisture tension ?
a. Next morning b. Next evening
c. Same night d. Over night

Answers									
	307. d	310. a	313. a	316. a
	308. a	311. b	314. b	317. b
	309. a	312. c	315. d	318. a

319. Relationship between soil moisture tension and soil moisture content depends upon
a. Soil texture
b. Mineralogical composition
c. Organic portion
d. All

320. Tensiometer measurement is a measurement of
a. Matric potential
b. Energy status of water
c. Soil moisture potential
d. All

321. The porus cup in a mercury manometer is made up of
a. Sand
b. Kaolin suspension
c. Soil : water suspension
d. Mercury

322. Tensiometer measurements are not suitable for
a. Sandy soils b. Loamy soils
c. Silty soils d. Clayey soils

323. Scheduling of irrigation is crops should be based on
a. Soil moisture content
b. Soil moisture regime
c. Both a and b d. None

324. Which indices of soil structure will be highest for FYM ?
a. Water Soluble Aggregate (%)
b. Mean Weight Diameter
c. Geometric Mean Diameter
d. Cumulative Mean Weight Diameter

325. Which indices of soil structure will be highest for manure ?
a. Water Soluble Aggregate (%)
b. Mean Weight Diameter
c. Geometric Mean Diameter
d. Cumulative Mean Weight Diameter

326. Which indices of soil structure will be highest for SSP ?
a. Water Soluble Aggregate (%)
b. Mean Weight Diameter
c. Geometric Mean Diameter
d. Cumulative Mean Weight Diameter

327. 1 bar is equal to
a. 10^4 dynes cm^{-2}
b. 10^5 dynes cm^{-2}
c. 10^6 dynes cm^{-2}
d. None

328. 1 bar is equal to
a. 1 KPU b. 10 KPU
c. 100 KPU d. None

329. Which gas has more percent volume composition in swampy rice land ?
a. N_2 b. O_2
c. CO_2 d. H_2

330. Coefficient of linear extensibility is also denoted by
a. PVC b. Swell index
c. Both a and b d. None

331. Soil crusting is related to
a. Soil composition b. Bulk density
c. Soil strength
d. All the above
e. None of the above

332. Soil crusts are formed due to
a. High Exchangeable Sodium Percentage
b. Poor structure
c. Low organic matter
d. All the above

Answers					
	319. d	322. d	325. a	328. c	331. d
	320. d	323. b	326. a	329. a	332. d
	321. b	324. a	327. c	330. c	

333. Content of CO_2 in soils is
a. Higher
b. Lower
c. Same
d. No change than atmospheric CO_2

334. Size of which of the primary particles of soil is same in both ISSS and USDA system
a. Sand b. Silt
c. Clay d. Both a and b

335. Under USDA system of soil textural classification, size of silt is
a. < 0.05 mm
b. > 0.05 mm
c. 0.05 to 0.002 mm
d. < 0.0002 mm

336. Size of clay under ISSS system is
a. < 0.02 mm b. < 0.2 mm
c. < 0.002 mm d. < 0.0002 mm

337. In gravimetric method of soil moisture estimation, moist soil is oven dried at
a. 10 °C b. 105 °C
c. 140 °C d. 120 °C

338. Which of the soil materials listed below is likely to have the smallest bulk density ?
a. Sand b. Silt loam
c. Peat d. Sandy loam

339. If large amounts of sand are incorporated into a flower bed the bulk density would
a. Increase b. Decrease
c. Not change d. None

340. Compaction of a soil due to golf cart traffic would cause the bulk density to
a. Increase b. Decrease
c. Not change d. Be unity

341. Compaction of a soil causes the water holding capacity to
a. Increase b. Decrease
c. Not change d. Be unity

342. The total pore space in a soil is equal to the percent solids
a. The particle density of the sand
b. The percent water by volume when a soil is saturated
c. The bulk density of the sand
d. The particle density of the soil

343. An increase in soil water content causes soil strength to
a. Increase b. Decrease
c. Not change d. None

344. The cohesive and adhesive properties of water are due to the
a. Slight polarity of the individual molecules
b. Capillary forces
c. Gravity
d. Surface tension

345. As soil moisture increases the soil air
a. Increases b. Decreases
c. Stays the same d. None

346. Water has a high specific heat, which means
a. A relatively small amount of heat is required to change its temperature
b. A relatively large amount of heat is required to change its temperature
c. No specific amount of heat is required to change temperature
d. Both a and b
e. All the above

Answers					
333. a	336. c	339. a	342. c	345. b	
334. d	337. b	340. a	343. b	346. b	
335. c	338. c	341. b	344. a		

347. The temperature of a wet soil increases more slowly than a dry soil in the spring because of
a. The high specific heat of water
b. The high conductivity of water
c. Wetness does not influence warming of soil in the spring
d. Both a and b
e. All the above

348. Which soil separate has the greatest total water holding capacity ?
a. Sand b. Clay
c. Silt d. None

349. Gravitational water in soil move through the
a. Micropores b. Macropores
d. Both a and b d. None

350. Water held against the force of gravity in micropores is
a. Heavy water
b. Gravitational water
c. Capillary water
d. Hygroscopic water

351. Water tightly held in thin films around soil particles is
a. Hygroscopic water
b. Gravitational water
c. Capillary water
d. Heavy water

352. Capillary rise of water is due to the forces of
a. Cohesion
b. Adhesion
c. Cohesion and adhesion
d. Matric potential

353. Which type of water includes that which is available to plants ?
a. Hygroscopic water
b. Gravitational water
c. Capillary water
d. All

354. Capillary water in the soil is that which is found in the
a. Macropores
b. Micropores
c. Root channels
d. Both a and b

355. Water holding capacity of a soil is affected by
a. Texture
b. Organic matter
c. Structure
d. All of the above

356. The osmotic potential of soil water is affected by
a. Salt content
b. Barometric pressure
c. Clay content
d. All

357. When soil is saturated the dominant force affecting water movement is
a. Chemical bonding
b. Capillary tension
c. Gravity
d. Vander Waal's force

358. The water held between - 1/3 and - 15 bar is called
a. Gravitational water
b. Plant available water
c. Wilting point
d. Field capacity

Answers				
347. a	350. c	353. c	356. a	
348. b	351. a	354. b	357. c	
349. b	352. c	355. d	358. b	

359. Transpiration ratio indicates
- a. The amount of water transpired by a crop divided by 10
- b. The amount of water required to produce 1 pound of dry weight of plant material
- c. The amount of water in a bushel of corn
- d. Both a and c
- e. All the above

360. A layer of sand in a silt loam soil
- a. Restricts saturated flow
- b. Has no effect on water movement
- c. Restricts unsaturated flow downward
- d. Both a and c

361. In order for water to move from the silt loam through the sand layer the moisture content of the silt loam must be
- a. Air dry
- b. Near saturation
- c. At the wilting point
- d. Both a and c
- e. All the above

362. A clay layer in the silt loam would restrict water movement because
- a. Capillary forces are greater in the silt loam
- b. Small pores in the clay transmit water slowly
- c. Larger pores in the clay restrict movement
- d. Both a and b
- e. All the above

363. At field capacity, a root channel would be filled with
- a. Water
- b. Air
- c. Soil
- d. Both a and b

364. Gravitational water is not considered available to plants because
- a. It moves out of the root zone quickly in well drained soils
- b. No oxygen is available for root respiration while the soil is saturated
- c. Both of the above
- d. None of the above

365. Horizontal and upward movement of water in soil is nearly as great as downward movement when the soil is
- a. Saturated
- b. Unsaturated
- c. Partly saturated
- d. Submerged

366. More hygroscopic water would be present in
- a. Sand
- b. Silt
- c. Clay
- d. Both b and c

367. One indicator of wetland soils is
- a. Silt loam textural class
- b. Gray colors within one foot of the surface
- c. Red colors in the B horizon
- d. Both a and c
- e. All the above

368. The criteria required to define for jurisdictional wetlands are hydrology, hydric soils and
- a. Water standing on the surface
- b. Clay subsoils
- c. Wetland vegetation
- d. All of the above

369. Wetland soils usually have
- a. Greater amounts of organic matter than well drained soils
- b. Less organic matter than well drained soils
- c. More oxygen than well drained soils
- d. Undisturbed structures

Answers				
	359. b	362. b	365. b	368. c
	360. c	363. b	366. c	369. a
	361. b	364. c	367. b	

370. When saturated conditions occur in a soil above an impermeable soil layer such as clay, it is referred to as
- a. A perched water table
- b. The capillary fringe
- c. The aquic zone
- d. The udic zone

371. The plant nutrients which are of concern when they are present in excess amounts in lakes, rivers and estuaries are
- a. Nitrogen
- b. Phosphorus
- c. Sulphur
- d. Both N and P

372. Nonpoint source pollution may come from
- a. Sewage outfalls
- b. Runoff from farms and urban areas
- c. Drainage from farms and urban areas
- d. Both b and c
- e. All the above

373. A wet zone in soils above the water table resulting from capillary rise is called the
- a. Capillary fringe
- b. Perched water table
- c. Aquafina
- d. Both a and b

374. If a sandy loam soil and a clay soil are both at field capacity, the percent moisture will be
- a. Greater in the sandy loam
- b. Greater in the clay
- c. The same in both soils
- d. None

375. Equal amounts of water applied to a sandy loam soil and a clay loam soil will percolate to a greater depth in
- a. The sandy loam
- b. The clay loam
- c. There would be no difference
- d. None

376. The inner film of water around a soil particle is held by
- a. Cohesion
- b. Adhesion
- c. Chemical bond
- d. Both a and b

377. Hygroscopic water can be removed from soil by
- a. Drainage tile
- b. Air drying
- c. Oven drying
- d. Both b and c

378. Which of the following is not a kind of soil structure ?
- a. Crumb
- b. Platy
- c. Angular blocky
- d. Flat crumb

379. Identify particle sizes by least to greatest or fine to coarse.
- a. Sand, Silt, Clay
- b. Clay, Sand, Silt
- c. Silt, Sand, Clay
- d. Clay, Silt, Sand

380. A soil textural triangle measures
- a. Percentage of sand, silt, clay
- b. Mineral levels in a soil sample
- c. Percent slope of a land class
- d. Percentage of soil erosion on a given location

381. Which soil particles have the ability to have excessive drainage ?
- a. Silt
- b. Clay
- c. Sand
- d. None

382. In level or low spots, black topsoil with gray coloured subsoil, the drainage class would be _____.
- a. Somewhat poorly drained
- b. Moderately well drained
- c. Well drained
- d. Very poorly drained

Answers					
	370. a	373. a	376. b	379. d	382. d
	371. d	374. b	377. c	380. a	
	372. b	375. a	378. d	381. c	

383. The average composition of soil contains
a. 53% parent material, 7% organic matter, 5% air, 35% water
b. 25% air, 25% water, 5% mineral matter, 45% organic matter
c. 25% organic matter, 25% water, 5% air, 45% mineral matter
d. 25% air, 25% water, 5% organic matter, 45% mineral matter

384. Relative lightness or darkness in Munsell colour chart indicates
a. Hue b. Value
c. Chroma d. All

385. Osmotic potential is also called as
a. Solute potential
b. Matric potential
c. Pressure potential
d. Gravitational potential

386. Gravitational potential is independent of chemical potential but dependent on
a. Vertical location
b. Density of water
c. Both a and b
d. None

387. Solute and matric potential are collectively called as
a. Osmotic potential
b. Matric potential
c. Gravitational potential
d. All

388. Soil water potential always has
a. Positive sign b. Negative sign
c. No sign d. None

389. Soil water suction always has
a. Positive sign b. Negative sign
c. No sign d. None

Answers
383. d 386. c 389. a
384. b 387. a
385. a 388. b

4

Soil Pedology

Questions :

1. Science that deals with soil genesis and classification is called as
   a. Petrology b. Pedology
   c. Pedagogy d. Petrography

2. Rocks formed by cooling of the molten materials (magma) from the sun is called as
   a. Metamorphic rocks b. Igneous rocks
   c. Sedimentary rocks d. All

3. Of the followings, which is/are the examples of igneous rocks?
   a. Granites b. Basalts
   c. Syenites d. All

4. Rocks formed from igneous rocks by the influence of high pressure and temperature are called as
   a. Metamorphicrocks b. Primary rocks
   c. Sedimentary rocks d. All

5. Gneiss, Schist and Slate are the examples of
   a. Metamorphic rocks
   b. Sedimentary rocks
   c. Primary rocks
   d. Igneous rocks

6. Sandstone and limestone are
   a. Metamorphic rocks
   b. Sedimentary rocks
   c. Primary rocks
   d. Igneous rocks

7. Major component of igneous rocks are
   a. Quartzs
   b. Amphiboles and pyroxenes
   c. Feldspars
   d. Micas

8. Percentage of quartz in igneous rocks is
   a. 4 b. 12
   c. 18 d. 60

9. Percentage of feldspar in igneous rocks is
   a. 4 b. 12
   c. 18 d. 60

10. Percentage of mica in igneous rocks is
    a. 4 b. 12
    c. 18 d. 60

11. The process of disintegration and decomposition of minerals within the soil is called as
    a. Geochemical weathering
    b. Pedochemical weathering
    c. Physical weathering
    d. Chemical weathering

12. The process of weathering that takes place before soil development and continues beneath the soil cover is called as
    a. Geochemical weathering
    b. Pedochemical weathering
    c. Physical weathering
    d. Chemical weathering

13. Of the following, which is an important chemical weathering process?
    a. Carbonation b. Oxidation
    c. Hydrolysis d. Hydration

14. Which is/are the chemical weathering processes?
    a. Carbonation b. Hydrolysis
    c. Hydration d. All

15. Which of the following processes is responsible for the formation of serpentine from olivine?
    a. Hydrolysis b. Hydration
    c. Oxidation d. Reduction

Answers													
	1.	b	4.	c	7.	c	10.	a	13.	c
	2.	b	5.	a	8.	b	11.	b	14.	d
	3.	d	6.	b	9.	d	12.	a	15.	b

16. Which of the following processes is responsible for the formation of gypsum from calcium sulphate?
    a. Hydration b. Carbonation
    c. Oxidation d. Hydrolysis

17. Which of the following processes is responsible for the formation of allophane from orthoclase feldspar?
    a. Hydration b. Carbonation
    c. Oxidation d. Hydrolysis

18. Transformation of biotite to kaolinite takes place by the process of
    a. Physical weathering
    b. Chemical weathering
    c. Biological weathering
    d. Both b and c

19. Weathered products of rocks and rock minerals are called as
    a. Pedon
    b. Parent materials
    c. Solum d. Polypedons

20. Most easily weatherable mineral is
    a. Gypsum b. Biotite
    c. Olivine d. Calcite

21. Mineral formed by exfoliation, a type of physical weathering, is
    a. Granite b. Basalt
    c. Gypsum d. Calcite

22. Stability of minerals to weathering and to decomposition is related to
    a. Degree of basicity
    b. Degree of linkage to tetrahedron
    c. Silica: Sesquioxide ratio
    d. All

23. When bases are more, the stability of minerals will
    a. Decrease b. Increase
    c. Unaltered d. None

24. The main products of weathering is/are
    a. Silica b. Alumina
    c. Soluble cations d. All

25. Secondary minerals that act as a primary minerals are
    a. Biotite and muscovite
    b. Muscovite and montmorillonite
    c. Mica and biotite
    d. Mica and muscovite

26. Which is the correct sequence of formation of the secondary clay minerals?
    a. Mica → Illite → Vermiculite → Montmorillonite
    b. Montmorillonite → Vermiculite → Illite → Mica
    c. Vermiculite → Montmorillonite → Illite → Mica
    d. Mica → Vermiculite → Montmorillonite → Illite

27. Presence of more calcium and magnesium are more conducive for the formation of
    a. Chlorite
    b. Montmorillonite
    c. Kaolinite d. Illite

28. Which is the product of exhaustive hydrolysis and leaching?
    a. Vermiculite
    b. Montmorillonite
    c. Illite d. Kaolinite

29. Which is the dominant clay mineral in humid tropics?
    a. Kaolinite
    b. Montmorillonite
    c. Vermiculite d. Illite

Answers													
	16.	a	19.	b	22.	d	25.	c	28.	d
	17.	d	20.	c	23.	b	26.	a	29.	a
	18.	d	21.	a	24.	d	27.	b		

30. Clay minerals predominate in the soils of arid regions are
a. Montmorillonite and vermiculite
b. Illite and montmorillonite
c. Illite and chlorite
d. Illite and vermiculite

31. Clay minerals present in humid regions with alkaline environment are
a. Montmorillonite and vermiculite
b. Illite and montmorillonite
c. Illite and chlorite
d. Illite and vermiculite

32. Dominant clay mineral in arid soils with favourable potassium environment is
a. Chlorite b. Illite
c. Vermiculite d. Biotite

33. Dominant clay mineral in semi-arid soils with favourable calcium and magnesium environment is
a. Montmorillonite b. Vermiculite
c. Muscovite d. Chlorite

34. At the early stages of soil formation, type of clay mineral formation is highly influenced by
a. Climate b. Organisms
c. Parent materials d. Topography

35. In the advanced stages of soil formation, type of clay mineral formation is highly influenced by
a Organisms b. Climate
c. Topography and time
d. All

36. The secondary clay mineral kaolinite is mainly derived from
a. Igneous rocks
b. Sedimentary rocks
c. Metamorphic rocks
d. All

37. The secondary clay mineral illite is mainly derived from
a. Granite b. Basalt
c. Olivines
d. Pyroxenes and amphiboles

38. The secondary clay mineral montmorillonite is formed from
a. Basalt b. Gabbro
c. Phonolite d. All

39. Impeded drainage conditions with high concentration of silica favour the formation of
a. Kaoline group minerals
b. Mica group minerals
c. Smectite group minerals
d. Amorphous minerals

40. Intensive leaching with low bases favour the formation of
a. Kaoline group minerals
b. Mica group minerals
c. Smectite group minerals
d. Amorphous minerals

41. The unconsolidated materials from which the solum develops
a. Pedon b. Regolith
c. Parent materials d. Both b and c

42. Materials transported and deposited by water are called as
a. Alluvium b. Colluvium
c. Loess d. Aeolian

43. Materials transported by the action of gravity are called as
a. Alluvium b. Lacustrine
c. Glacial drift d. Colluvium

Answers					
	30. c	33. a	36. b	39. a	42. a
	31. d	34. c	37. a	40. a	43. d
	32. b	35. d	38. d	41. c	

44. Materials transported by water and settled out in lakes are called as
a. Alluvium b. Lacustrine
c. Glacial drift d. Colluvium

45. Silt materials transported by wind are called as
a. Delta b. Meander
c. Loess d. Aeolian

46. Sand materials transported by wind are called as
a. Delta b. Meander
c. Loess d. Aeolian

47. Property of parent material, to a large extent, determines the depth of soil profile formation is
a. Texture b. Structure
c. Temperature d. Porosity

48. Soils are deeper when the texture of the parent materials is
a. Light b. Heavy
c. Medium d. None

49. Milne developed the concept of
a. Soil sequm
b. Soil association
c. Soil catena
d. Soil consociation

50. A regular repetition of a sequence of soil properties in association with certain relief, the parent materials may or may not be same, is called as
a. Soil sequm
b. Soil association
c. Soil catena
d. Soil consociation

51. At higher topographic positions, the soils formed are
a. Red soils b. Black soils
c. Alluvial soils d. Laterite soils

52. At lower topographic positions, the soils formed are
a. Red soils b. Laterite soils
c. Alluvial soils d. Black soils

53. The local name Kanhar means what?
a. Red soils b. Black soils
c. Yellow soils d. Brown soils

54. The local name pokkali or cat clays means what?
a. Red soils b. Black soils
c. Laterite soils d. Alluvial soils

55. Soils formed under the influence of local conditions are grouped into
a. Azonal soils b. Zonal soils
c. Intrazonal soils d. None

56. Soils formed under the influence of climate and vegetation are grouped into
a. Zonal soils b. Azonal soils
c. Intrazonal soils d. None

57. Azonal soils are
a. Black soils b. Red soils
c. Laterite soils d. Alluvial soils

58. Thornthwait's formula is used for the calculation of
a. Evaporation b. Transpiration
c. Evapotranspiration
d. Potential evapotranspiration

59. Diagnostic soil horizons characterized by the status of organic matter
a. Histic epipedon
b. Mollic epipedon
c. Both a and b
d. Oxic epipedon

Answers							
	44. b	47. a	50. c	53. b	56. a	59. c	
	45. c	48. a	51. a	54. c	57. d		
	46. d	49. c	52. d	55. c	58. d		

60. Microorganism involved in soil granulation
a. Earthworms b. Moles
c. Ants d. Fungi

61. Age of soil was described by
a. Myers
b. Mohr and von Baren
c. Jenny
d. Hilgard

62. Climatic condition that hasten the rate of soil development is
a. Cold humid climate
b. Warm humid climate
c. Cold climate
d. Dry climate

63. Five stages of soil development was given by
a. Jenny b. Myers
c. Mohr and von Baren
d. Hilgard

64. Which is the fourth stage of weathering given by Mohr and von Baren?
a. Juvenile b. Senile
c. Virile d. Final

65. The soil forming factor that has no relevance after soil reaches its maturity is
a. Time b. Topography
c. Climate d. All

66. Mobilization and translocation of certain constituents like clay, silica, sesquioxides, and humus etc. from one point of soil body to another is called as
a. Illuviation b. Eluviation
c. Laterization d. Podzolization

67. Soil forming processes prevalent in arid and semi-arid regions is/are
a. Calcification
b. Gypsification
c. Salinization and alkalization
d. All

68. Immobilization and accumulation of materials from the upper horizons at a depth beneath the soil surface is called as
a. Illuviation b. Eluviation
c. Laterization d. Podzolization

69. Which is the fundamental soil forming process?
a. Laterization b. Podzolization
c. Gypsification d. Humification

70. Which is/are the fundamental soil forming processes?
a. Illuviation b. Eluviation
c. Humification d. All

71. Decalcification leads to the formation of
a. Calcic horizon
b. Gypsic horizon
c. Salic horizon
d. Both a and b

72. Process of eluviation of oxides of iron and aluminium, humus and carbonates from the upper horizons and their accumulation in subsurface horizons is called as
a. Laterization b. Podzolization
c. Decalcification d. Calcification

73. Process of removal of silica and accumulation of sesquioxides is called as
a. Laterization b. Podzolization
c. Decalcification d. Calcification

74. Formation of 1: 1 type clay minerals of kaolinitic group is a characteristic process of
a. Argillization b. Podzolization
c. Laterization d. All

Answers										
	60. a	63. c	66. b	69. d	72. b
	61. c	64. c	67. d	70. d	73. a
	62. b	65. a	68. a	71. d	74. c

75. Cool and humid climatic conditions are favourable for
a. Podzolization b. Laterization
c. Humification d. Pedoturbation

76. Silicious parent materials are favourable for
a. Podzolization b. Laterization
c. Humification d. Pedoturbation

77. Warm and humid climatic conditions are favourable for
a. Podzolization b. Laterization
c. Humification d. Pedoturbation

78. Pedogenic process dominant in tropical and subtropical regions of the world is/are
a. Laterization b. Podzolization
c. Salinization d. Gypsification
e. All the above

79. Leaching of soluble salts from soil either by irrigation water or rain water is called as
a. Alkalization b. Salinization
c. Desalinization d. Solodization

80. Leaching of dispersed clay particles from the upper horizons and their accumulation in the lower horizons is called as
a. Gleization b. Argillization
c. Pedoturbation d. Horizonation

81. Process of reduction, due to anaerobic condition, of iron in waterlogged soils with the formation of mottles and concretions of iron and manganese is called as
a. Gleization b. Argillization
c. Pedoturbation d. Laterization

82. The process of intermixing of soil particles due to external factors is called as
a. Gleization b. Argillization
c. Pedoturbation d. Horizonation

83. A layer of soil approximately parallel to the soil surface produced by the soil forming factors is called as
a. Pedon b. Polypedon
c. Soil profile d. Soil horizon

84. The smallest volume of soil that can be recognized as a soil individual is called as
a. Pedon b. Polypedon
c. Soil profile d. Soil horizon

85. Area of pedon ranges from
a. 1 – 5 m^2 b. 1 – 10 m^2
c. 1 – 12 m^2 d. 1 – 15 m^2

86. Soil horizons A and B (A+B) are collectively called as
a. Pedon b. Soil profile
c. Soil regolith d. Soil solum

87. Soil horizons A, B and C (A+B+C) are collectively called as
a. Pedon b. Soil profile
c. Soil regolith d. Soil solum

88. Bed rocks are obviously absent in
a. Red soils b. Black soils
c. Laterite soils d. Alluvial soils

89. Master horizons are
a. O and C
b. O, A, E, B & C
c. O, A, B and C
d. A, B and C

90. Organic horizons of soil should contain more than _____ percent of organic matter if the mineral fractions contain more the 50% of clay.
a. 20 b. 25
c. 30 d. 35

Answers										
	75. a	78. a	81. a	84. a	87. c	90. c
	76. a	79. c	82. c	85. b	88. d	
	77. b	80. b	83. d	86. d	89. b	

91. Organic horizons of soil should contain more than _____ percent of organic matter if the mineral fractions have no clay.
a. 20 b. 25
c. 30 d. 35

92. Soil horizon that exhibits obliteration of all or most of the original rock structure is
a. E horizon b. A horizon
c. B horizon d. All

93. B horizon is a
a. Illuvial horizon
b. Elluvial horizon
c. Organic horizon
d. Bed rock

94. Bleached or ashy appearance is a characteristic feature of
a. O horizon b. A horizon
c. E horizon d. B horizon

95. Elluvial horizon is
a. A horizon b. E horizon
c. B horizon d. O horizon

96. Symbol 'e' in subordinate distinctions of master horizons denotes
a. Residual accumulation of sesquioxides
b. Highly decomposed organic matter
c. Intermediate decomposition of organic matter
d. Least decomposed organic matter

97. Symbol 'i' in subordinate distinctions of master horizons denotes
a. Residual accumulation of sesquioxides
b. Highly decomposed organic matter
c. Intermediate decomposition of organic matter
d. Least decomposed organic matter

98. Symbol 'o' in subordinate distinctions of master horizons denotes
a. Residual accumulation of sesquioxides
b. Highly decomposed organic matter
c. Intermediate decomposition of organic matter
d. Least decomposed organic matter

99. Subordinate distinction symbol of master horizons that indicates either iron has been reduced or removed during soil formation is
a. g b. r
c. k d. z

100. Subordinate distinction symbol of master horizons that indicates the accumulation of alkaline earth carbonates, commonly calcium carbonates is
a. m b. c
c. k d. a

101. Subordinate distinction symbol of master horizons that indicates the residual accumulation of sesquioxides is
a. s b. o
c. ss d. r

102. Subordinate distinction symbol of master horizons that indicates the accumulation of secondary silica is
a. s b. ss
c. q d. k

103. Subordinate distinction symbol of master horizons that indicates the presence of sesquioxides is
a. s b. ss
c. q d. k

Answers					
	91. a	94. c	97. d	100. c	103. b
	92. a	95. b	98. b	101. b	
	93. a	96. c	99. a	102. c	

104. Subordinate distinction symbol of master horizons that indicates the accumulation of silicates either by illuviation into the horizon or by formation and subsequent translocation within the horizon or both is
a. t b. c
c. y d. v

105. Subordinate distinction symbol 'v' within the master horizons indicates what?
a. Accumulation of gypsum
b. Accumulation of salts more soluble than gypsum
c. Slickensides
d. Plinthite (iron–rich, humus poor material)

106. Subordinate distinction symbol 'v' within the master horizons indicates what?
a. Accumulation of gypsum
b. Accumulation of salts more soluble than gypsum
c. Slickensides
d. Plinthite (iron–rich, humus poor material)

107. The book "Benchmark soils of India" was written by
a. Syers *et al*
b. Murthy *et al.*
c. Storie and Ricquier
d. Sys and Verheye

108. In soil colour indication (2.5Y 4/2,D), 2.5Y denotes_____.
a. Hue b. Value
c. Chroma d. None

109. In soil colour indication (2.5Y 4/2,D), 4/2 indicates_____.
a. Hue b. Value
c. Chroma d. None

110. Prominent structure in black soils is
a. Subangular blocky
b. Angular blocky
c. Prismatic d. Columnar

111. The process, pedoturbation is a characteristic feature of
a. Black soils b. Red soils
c. Laterite soils d. Podzols

112. Which soils are developed on ferruginous sand stone under the climatic conditions favourable for the high degree of weathering?
a. Black soils b. Red soils
c. Laterite soils d. Podzols

113. Distribution and accumulation of carbonates is a characteristic feature of
a. Red soils b. Black soils
c. Laterite soils d. Desert soils

114. Soil classification based on the climate was given by
a. Dokuchaiev b. Marbut
c. Coffey d. Vilenski

115. Soil zonality concept was introduced by
a. Dokuchaiev b. Marbut
c. Coffey d. Vilenski

116. Typical soils for the temperate humid regions are
a. Lateritic and laterite soils
b. Chernozems
c. Podzols d. Chesnut soils

117. Soils of semi–arid and sub humid regions are
a. Lateritic and laterite soils
b. Chernozems
c. Podzols
d. Sierozem soils

Answers					
	104. a	107. b	110. b	113. d	116. c
	105. d	108. a	111. a	114. d	117. b
	106. a	109. b	112. c	115. a	

118. Soils of subtropics and tropical regions are
a. Lateritic and laterite soils
b. Chernozems
c. Podzols
d. Tundra soils

119. Soils of semi–arid and arid regions are
a. Lateritic and laterite soils
b. Chernozems
c. Podzols
d. Desert soils

120. Soils associated with permanently sold climate in the arctic regions are
a. Podzols b. Priarie soils
c. Tundra soils d. Chesnut soils

121. Soils formed by physical weathering are
a. Podzols b. Priarie soils
c. Tundra soils d. Chesnut soils

122. Coniferous forest is necessary for the formation of
a. Lateritic and laterite soils
b. Podzols
c. Priarie soils
d. brown earth soils

123. Deciduous forest vegetation is necessary for the formation of
a. Lateritic and laterite soils
b. Podzols
c. Priarie soils
d. brown earth soils

124. The mixture that consists of well decomposed humus and minerals made by earthworms is called as
a. Mur b. Mull
c. Peat d. Muck

125. Steppe or grass vegetation is necessary for the formation of
a. Sierozems b. Podzols
c. Chernozems d. Rendzena soils

126. AC horizon is a characteristic feature of
a. Sierozem soils
b. Chernozem soils
c. Podzols
d. Rendzena soils

127. Black soils of India are locally called as
a. Regurs b. Bhata
c. Matarsi d. Dorsa

128. Calcification and decalcification are the essential features of
a. Sierozem soils
b. Chernozem soils
c. Podzols
d. Rendzena soils

129. End product of laterization process is
a. Rendzinas b. Regosols
c. Lateritics d. Laterites

130. What is the ratio of silica–sesquioxides in laterite soils?
a. 2 b. 3
c. 0 d. 1

131. Soils formed by the process of latolization are
a. Laterite soils b. lateritic soils
c. Regosols d. Latosols

132. Soils formed by the process of ferralitization are
a. Ferraltisols b. Regosols
c. Rendzinas d. Lithosols

133. An iron–rich, humus poor mixture of clay with quartz sand and other diluents is called as
a. Soloths b. Plinthos
c. Chesnuts d. Braunerde

Answers						
	118. a	121. c	124. a	127. a	130. c	133. b
	119. d	122. b	125. c	128. b	131. d	
	120. c	123. d	126. b	129. d	132. a	

134. Dense tropical forest with deep–rooted vegetations is necessary for the formation of
a. Black soils b. Laterite soils
c. Red soils d. Podzols

135. Presence or accumulation of earth carbonates is a striking feature of
a. Black soils b. Podzols
c. Desert soils d. Alluvial soils

136. Bog soils are
a. Zonal soils b. Intrazonal soils
c. Azonal soils d. None

137. The soil groups, pedocals and pedalfers were given by
a. Marbut b. Dokuchaiev
c. Coffey
d. Baldwin and associates

138. Soils with fully developed profiles in which, lime carbonate is found in some horizon in higher percentage than in the parent geological formation beneath are called as
a. Regosols b. Lithosols
c. Pedalfers d. Pedocals

139. Which of the following is a fundamental unit in USDA soil classification?
a. Soil solum b. Soil pedon
c. Soil profile d. All

140. A group of soils having horizons similar in differentiating characters except for the texture, and developed from the same parent materials are called as
a. Soil catena b. Soil series
c. Soil family d. Soil association

141. In USA soil classification, soil series are subdivided into soil types on the basis of
a. Soil temperature regimes
b. Soil moisture regimes
c. Soil structure
d. Both a and b

142. Gley soils and Planosols are
a. Zonal soils b. Intrazonal soils
c. Azonal soils d. None

143. Podzolic soils and Sierozems are
a. Zonal soils b. Intrazonal soils
c. Azonal soils d. None

144. Lithosols and regosols are
a. Zonal soils b. Intrazonal soils
c. Azonal soils d. None

145. In USSR soil classification, soil varieties are differentiated on the basis of
a. Soil temperature regimes
b. Soil moisture regimes
c. Soil structure
d. Both a and b

146. Which of the following soil classification is followed in India?
a. USSR soil classification
b. USDA soil classification
c. Marbut's soil classification
d. Coffey's soil classification

147. What is the depth of diagnostic horizons or epipedon from the soil surface?
a. 10 – 15 cm b. 10 – 20 cm
c. 20 – 25 cm d. 15 – 18 cm.

148. What is the percentage of base saturation in mollic epipedon?
a. More than 50 %
b. More than 35 %
c. Less than 35 %
d. Less than 50 %

Answers						
	134. b	137. a	140. b	143. a	146. b	
	135. c	138. d	141. c	144. c	147. d	
	136. b	139. c	142. b	145. c	148. a	

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149. The epipedon that resembles mollic epipedon in all the features except in the limit of acid soluble phosphates or the length of period of moisture availability is
a. Umbric epipedon
b. Histic epipedon
c. Anthropic epipedon
d. Plaggen epipedon

150. Which is the man–made epipedon produced by continuous manuring?
a. Umbric epipedon
b. Ochric epipedon
c. Anthropic epipedon
d. Plaggen epipedon

151. Umbric epipedon resembles _____ in all the features except that the base saturation percentage is less than 50 per cent.
a. Anthropic epipedon
b. Histic epipedon
c. Mollic epipedon
d. Plaggen epipedon

152. The epipedon that has too high chroma or value, little organic matter and is too hard and massive when dries is
a. Umbric epipedon
b. Ochric epipedon
c. Plaggen epipedon
d. Grossarenic epipedon

153. Diagnostic subsurface horizon (endopedon) formed under cultivation and contains significant amount of illuvial silt, clay and humus is
a. Cambic horizon b. Argillic horizon
c. Agric horizon d. Albic horizon

154. Diagnostic subsurface horizon formed due to illuvial accumulation of clay from the above horizons is
a. Argillic horizon b. Agric horizon
c. Oxic horizon d. Spodic horizon

155. Diagnostic subsurface horizon formed due to alteration by physical movement or chemical weathering is
a. Albic horizon b. Cambic horizon
c. Natric horizon d. Agric horizon

156. Diagnostic subsurface horizon that consists of a mixture of hydrated oxides of iron and aluminium or both with considerable amount of 1: 1 lattice clay is
a. Oxic horizon b. Spodic horizon
c. Kandic horizon d. Cambic horizon

157. Diagnostic subsurface horizon cemented by silica and donot slake either in water or in hydrochloric acid is
a. Salic horizon b. Durinodes
c. Fragipan d. Duripan

158. Gypsic horizon should contain at least _____ percent more gypsum than the C–horizon or the underlying stratum.
a. 20 b. 15
c. 5 d. 10

159. What is the minimum percentage of salt in the Salic subsurface diagnostic horizon?
a. 2 b. 5
c. 10 d. 4

160. Diagnostic subsurface horizon with CEC of 16 cmol (p+) kg^{-1} of clay, ECEC of 12 cmol (p+) kg^{-1} and with kaolinitic group of clay minerals is
a. Oxic horizon b. Cambic horizon
c. Spodic horizon d. Kandic horizon

Answers				
	149. c	152. b	155. b	158. c
	150. d	153. c	156. a	159. a
	151. c	154. a	157. d	160. d

161. Soil moisture regimes are defines in terms of the presence or absence of water held at a tension of
a. Less than 1500 kPa
b. Less than 33 kPa
c. More than 1500 kPa
d. More than 33 kPa

162. The soil moisture regimes Torridus means
a. Dry b. Hot and dry
c. Burnt d. Humid

163. The soil moisture regimes Udic means
a. Burnt b. Hot and dry
c. Humid d. Water

164. The soil moisture regimes Udus means
a. Burnt b. Hot and dry
c. Humid d. Water

165. Which is the intermediate moisture regime between the aridic and the udic moisture regimes?
a. Aquic b. Torric
c. Xeric d. Ustic

166. In defining soil temperature regimes, the temperature mentioned is at
a. 50 cm of soil depth
b. Lithic contact
c. Paralithic contact
d. All

167. Soil temperature regime that has a mean annual temperature higher than 0 °C, but lower than 8 °C is called as
a. Pergillic b. Cryic
c. Mesic d. Frigid

168. Soil temperature regime that has a mean annual temperature lower than 8 °C, and the difference between mean winter and mean summer soil temperature is more than 5 °C is called as
a. Cryic b. Pergillic
c. Frigid d. Mesic

169. The prefix 'iso' is used with the soil temperature regimes when the difference between mean winter and mean summer soil temperature is
a. Less than 10 °C
b. Less than 5 °C
c. More than 10 °C
d. More than 5 °C

170. Meaningless syllables in soil order is/are
a. Alfisols b. Entisols
c. Inceptisols d. Both a and b
e. All the above

171. The word 'verto' means
a. Last b. Turn
c. Wood ash d. Soft

172. Formative element for the soil order Andisols is
a. And b. Od
c. Id d. None

173. Formative element for the soil order Histosols is
a. Ist b. Oll
c. Ept d. None

174. Formative element for the soil order Vertisols is
a. Ept b. Ert
c. Ver d. None

175. Soils under the soil order Alfisols is/are
a. Red soils b. Laterite soils
c. Black soils d. Both a and b

Answers					
	161. a	164. a	167. b	170. d	173. a
	162. b	165. d	168. c	171. b	174. b
	163. c	166. d	169. b	172. d	175. d

176. Soil order that has little or no evidence of development of pedogenic horizons is
a. Aridisols b. Vertisols
c. Entisols d. Inceptisols

177. Reasons for the little or no evidence of development of pedogenic horizons in Entisols may be
a. Lack of time to form horizons
b. Inert parent materials
c. Climate
d. Both a and b
e. All the above

178. Soil order that is dominantly organic in nature is
a. Mollisols b. Spodosols
c. Histosols d. Andosols

179. All the pedogenic processes are active to some extent, but none predominates in
a. Entisols b. Inceptisols
c. Aridisols d. Andosols

180. Extreme weathering of most minerals other than quartz to kaolin and free oxides in
a. Ultisols b. Alfisols
c. Oxisols d. Vertisols

181. Pedoturbation and haploidization are the pedogenic processes found in
a. Mollisols b. Ultisols
c. Oxisols d. Vertisols

182. What is the width of cracks formed in Vertisols?
a. 0.5 cm or more
b. 1 cm or more
c. 2 cm or more
d. 5 cm or more

183. What is the depth of cracks formed in Vertisols?
a. Up to 25 cm b. Up to 50 cm
c. Up to 75 cm d. Up to 1 m

184. Slickensides and gilgai–microrelief are found in
a. Mollisols b. Histosols
c. Vertisols d. Spodosols

185. The subgroup that does not show any transition to another subgroup is called as
a. Typic group b. Intergrades
c. Extragrades d. All

186. The subgroups that belong to one Great group, but have some properties of another order, suborder or Great group is called as
a. Typic group b. Intergrades
c. Extragrades d. All

187. Subgroups that have important properties and the properties are not representative of the Great group is called as
a. Typic group b. Intergrades
c. Extragrades d. All

188. In detailed soil survey, the soils are examined at the intervals of
a. 0.25 – 0.5 km b. 0.5 – 1.0 km
c. 1.0 – 3.0 km d. 3.0 – 6.0 km

189. What is the number of pedons examined for every two hectares in detailed soil survey?
a. 1 – 2 b. 2 – 3
c. 3 – 5 d. 5 – 7

190. In the preparation of soil maps for detailed soil survey, the base materials used are
a. Cadastral maps
b. Aerial photograph
c. Soil series
d. Both a and b e. All

Answers					
	176. c	179. b	182. b	185. a	188. a
	177. d	180. c	183. b	186. b	189. b
	178. c	181. d	184. c	187. c	190. d

191. What is the scale of cadastral map used in detailed soil survey?
a. 1 : 8000 b. 1 : 4000
c. 1 : 15000 d. Both a and b
e. All

192. In reconnaissance soil survey examination of pedons is at the intervals of
a. 0.25 – 0.5 km b. 0.5 – 1.0 km
c. 1.0 – 3.0 km d. 3.0 – 6.0 km

193. Map scale used in reconnaissance soil survey
a. 1 : 8000 b. 1 : 4000
c. 1 : 15000 d. 1 : 50000

194. Soil series occurring together in a regularly repeating geographic pattern are grouped in to
a. Soil association
b. Soil catena
c. Soil family
d. Great Soil Group

195. Soil occupying a key interpretative position in soil classification framework and/or covering large area is called as
a. Burried soils
b. Benchmark soils
c. Soil catena
d. Soil correlation

196. Total geographical area of India is
a. 327 mha b. 328 mha
c. 329 mha d. 325 mha

197. Fertile soils of India are locally called as
a. Urvara b. Anurvara
c. Usara d. Kari

198. Barren soils of India are locally called as
a. Usara b. Anurvara
c. Urvara d. Kallar
e. Both a and b

199. Sodic or alkali soils of India are commonly called as
a. Reh b. Kallar
c. Kari d. Matarsi

200. Acid sulphate soils of India are locally called as
a. Kari soils b. Pokkali soils
c. Nullah regadi d. Both a and b

201. Which is the soil order of shallow black soils?
a. Entisols b. Inceptisols
c. Vertisols d. Both a and b

202. Which is the soil order of Tarai soil group?
a. Mollisols b. Histosols
c. Podzols d. Ultisols

203. Which is the soil order of medium and deep black soils?
a. Entisols b. Inceptisols
c. Vertisols d. Both b and c

204. Total area of black soils in India is
a. 72 mha b. 74 mha
c. 75 mha d. 70 mha

205. Total area of red soils in India is
a. 72 mha b. 74 mha
c. 75 mha d. 70 mha

206. Total area of laterite and lateritic soils in India is
a. 28 mha b. 25 mha
c. 32 mha d. 29 mha

207. Total area of desert soils in India is
a. 28 mha b. 25 mha
c. 32 mha d. 29 mha

Answers						
	191. d	194. a	197. a	200. d	203. c	206. b
	192. d	195. b	198. e	201. d	204. b	207. d
	193. c	196. b	199. b	202. a	205. a	

208. Total area of alluvial soils in India is
a. 72 mha b. 74 mha
c. 75 mha d. 70 mha

209. Semi-arid to subhumid tropical to subtropical climate with alternate wet and dry periods and calcification are favourable for the formation of
a. Black soils
b. Red soils
c. Laterite and lateritic soils
d. All

210. Gilgai-microrelief is a common feature of
a. Black soils
b. Red soils
c. Laterite and lateritic soils
d. Alluvial soils

211. AC soil profile is found in
a. Black soils
b. Red soils
c. Laterite and lateritic soils
d. Alluvial soils

212. Argillic subsurface diagnostic horizon is a diagnostic feature of
a. Black soils
b. Red soils
c. Laterite and lateritic soils
d. Alluvial soils

213. Honey-comb structure is diagnostic feature of
a. Red soils b. Laterite soils
c. Lateritic soils d. Both b and c

214. Occurrence or plinthite or a pallid zone above the water table is common feature of
a. Black soils b. Red soils
c. Laterite and lateritic soils
d. All

215. The most important soils for agriculture are
a. Alluvial soils
b. Black soils
c. Red soils
d. Laterite and lateritic soils

216. Newer or recent alluvium is locally called as
a. Bhangar b. Khadar
c. Bhata d. Matarsi

217. Older alluvium is locally called as
a. Bhangar b. Khadar
c. Bhata d. Matarsi

218. Pan formation or compact soil layer is a common feature of
a. Black soils
b. Red soils
c. Laterite and lateritic soils
d. Alluvial soils

219. Percentage of organic matter in peaty and marshy soils is
a. 10 – 30 % b. 10 – 40 %
c. 10 – 50 % d. 20 – 60 %

220. Agro-ecological zones in India are
a. 8 b. 15
c. 13 d. 21

221. Total area of salt affected soils in India is
a. 25 mha b. 28 mha
c. 29 mha d. 10 mha

222. Total area of saline soils in India is
a. 10 mha b. 7.2 mha
c. 2.8 mha d. 6.1 mha

Answers					
	208. c	211. a	214. c	217. a	220. a
	209. a	212. b	215. a	218. d	221. b
	210. a	213. c	216. b	219. d	222. b

223. Total area of sodic or alkali soils in India is
a. 10 mha b. 7.2 mha
c. 2.8 mha d. 6.1 mha

224. Primary source of salts in salt affected soils is
a. Rock weathering
b. Ground water fluctuation
c. Irrigation and fertilizers
d. Sea inundation

225. What is the limit of electrical conductivity for the categorization of saline soils?
a. 2 dS m^{-1} b. 4 dS m^{-1}
c. 6 dS m^{-1} d. 8 dS m^{-1}

226. What is the pH of saline–sodic soils?
a. Less than 8.5 b. More than 8.5
c. 8.5 – 10.0 d. 8.5

227. What is the electrical conductivity of saline-sodic soils?
a. Less than 4 dS m^{-1}
b. More than 4 dS m^{-1}
c. 4 dS m^{-1}
d. None

228. Most of the coastal soils are rich in
a. Nitrogen b. Phosphorous
c. Potassium
d. Calcium and Magnesium

229. High salt tolerant crops is/are
a. Barley
b. Rice and sugarcane
c. Oats
d. All

230. Medium salt tolerant crops is/are
a. Cotton
b. Sorghum and pearl millet
c. Wheat and maize
d. All

231. Low salt tolerant crops
a. Pulses b. Pea
c Sesamum d. All

232. A soil may be called as alkaline when the pH of the soil is more than
a. 6.5 b. 7.0
c. 7.5 d. 8.0

233. Laboratory method that is widely used for the calculation of gypsum requirement is
a. Schoonover's method
b. Schofield's method
c. SMP method
d. Puri's method

234. What is the gypsum equivalent of iron pyrites?
a. 0.19 b. 0.63
c. 0.85 d. 1.62

235. What is the gypsum equivalent of sulphur?
a. 0.19 b. 0.63
c. 0.85 d. 1.62

236. What is the gypsum equivalent of $CaCl_2 \cdot 2H_2O$?
a. 0.19 b. 0.63
c. 0.85 d. 1.62

237. Which is high sodium tolerant crop?
a. Rice b. Wheat
c. Barley d. Cotton

238. Which is/are the medium sodium tolerant crops?
a. Wheat b. Barley
c. Cotton d. All

239. Tree species used for the reclamation of salt affected soils is/are
a. Casuarinas b. Prosopis
c. Eucalyptus d. All

Answers						
	223. c	226. a	229. d	232. b	235. a	238. d
	224. a	227. b	230. d	233. a	236. c	239. d
	225. b	228. c	231. d	234. b	237. a	

240. What is the pH of acid soils in 1: 1 soil–water suspension defined by the USDA?
a. Less than 6.5 b. Less than 6.0
c. Less than 5.5 d. Less than 7.0

241. Which is/are the major pedogenic processes involved in the formation of acid soils?
a. Laterization b. Podzolization
c. Carbonation d. Both a and b
e. All the above

242. What is the total area of acid soils in India?
a. 28 m ha b. 25 m ha
c. 43 m ha d. 48 m ha

243. What is the total area of acid soils with pH below 5.5 in India?
a. 23 m ha b. 25 m ha
c. 28 m ha d. 32 m hass

244. What is the total area of acid soils with pH between 5.6 and 6.5 in India?
a. 23 m ha b. 25 m ha
c. 28 m ha d. 32 m hass

245. In lime requirement, liming materials are added to raise the soil pH to
a. 6.0 – 7.0 b. 6.0 – 8.0
c. 7.0 – 8.0 d. 7.0 – 9.0

246. 'Soil is a nutrient bin'– this statement was given by
a. Ruffin b. Whitney
c. Hilgard d. Dokuchaiev

247. 'Soil is mixture of earth's upper most mantles of weathered rocks and organic matter'– this statement given by
a. Ruffin b. Whitney
c. Hilgard d. Dokuchaiev

248. 'Soil individual is the smallest natural body that can be defined as a thing complete in itself'– this statement given by
a. Jenny b. Whitney
c. Cline d. Ruffin

249. Who is the father of soil science?
a. Dokuchaiev
b. Justin von Liebig
c. J.W. Leather
d Marbut

250. Who is the father of Indian soil science?
a. Dokuchaiev
b. Justin von Liebig
c. J.W. Leather
d Marbut

251. The Great Soil Group of the world was translated from German to English by
a. Dokuchaiev
b. Justin von Liebig
c. J.W. Leather
d Marbut

252. What is the approximate proportion of solid phase in surface soil?
a. 45 % b. 5 %
c. 50 % d. 25 %

253. What is the approximate proportion of organic matter in surface soil?
a. 45 % b. 5 %
c. 50 % d. 25 %

254. A loose, unconsolidated inorganic material of weathered rock on the earth surface is called as
a. Regolith b. Parent material
c. Solum d. Both a and b

255. What is the thickness of earth's crust?
a. 3500 km b. 2900 km
c. 5 to 56 km d. 1500 km

Answers									
	240. c	243. b	246. b	249. a	252. c	255. c			
	241. d	244. a	247. a	250. c	253. b				
	242. d	245. a	248. c	251. d	254. d				

256. What is the thickness of earth's core?
a. 3500 km b. 2900 km
c. 5 to 56 km d. 1500 km

257. What is the thickness of earth mantle?
a. 3500 km b. 2900 km
c. 5 to 56 km d. 1500 km

258. What is the percentage of nitrogen in atmospheric air?
a. 78.09 b. 79.0
c. 77.0 d. 80.1

259. What is the percentage of carbon dioxide in atmospheric air?
a. 0.3 b. 0.03
c. 0.003 d. 3.0

260. What is the density of earth's crust?
a. 2.6 – 2.7 g cm^{-3}
b. 3.0 – 4.5 g cm^{-3}
c. 9.0 – 12.0 g cm^{-3}
d. 2.6 – 3.0 g cm^{-3}

261. What is the density of earth's core?
a. 2.6 – 2.7 g cm^{-3}
b. 3.0 – 4.5 g cm^{-3}
c. 9.0 – 12.0 g cm^{-3}
d. 2.6 – 3.0 g cm^{-3}

262. What is the density of earth's mantle?
a. 2.6 – 2.7 g cm^{-3}
b. 3.0 – 4.5 g cm^{-3}
c. 9.0 – 12.0 g cm^{-3}
d. 2.6 – 3.0 g cm^{-3}

263. Density of the earth is
a. 4.0 g cm^{-3} b. 5.5 g cm^{-3}
c. 2.6-2.7 g cm^{-3} d. 3.0-4.5 g cm^{-3}

264. Density of common rocks present in the earth is
a. 4.0 g cm^{-3} b. 5.5 g cm^{-3}
c. 2.6-2.7 g cm^{-3} d. 3.0-4.5 g cm^{-3}

265. Earth core contains high proportion of
a. Ni b. Fe
c. Al d. Both a and b
e. All the above

266. Two elements occurring in greatest abundance in the earth's crust are
a. Oxygen and Aluminium
b. Silicon and Aluminium
c. Silicon and Iron
d. Oxygen and Silicon

267. What is the percentage of silicon (Si^{4+}) in the earth's crust?
a. 46.60 b. 27.72
c. 8.13 d. 5.0

268. Total number of elements that are sufficiently abundant in the earth's crust is
a. 108 b. 7
c. 8 d. 12

269. What is the percentage of sedimentary rocks in upper 5 km of the earth's crust?
a. 74 b. 18
c. 95 d. 5

270. What is the percentage of igneous rocks in upper 5 km of the earth's crust?
a. 74 b. 18
c. 95 d. 5

271. What is the percentage of shale in upper 5 km of the earth's crust?
a. 52 b. 15
c. 7.0 d. 4.0

272. What is the percentage of limestone and dolomite in upper 5 km of the earth's crust?
a. 52 b. 15
c. 7.0 d. 4.0

Answers									
	256. a	259. b	262. b	265. d	268. c	271. a			
	257. b	260. d	263. b	266. d	269. a	272. c			
	258. a	261. c	264. c	267. b	270. b				

273. Percentage of sandstone in upper 5 km of the earth's crust is
a. 52 b. 15
c. 7.0 d. 4.0

274. Percentage of granite in upper 5 km of the earth's crust is
a. 52 b. 15
c. 7.0 d. 4.0

275. Percentage of basalt in upper 5 km of the earth's crust is
a. 52 b. 15
c. 7.0 d. 4.0

276. Percentage of igneous rock in the earth as a whole is
a. 74 b. 18
c. 95 d. 5

277. What is the percentage of sedimentary rock in the earth as a whole?
a. 74 b. 18
c. 95 d. 5

278. A naturally occurring inorganic compound that has a definite chemical composition and a characteristic geometric form is called as
a. Rocks b. Minerals
c. Regolith d. Both a and b

279. Which is/are the examples of ferromagnesian ortho–ino silicate primary minerals?
a. Olivines b. Pyroxenes
c. Amphiboles d. All

280. Which is/are the examples of non–ferromagnesian ortho–ino silicate primary minerals?
a. Biotite b. Muscovite
c. Feldspar d. Tremolite

281. What is the ionic radius of oxygen?
a. 1.32 °A b. 0.42 °A
c. 1.58 °A d. 1.18 °A

282. Ionic radius of silicon
a. 1.32 °A b. 0.42 °A
c. 1.58 °A d. 1.18 °A

283. Examples for non–crystalline minerals are
a. Allophane and Actinolite
b. Allophane and Tremolite
c. Allophane and Chalcedony
d. All

284. Minerals that are formed by the crystallization of molten magma
a. Primary minerals
b. Secondary minerals
c. Tertiary minerals
d. Accessory minerals

285. Typical example for ortho–silicate minerals are
a. Olivines b. Amphiboles
c. Pyroxenes d. All

286. Example(s) for single chain ino–silicate minerals is/are
a. Amphiboles b. Pyroxenes
c. Hornblende d. Both a and c
e. All the above

287. Example(s) for double chain ino–silicate minerals is/are
a. Amphiboles b. Pyroxenes
c. Hornblende d. Both a and c
e. All the above

288. Which of the following silicate minerals made up of individual silicon tetrahedron?
a. Quartz b. Olivines
c. Prroxenes d. Amphiboles

Answers						
	273. b	276. c	279. d	282. b	285. a	288. b
	274. b	277. d	280. c	283. c	286. b	
	275. d	278. b	281. a	284. a	287. d	

289. What is the number of oxygen ions shared in single chain ino–silicate structures?
a. Two b. Three
c. Four d. One

290. What is the number of oxygen ions shared in double chain ino–silicate structures?
a. Two b. Three
c. Four d. One

291. All the four oxygen ions in tetrahedra are shared in the formation of
a. Phyllo–silicates structure
b. Tecto–silicates structure
c. Chain silicates structure
d. Ortho–silicates structure

292. Silicates that is neutral in structure is
a. Phyllo–silicates structure
b. Tecto–silicates structure
c. Chain silicates structure
d. Ortho–silicates structure

293. Examples for tectosilicates is/are
a. Quartz b. Feldspars
c. Amphiboles d. Both a and b
e. All the above

294. Tremolite, Actinolite and Hornblende are belong to the group of
a. Amphiboles b. Pyroxenes
c. Tectosilictes d. Orthosilicates

295. Honey-comb structure is found in
a. Orthosilicates b. Inosilicates
c. Phyllosilicates d. Tectosilicates

296. Brucite, $[Mg_3 (OH)_6]_n$, is a
a. Orthosilicates b. Inosilicates
c. Phyllosilicates d. Tectosilicates

297. The crystalline layers of mica (muscovite and biotite) are loosely joined together by
a. Water b. Magnesium
c. Potassium d. Hydrogen

298. Si-O-Si linkage is found in
a. Orthosilicates b. Inosilicates
c. Phyllosilicates d. All

299. Which is the abundant primary mineral in most of the soils?
a. Quartz b. Feldspars
c. Pyroxenes and amphiboles
d. Mica

300. What is the ionic radius of aluminium?
a. 0.42 °A b. 0.51 °A
c. 1.32 °A d. 0.24°A

301. Serpentine mineral is formed from the alteration of
a. Olivines b. Amphiboles
c. Pyroxenes d. Both a and b

302. The clay mineral, chlorite is formed from the alteration of
a. Biotite b. Muscovite
c. Orthoclase d. Anorthite

303. Gibbsite is formed from the alteration of
a. Orthoclase b. Anorthite
c. Amphiboles d. Pyroxenes

304. One of the most important minerals found in sand and silt fraction of most soils is
a. Quartz b. Feldspars
c. Pyroxenes and amphiboles
d. Micas

305. Weathering stability of these minerals follows the order of
a. Olivines > Pyroxenes > Amphiboles
b. Pyroxenes > Amphiboles > Olivines
c. Amphiboles > Pyroxenes > Olivines
d. Olivines > Pyroxenes > Amphiboles

Answers						
	289. a	292. b	295. c	298. d	301. d	304. a
	290. b	293. d	296. c	299. b	302. a	305. c
	291. b	294. a	297. c	300. b	303. a	

306. In orthoclase feldspar (K Al Si_3 O_8), Al^{3+} replaces Si^{4+} in every _____ tetrahedron and K^+ corrects the electric balance
a. Second b. Third
c. Fourth d. Fifth

307. In albite (Na Al Si_3 O_8), Al^{3+} replaces Si^{4+} in every _____ tetrahedron and K^+ corrects the electric balance
a. Second b. Third
c. Fourth d. Fifth

308. Which is/are the non–ferromagnesian minerals?
a. Quartz b. Feldspars
c. Muscovite d. All

309. Secondary minerals observed in soils of arid and semi–arid regions is/are
a. Gypsum b. Calcite
c. Apatite d. All the above
e. None of the above

310. Of the following, which is the non–silicate secondary mineral?
a. Chlorite b. Muscovite
c. Biotite d. Gibbsite

311. Secondary minerals dominantly occur in
a. Igneous rocks
b. Sedimentary rocks
c. Metamorphic rocks
d. All

312. The most common clay mineral observed in soil is
a. Vermiculite
b. Montmorillonite
c. Kaolinite
d. Illite

313. In alluvium derived soils, the dominance of clay minerals follows the order of
a. Illite > Vermiculite > Chlorite > Montmorillonite > Kaolinite
b. Vermiculite > Illite > Chlorite > Montmorillonite > Kaolinite
c. Vermiculite > Montmorillonite > Illite > Chlorite > Kaolinite
d. Illite > Vermiculite > Montmorillonite > Chlorite > Kaolinite

314. In forest soils, the dominance of clay minerals follows the order of
a. Illite > Vermiculite > Chlorite > Montmorillonite > Kaolinite
b. Illite > Chlorite > Vermiculite > Montmorillonite > Kaolinite
c. Vermiculite > Montmorillonite > Illite > Chlorite > Kaolinite
d. Illite > Vermiculite > Montmorillonite > Chlorite > Kaolinite

315. In black soils, the dominance of clay minerals follows the order of
a. Smectite > Illite > Chlorite
b. Smectite > Chlorite > Illite
c. Illite > Smectite > Chlorite
d. Illite > Chlorite > Smectite

316. In desert soils, the dominance of clay minerals follows the order of
a. Illite > Attapulgite > Vermiculite
b. Vermiculite > Attapulgite > Illite
c. Illite > Vermiculite > Attapulgite
d. Attapulgite > Vermiculite > Illite

317. In red and lateritic soils, the dominance of clay minerals follows the order of
a. Illite > Kaolinite > Chlorite
b. Kaolinite > Illite > Chlorite
c. Chlorite > Illite > Kaolinite
d. Kaolinite > Chlorite > Illite

Answers				
	306. c	309. d	312. d	315. a
	307. c	310. d	313. a	316. a
	308. d	311. b	314. b	317. d

318. What is the common name of Fe_2 O_3. $3H_2O$?
a. Haematite b. Limonite
c. Goethite d. Magnetite

319. What is the common name of Al_2 O_3. $3H_2O$?
a. Haematite b. Limonite
c. Goethite d. Gibbsite

320. Presence of which of the following mineral in rocks is an indication of quick chemical change?
a. Haematite b. Limonite
c. Goethite d. Magnetite

321. Haematite alters to
a. Limonite b. Magnetite
c. Pyrite and siderite d. All

322. Limonite is a common alteration product of
a. Pyrite
b. Magnetite
c. Hornblende and pyroxenes
d. All

323. Mineral abundantly found in highly weathered soils of the tropical regions is
a. Goethite b. Gibbsite
c. Limonite d. Haematite

324. Important mineral in water logged soils is
a. Haematite b. Magnetite
c. Limonite d. Siderite

325. What is the quantity of essential minerals in the rocks?
a. 80 – 90 % b. 85 – 90 %
c. 95 – 98 % d. 90 – 98 %

326. What is the quantity of accessory minerals in the rocks?
a. 2 – 5 % b. 5 – 8 %
c. 1 – 5 % d. 5 – 10 %

327. What is the specific gravity of heavy minerals?
a. Below 2.85 g cm^{-3}
b. Below 2.95 g cm^{-3}
c. Below 2.75 g cm^{-3}
d. Below 2.65 g cm^{-3}

328. Which of the following minerals indicates high degree of weathering and leaching under well drained conditions?
a. Goethite b. Gibbsite
c. Limonite d. Haematite

329. Example(s) of light minerals is/are
a. Quartz b. Feldspars
c. Muscovite d. All

330. Specific gravity of light minerals is
a. Above 2.85 g cm^{-3}
b. Above 2.95 g cm^{-3}
c. Above 2.75 g cm^{-3}
d. Above 2.65 g cm^{-3}

331. Example(s) of heavy minerals is/are
a. Olivines b. Haematite
c. Pyrite and Augite d. All

332. Mono-mineralic mineral is
a. Olivinite b. Tremolite
c. Actinolite d. Pyrolusite

333. Example for hard and compact rock is
a. Conglomerate b. Basalt
c. Sandstone d. Pumice

334. Which is/are loose and feebly aggregated rock(s)?
a. Conglomerate b. Sandstone
c. Granite d. Both a and b

Answers						
	318. b	321. d	324. d	327. a	330. a	333. b
	319. d	322. d	325. c	328. b	331. d	334. d
	320. a	323. b	326. a	329. d	332. a	

335. Volcanic rock that is vesicular in structure is
a. Rhyolite b. Andesite
c. Pumice d. Phenolite

336. What is the percentage of silica in acidic rocks or over saturated rocks?
a. More than 50 %
b. More than 60 %
c. More than 70 %
d. More than 80 %

337. Syenite and diorite are
a. Neutral plutonic igneous rocks
b. Neutral volcanic igneous rocks
c. Acidic plutonic igneous rocks
d. Acidic volcanic igneous rocks

338. Neutral volcanic igneous rocks are
a. Granite and Tonalite
b. Rhyolite and Dacite
c. Trachite and Andesite
d. Foidal syenite and Gabbro

339. What is the percentage of silica in basic rocks or under–saturated rocks?
a. Less than 50 %
b. Less than 40 %
c. Less than 60 %
d. Less than 55 %

340. What is the range of silica in neutral rocks?
a. 41 – 50 % b. 51 – 60 %
c. 45 – 55 % d. 55 – 60 %

341. Acidic plutonic igneous rocks are
a. Granite and Tonalite
b. Rhyolite and Dacite
c. Trachite and Andesite
d. Foidal syenite and Gabbro

342. Acidic volcanic igneous rocks are
a. Granite and Tonalite
b. Rhyolite and Dacite
c. Trachite and Andesite
d. Foidal syenite and Gabbro

343. Basic plutonic igneous rocks are
a. Granite and Tonalite
b. Syenite and Diorite
c. Foidal syenite and Gabbro
d. Basalt and Phonolite

344. Basic volcanic igneous rocks are
a. Granite and Tonalite
b. Syenite and Diorite
c. Foidal syenite and Gabbro
d. Basalt and Phonolite

345. Coarse grained plutonic igneous rock which is similar in composition of basalt is
a. Granite b. Syenite
c. Gabbro d. Diorite

346. Fine grained volcanic igneous rock which is similar in composition of granite is
a. Rhyolite b. Andesite
c. Basalt d. Trachite

347. Stratification is the most common feature of
a. Igneous rocks
b. Sedimentary rocks
c. Metamorphic rocks
d. All

348. Solifluxion is also called as
a. Soil creep b. Saltation
c. Colluvium d. Graded bedding

349. Fragmental, detrital or mechanically formed sedimentary rock is
a. Shale b. Gypsum
c. Halite d. Limestone

Answers					
	335. c	338. c	341. a	344. d	347. b
	336. b	339. a	342. b	345. c	348. a
	337. a	340. a	343. c	346. a	349. a

350. Sedimentary rock formed by the evaporation or precipitation of materials dissolved in sea or lake water is
a. Limestone b. Dolomite
c. Gypsum d. Anthracite

351. Sedimentary rock formed by the precipitation and flocculation of materials dissolved in sea or lake water is
a. Gypsum b. Limestone
c. Halite d. Lignite

352. Organically or biochemically formed sedimentary rocks is/are
a. Peat and lignite b. Bituminous
c. Anthracite d. All

353. Sedimentary rocks formed by the precipitation and flocculation of materials dissolved in sea or lake water is/are
a. Limestone and Dolomite
b. Gypsum and Anhydrite
c. Halite (rock salt)
d. All

354. Fragmental, detrital or mechanically formed sedimentary rocks is/are
a. Shale and Breccia b. Sandstone
c. Conglomerate d. All

355. Banded or laminated character is the most peculiar feature of
a. Igneous rocks
b. Sedimentary rocks
c. Metamorphic rocks
d. All

356. Granites are first converted in gneisses due to
a. Dynamo metamorphism
b. Thermal metamorphism
c. Dynamo–thermal metamorphism
d. All

357. Gneisses are eventually converted in to schists due to
a. Dynamo metamorphism
b. Thermal metamorphism
c. Dynamo–thermal metamorphism
d. All

358. The metamorphic rock, gneiss is formed from
a. Conglomerate b. Gabbro
c. Granite & Syenite d. All

359. The metamorphic rock, slate is formed from
a. Shale b. Sandstone
c. Limestone d. Coal

360. The metamorphic rock, quartzite is formed from
a. Shale b. Sandstone
c. Limestone d. Coal

361. The metamorphic rock, marble is formed from
a. Shale b. Sandstone
c. Limestone d. Coal

362. The metamorphic rock, graphite is formed from
a. Shale b. Sandstone
c. Limestone d. Coal

363. Crystalline metamorphic rock is
a. Schist b. Gneiss
c. Marble d. Slate

364. Which is the laminated or finely foliated metamorphic rock?
a. Schist b. Gneiss
c. Marble d. Slate

Answers					
	350. c	353. a	356. b	359. a	362. d
	351. b	354. d	357. c	360. b	363. b
	352. d	355. c	358. d	361. c	364. a

365. Which is the non–foliated metamorphic rock?
a. Phyllite b. Schist
c. Marble d. Slate

366. Fine-textured basalt will weather more readily than coarse textured sandstone (True/False)

367. Exfoliation is a characteristic feature of
a. Granite b. Basalt
c. Sandstone d. Limestone

368. Often a river deposits its finer silt load at its mouth, where it meets the sea and the deposits are called as
a. River levees b. Delta
c. Marine deposits d. Lacustrine

369. When water freezes in to ice, its volume is increased by
a. 6 per cent b. 7 per cent
c. 8 per cent d. 9 per cent

370. What is the amount of pressure exerted by water when it freezes in to ice?
a. 131 t forces/ ft^2
b. 141 t forces/ ft^2
c. 151 t forces/ ft^2
d. 161 t forces/ ft^2

371. Materials deposited by the action of glaciers are called as
a. Marine b. Moraine
c. Colluvium d. Alluvium

372. Most important weathering for soil formation is/are
a. Physical weathering
b. Chemical weathering
c. Biological weathering
d. All

373. The mineral bauxite is formed from Al_2O_3 by
a. Hydration b. Hydrolysis
c. Oxidation d. Reduction

374. Limonite is formed from haematite by
a. Hydration b. Hydrolysis
c. Oxidation d. Reduction

375. Formation of bauxite from orthoclase by
a. Hydration b. Hydrolysis
c. Oxidation d. Reduction

376. Formation of haematite from magnetite by
a. Hydrolysis b. Hydration
c. Oxidation d. Reduction

377. Cleavage occur in only one plane during the weathering of
a. Olivine b. Feldspar
c. Hornblende d. Mica

378. Cleavage occur in two planes during the weathering of
a. Olivine and Augite b. Feldspar
c. Hornblende d. All

379. Minerals formed during the early stage of weathering are
a. Calcite and gypsum
b. Albite and Anorthite
c. Biotite and Pyroxenes
d. All

380. Minerals formed during the intermediate stage of weathering are
a. Kaolinite and Halloysite
b. Haematite and Gibbsite
c. Vermiculite and Montmorillonite
d. All

Answers						
	365. c	368. b	371. b	374. a	377. d	380. c
	366. T	369. d	372. b	375. b	378. d	
	367. a	370. c	373. a	376. c	379. d	

381. Minerals formed during the advanced stage of weathering are
a. Kaolinite and Halloysite
b. Quartz and Illite
c. Muscovite and Hornblende
d. All

382. Stability index of minerals was given by
a. Sys b. Jackson
c. Puri d. Jenny

383. 'Soils are developed, as a result of interplay of soil forming factors'– this statement was first given by
a. Dokuchaiev b. Jenny
c. Hilgard d. Whitney

384. The equation, S = f (cl, b, r, p, t....) was first formulated by
a. Dokuchaiev b. Jenny
c. Hilgard d. Whitney

385. The equation, S = f (P, Cl, O) was first formulated by
a. Dokuchaiev b. Jenny
c. Hilgard d. Whitney

386. Active soil forming factors are
a. Parent material
b. Relief or Topography
c. Time
d. Climate and vegetation
e. All the above

387. Passive soil forming factors are
a. Parent material
b. Relief or Topography
c. Time d. All

388. The igneous rock basalt, in humid tropics may give rise to
a. Black soils b. Red soils
c. Laterite soils d. Alluvial soils

389. The igneous rock basalt, in semi–arid/sub humid subtropics may give rise to
a. Black soils b. Red soils
c. Laterite soils d. Alluvial soils

390. Soils wherein, the composition of parent materials subdues the effect of climate and vegetation are called as
a. Ectodynamomorphic soils
b. Endodynamomorphic soils
c. Thermodynamic soils
d. All

391. Light textured podzolic soils are derived from
a. Acid igneous rocks
b. Basic igneous rocks
c. Basic alluvium or Aeolian materials
d. All

392. ABCR soil profile is found in the soils formed from
a. Granite b. Alluvium
c. Aeolian d. All

393. What is the percentage of slope in undulating land surface given by FAO (1990)?
a. 2 – 5 per cent b. 5 – 10 per cent
c. 10–15 per cent d. 0–2 per cent

394. What is the percentage of slope in rolling land surface given by FAO (1990)?
a 2 – 5 per cent b. 5 – 10 per cent
c. 10–15 per cent d. 0–2 per cent

395. Soil may be considered as representative of the regional climate when it is formed on
a. Leveled topographic position
b. Depressed
c. Moderately undulating land surface
d. Sloping land

Answers					
	381. a	384. b	387. d	390. b	393. b
	382. b	385. a	388. b	391. a	394. c
	383. a	386. d	389. a	392. a	395. a

396. Soils formed in higher topographic position are
a. Black soils b. Red soils
c. Alluvial soils d. Laterite soils

397. Soils formed in lower topographic position are
a. Black soils b. Red soils
c. Alluvial soils d. Laterite soils

398. Soils that are formed from the same kind of parent materials but differing in their topographic positions within the landscape are called as
a. Soil catena
b. Climosequence
c. Toposequence
d. Clinosequence

399. By chemical weathering, sandstone decomposes more readily than limestone (True/False).

400. Weathering stages in soil formation was given by
a. Jenny b. Mohr
c. von Barren d. Dokuchaiev

401. Spodosols may develop much faster than Alfisols (True/False).

402. Amongst all the soil forming factors, the most influential factor in soil development is
a. Parent material b. Vegetation
c. Climate d. Time

403. Which is the common soil order found in humid regions?
a. Inceptisols and Alfisols
b. Aridisols and Inceptisols
c. Alfisols and Ultisols
d. Ultisols and Oxisols

404. For every 10 °C rise in temperature, the speed of chemical reactions increases by a factor of
a. Two b. Three
c. Four d. Both a and b

405. Cold humid climates are favourable for the activity of
a. Bacteria b. Fungi
c. Actinomycetes d. All

406. What is the silica: sesquioxides (SiO_2: R_2O_3) ratio of cold humid regions?
a. Less than 2 b. 2.0 – 3.0
c. 3.0 – 3.5 d. More than 3.5

407. What is the silica: sesquioxides (SiO_2: R_2O_3) ratio of arid regions?
a. Less than 2 b. 2.0 – 3.0
c. 3.0 – 3.5 d. More than 3.5

408. What is the silica: sesquioxides (SiO_2: R_2O_3) ratio of tropical regions?
a. Less than 2 b. 2.0 – 3.0
c. 3.0 – 3.5 d. More than 3.5

409. What is the silica: sesquioxides (SiO_2: R_2O_3) ratio of subhumid regions?
a. Less than 2 b. 2.0 – 3.0
c. 3.0 – 3.5 d. More than 3.5

410. The nature of vegetation growing in an area at initial stage is influenced by
a. Parent material b. Climate
c. Topography d. All

411. Soils under heath or pine vegetations develop in to
a. Spodosols b. Mollisols
c. Inceptisols d. Entisols

Answers						
	396. b	399. F	402. c	405. b	408. a	411. a
	397. a	400. b	403. c	406. c	409. b	
	398. c	401. T	404. d	407. d	410. a	

412. Soils under grassland vegetations develop in to
a. Spodosols b. Mollisols
c. Inceptisols d. Entisols

413. Surface soil horizon developed under acid litter and humus from coniferous and heath vegetation is called as
a. Mor b. Mull
c. Sward d. Orterde

414. Humus rich B–horizon in podzols is
a. Mor b. Mull
c. Sward d. Orterde

415. Forest soil horizon of intimately mixed mineral matter and amorphous humus is called as
a. Mor b. Mull
c. Sward d. Orterde

416. A1 horizon in grasslands as contrasted with zoogenous mull horizon of forest soils is called as
a. Mor b. Mull
c. Sward d. Orterde

417. A soil is considered as peat when the content of organic matter is more than
a. 30 per cent b. 40 per cent
c. 50 per cent d. 55 per cent

418. New horizon designation for A1 horizon is
a. Ah b. Ap
c. Ag d. At

419. New horizon designation for A2 horizon is
a. B b. A
c. E d. Eg

420. Of the followings, which soil is sandier?
a. Typic Hapludult
b. Arenic Hapludult
c. Ochraqults
d. None

421. Which of the following soils has more organic matter?
a. Typic Argiustoll
b. Typic Haplustalf
c. Typic Cryosaprist
d. All

422. The mechanical movement of clay and iron oxides from the A–horizon without undergoing chemical alteration is called as
a. Solufluction b. Pedoturbation
c. Lessivage d. None

423. What is the base saturation percentage of umbric horizon?
a. < 35 b. < 50
c. > 35 d. > 50

424. Soil order characterized by excess weathering with dominant iron and aluminum oxide clays, common in tropics is
a. Entisols b. Oxisols
c. Alfisols d. Mollisols

425. The process that leads to textural contrast between E and Bt horizons, and higher fine: total clay ratio in the Bt horizon is called as
a. Eluviation b. Illuviation
c. Laterization d. Podzolization

426. Specific pedogenic processes are
a. Illuviation and Eluviation
b. Illuviation and Humification
c. Illuviation, Eluviation and Humification
d. Calcification, Laterization and Podzolization

Answers						
	412. b	415. b	418. a	421. a	424. b	
	413. a	416. c	419. c	422. c	425. b	
	414. d	417. c	420. b	423. b	426. d	

427. Fundamental pedogenic processes are
a. Illuviation and Eluviation
b. Illuviation and Humification
c. Illuviation, Eluviation and Humification
d. Calcification, Laterization and Podzolization

428. Main weathering process in the formation of calcium carbonate (calcification) is
a. Hydrolysis
b. Hydration
c. Carbonation
d. Oxidation–Reduction

429. Podzolization is the negative of
a. Laterization b. Calcification
c. Decalcification d. All

430. Silicious parent materials are essential for the process of
a. Pedoturbation b. Laterization
c. Podzolization d. Gleization

431. Basic parent materials with sufficient iron–bearing minerals are essential for the process of
a. Laterization b. Podzolization
c. Gleization d. Pedoturbation

432. The pedogenic process, laterization occurs in
a. Laterites b. Latosols
c. Oxisols d. All

433. Pedogenic process that is dominant in the situation of high ground water and/or in humid regions is
a. Pedoturbation b. Gleization
c. Laterization d. Podzolization

434. Zonal soil forming process is
a. Calcification b. Salinization
c. Solonization d. Gleization

435. Intrazonal soil forming process is
a. Calcification b. Podzolization
c. Laterization d. Gleization

436. Zonal soil forming process is
a. Calcification b. Podzolization
c. Laterization d. All

437. Intrazonal soil forming processes is/are
a. Salinization b. Solonization
c. Gleization d. All

438. Soils formed by the process of gleization is called as
a. Calcimorphic soils
b. Hydromorphic soils
c. Halomorphic soils
d. Dynamomorphic soils

439. Pedogenic process responsible for the development of bluish to grayish horizons in soils is
a. Eluviation b. Laterization
c. Gleization d. Podzolization

440. Process of accumulation of salts, such as sulphate, chlorides of calcium, magnesium, sodium and potassium, in soils is
a. Salinization b. Alkalization
c. Solonization d. Solodization

441. Saline soils are also called as
a. Solonetz b. Solonchalks
c. Soloth d. Both b and c

442. What is the percentage of salt in saline soils?
a. More than 0.1 %
b. More than 0.5 %
c. More than 1.0 %
d. More than 2.0 %

Answers						
	427. c	430. c	433. b	436. d	439. c	442. d
	428. a	431. a	434. a	437. d	440. a	
	429. a	432. d	435. d	438. b	441. b	

443. What is the critical limit of salt concentration in soils for normal crop growth?
a. 0.01 % b. 0.1 %
c. 0.02 % d. 0.2 %

444. Process that involves the accumulation of sodium ions on the exchange complex of the clay is/are
a. Solonization b. Alkalization
c. Solodization d. Both a and b

445. Sodic soils are also called as
a. Soloth b. Solonetz
c. Solonchalks d. Both a and b

446. Formation of black organic–clay coatings on the ped faces and on surfaces of soils by
a. Sodium b. Potassium
c. Calcium d. Magnesium

447. A typical columnar structure is a characteristic feature of
a. Solonchalks b. Solonetz
c. Soloth d. All

448. Process refers to the removal of Na^+ from the exchange sites of soils is/are
a. Salinization b. Solonization
c. Solodization d. Both b and c

449. Soils formed as the result of dealkalization is
a. Saline soils b. Sodic soils
c. Soloth d. Neutral soils

450. Process of mixing of soils not by the illuviation is called as
a. Gleization b. Pedoturbation
c. Argillization d. Both b and c

451. Mixing of materials in-solum by the churning process caused by swell–shrink clay is called as
a. Faunal pedoturbation
b. Floral pedoturbation
c. Argillic pedoturbation
d. Argillization

452. Which hand auger used in soils having very hard layers in soil survey?
a. Dutch auger
b. Riverside auger
c. Stony auger
d. Spiral auger

453. The smallest area of a map that can be delineated by a single boundary at the scale used is called as
a. Mapping unit
b. Soil series
c. Soil delineation
d. Soil consociation

454. Soil survey used to prepare resource inventory of large area is
a. Detailed soil survey
b. Reconnaissance soil survey
c. Detailed–Reconnaissance soil survey
d. Semi–detailed soil survey

455. What is the frequency of field observations in rapid reconnaissance soil survey?
a. 1/25 ha b. 1/100 ha
c. 1/500 ha d. 1/10000 ha

456. What is the frequency of field observations in semi–detailed soil survey?
a. 1/25 ha b. 1/100 ha
c. 1/500 ha d. 1/10000 ha

457. What is the frequency of field observations in low intensity detailed soil survey?
a. 1/100 ha b. 1/25 ha
c. 1/ ha d. 4/ ha

Answers						
	443. d	446. a	449. c	452. d	455. d	
	444. d	447. b	450. b	453. a	456. a	
	445. b	448. c	451. c	454. b	457. c	

458. What is the frequency of field observations in high intensity detailed soil survey?
a. 1/100 ha b. 1/25 ha
c. 1/ ha d. 4/ ha

459. Grouping of soils according to their productivity is in which of the following classification of soils?
a. Economic soil classification
b. Physical soil classification
c. Chemical soil classification
d. Geological soil classification

460. Classification of soil based on the presumed underlying parent materials is in which of the following soil classification?
a. Economic soil classification
b. Physical soil classification
c. Chemical soil classification
d. Geological soil classification

461. Soils developed in-situ from the underlying rocks are called as
a. Residual soils b. Sedentary soils
c. Transported soils d. Both a and b

462. Soils developed on unconsolidated sediments are called as
a. Residual soils b. Sedentary soils
c. Transported soils d. Both a and b

463. Residual or sedentary soils are developed on which of the following?
a. Basalt b. Granite
c. Sandstone or limestone
d. All

464. Who is the founder of modern pedology?
a. Dokuchaiev b. Marbut
c. Coffey d. Baldwin

465. First genetic system of soil classification was given by
a. Dokuchaiev
b. Marbut
c. Coffey
d. Baldwin and associates

466. The three categories namely, Normal, Transitional and Abnormal soils were given by
a. Dokuchaiev
b. Marbut
c. Coffey
d. Baldwin and associates

467. Moor soils are
a. Normal soils
b. Transitional soils
c. Abnormal soils
d. None

468. Tundra soils are
a. Normal soils
b. Transitional soils
c. Abnormal soils
d. None

469. The soils where, time has been a limiting factor to produce horizonation are termed as
a. Zonal soils b. Azonal soils
c. Intrazonal soils d. None

470. Classification of soils based on their own soil properties was given by
a. Dokuchaiev b. Marbut
c. Coffey
d. Baldwin and associates

471. Morphogenetic system of soil classification was given by
a. Dokuchaiev b. Marbut
c. Coffey
d. Baldwin and associates

Answers					
	458. d	461. d	464. a	467. c	470. a
	459. a	462. c	465. a	468. a	471. b
	460. d	463. d	466. a	469. b	

472. The category, Great Soil Group was introduced by
a. Dokuchaiev
b. Marbut
c. Coffey
d. Baldwin and associates

473. Soil type was introduced in
a. Dokuchaiev's soil classification
b. Marbut's soil classification
b. Coffey's soil classification
d. Baldwin and associates soil classification

474. A new category, soil family was introduced between the Great soil group and Soil series in
a. Dokuchaiev's soil classification
b. Marbut's soil classification
c. Coffey's soil classification
d. Baldwin and associates soil classification

475. The morphogenetic system of Marbut's soil classification was revised and elaborated by
a. Baldwin b. Kellog
c. Thorp d. All

476. A new category, subgroup was introduced in
a. Marbut's soil classification
b. Soil Taxonomy
c. Dokuchaiev's soil classification
d. Baldwin and associates soil classification

477. Category in which, the diagnostic horizons are used for the classification of soils is
a. Soil order b. Suborder
c. Great soil group d. Soil series

478. Which are the important epipedons in Indian soils?
a. Mollic, Ochric and Umbric
b. Mollic, Histic and Umbric
c. Mollic, Ochric and Anthropic
d. Mollic, Histic and Ochric

479. Epipedon that contains more than 250 ppm of citrate soluble P_2O_5 is called as
a. Histic epipedon
b. Melanic epipedon
c. Anthropic epipedon
d. Mollic epipedon

480. A sandy horizon with 100 cm or more thickness over an argillic horizon is
a. Ochric epipedon
b Plaggen epipedon
c. Melanic epipedon
d. Grassarenic epipedon

481. Diagnostic subsurface horizon formed due to illuviation of humus and not of aluminium or sodium is
a. Kandic horizon
b. Sombric horizon
c. Cambic horizon
d. Glossic horizon

482. A mineral or organic subsurface diagnostic horizon that has a pH of less than 3.5 is
a. Glossic horizon
b. Albic horizon
c. Oxic horizon
d. Sulphuric horizon

483. What is the hardness of petrocalcic horizon?
a. 2 or more Mho scale
b. 3 or more Mho scale
c. 4 or more Mho scale
d. 5 or more Mho scale

Answers				
	472. b	475. d	478. a	481. b
	473. a	476. b	479. c	482. d
	474. d	477. c	480. d	483. b

484. Fibrous materials in an unrubbed condition constituting 1/3 to 2/3 of the mass is called as
a. Fibric soil materials
b. Hemic soil materials
c. Sapric soil materials
d Muck

485. Fibrous materials in an unrubbed condition constituting over 2/3 of the mass is called as
a. Fibric soil materials
b. Hemic soil materials
c. Sapric soil materials d. Muck

486. Fibrous materials in an unrubbed condition constituting less than 1/3 of the mass is called as
a. Fibric soil materials
b. Hemic soil materials
c. Sapric soil materials d. Peat

487. Sapric soil materials are also called as
a. Peat b. Mucky peat
c. Peaty materials d. Muck

488. Fibric soil materials are also called as
a. Peat b. Mucky peat
c. Peaty materials d. Muck

489. Hemic soil materials are also called as
a. Mucky peat b. Peaty muck
c. Muck d. Both a and b

490. Organic or inorganic materials deposited in water by the action of aquatic organisms or derived from under water and floating organisms are called as
a. Humilluvic material
b. Limnic soil material
c. Low chroma mottles
d. Hemic soil material

491. Limnic soil materials are
a. Marl and sedimentary peat
b. Marl and diatomaceous earth
c. Sedimentary peat and diatomaceous earth
d. All the above

492. A subsurface horizon at least half cemented by SiO_2 and their air dry peds donot slake in water or HCl but are destroyed by hot KOH is
a. Durinodes b. Duripans
c. Fragipan
d. Low chroma mottles

493. The formula (A – 0.2 R)/(L + 3H) is called as
a. A-value b. R-value
c. L-value d. n-value

494. In n-value = (A– 0.2 R)/(L + 3H), R denotes
a. Percentage of silt + sand
b. Percentage of clay
c. Percentage of organic matter
d. Percentage of water at field conditions

495. In n-value = (A– 0.2 R)/(L + 3H), L denotes
a. Percentage of silt + sand
b. Percentage of clay
c. Percentage of organic matter
d. Percentage of water at field conditions

496. A boundary between soil and continuous coherent underlying material that has a hardness of more than 3 on Mho's scale is called as
a. Lithic contact
b. Paralithic contact
c Petroferric contact
d. All

Answers					
	484. b	487. d	490. b	493. d	496. a
	485. a	488. a	491. d	494. a	
	486. c	489. d	492. b	495. b	

497. A boundary between soil and continuous coherent underlying material that has a hardness of less than 3 on Mho's scale is called as
a. Lithic contact
b. Paralithic contact
c. Petroferric contact d. All

498. A soil is considered moist when it is at moisture tension of less than
a. 33 kPa b. 100 kPa
c. 1000 kPa d. 1500 kPa

499. For the classification of soil, soil temperature regime is used in the category of
a. Soil family b. Suborder
c. Order d. All

500. For the classification of soil, diagnostic horizons are mainly used in the category of
a. Soil order b. Suborder
c. Great soil group d. Soil family

501. Moisture regimes exist in between the leaching and non–leaching environment are
a. Ustic & Xeric b. Aquic & Udic
c. Udic & Ustic d. Aridic & Ustic

502. Soil moisture regime where, water moves in to the soil almost throughout the year is called as
a. Aquic b. Ustic
c. Udic d. Xeric

503. Which is the dominant soil moisture regime in India?
a. Udic b. Ustic
c. Xeric d. Aridic

504. Arrange the soil moisture regimes according to their dominance of occurrence in India.
a. Udic > Aridic > Ustic
b. Udic > Ustic > Xeric
c. Ustic > Udic > Xeric
d. Ustic > Aridic > Udic

505. Temperature range that is important in determining the degree of biological, chemical activities and physical processing going on in soils is
a. 5 – 35 °C b. 10 – 35 °C
c. 15 – 40 °C d. 20 – 35 °C

506 For every 10 cm increase in soil depth, soil temperature decreases or increases by a factor of
a. 0.5 b. 0.6
c. 0.8 d. 0.9

507. Soil temperature regimes dominant in India are
a. Frigid and Mesic
b. Mesic and Thermic
c. Thermic and Hyperthermic
d. Hyperthermic and Megathermic

508. What is the total number of soil order?
a. 10 b. 11
c. 12 d. 13

509. Approximate number of soil series identified in India is
a. 100+ b. 200+
c. 300+ d. 400+

510. Agriustoll is a
a. Order b. Suborder
c. Great soil group d. Subgroup

511. Diagnostic horizons that may be present in the order Entisols are
a. Ochric and Anthropic
b. Ochric and Umbric
c. Umbric and Plaggen
d. All

Answers					
	497. b	500. c	503. b	506. b	509. b
	498. d	501. a	504. d	507. d	510. c
	499. d	502. c	505. a	508. c	511. d

512. Soil order that has an argillic diagnostic horizon but with low base saturation is
a. Oxisols b. Ultisols
c. Alfisols d. Mollisols

513. Soil order that has an argillic diagnostic horizon but with high base saturation is
a. Oxisols b. Inceptisols
c. Alfisols d. Mollisols

514. Best agricultural soils of the world is
a. Entisols b. Inceptisols
c. Mollisols d. Vertisols

515. Most important soil forming processes for the development of the order Aridisols are
a. Calcification and Gypsification
b. Calcification and Salinization
c. Salinization and alkalization
d. Salinization and Gypsification

516. Aridisols are formerly designated as
a. Desert
b. Sierozem
c. Reddish brown soils
d. All

517. In the past, Alfisols were termed as
a. Gray brown podzols
b. Planosols
c. Half-bog soils
d. All

518. Prominent secondary clay mineral in Ultisols is
a. Kaolinite b. Illite
c. Chlorite d. Vermiculite

519. In the past Ultisols were classified as
a. Brown–podzols
b. Laterite soils
c. Lateritic soils
d. Gray brown–podzols

520. In India, Histosols have been rarely reported to occur in
a. Kerela b. Tamilnadu
c. Karnataka d. Maharastra

521. Andisols were first recognized in
a. India b. Russia
c. England d. Japan

522 Dominant secondary mineral in Andisols is
a. Gibbsite b. Goethite
c. Brushite d. Allophane

523. Density of andic materials in Andisols is
a. < 0.5 gm^{-3} b. < 0.7 gm^{-3}
c. < 0.9 gm^{-3} d. 1.0 gm^{-3}

524. In India, Andisols may be observed in
a. Andaman and Nicobars
b. Assam
c. Himachal Pradesh
d. All

525. Major limitation(s) of Andisols is/are
a. N fixation b. P fixation
c. K fixation d.

526. Andisols are earlier grouped under
a. Inceptisols b. Entisols
c. Ultisols d. Oxisols

527. Soils formed due to alternate wet and dry conditions are called as
a. Rendzenas b. Lithosols
c. Plannosols d. Regosols

528. Horizon that contains more than 20% organic carbon (by weight), and saturated with water for less than a month in most years is
a. Fibric horizon b. Sapric horizon
c. Hemic horizon d. Folic horizon

Answers						
	512. b	515. b	518. a	521. d	524. a	527. c
	513. c	516. d	519. c	522. d	525. b	528. d
	514. c	517. d	520. b	523. a	526. a	

529. Soil horizon that contains jarosite mottles is
a. Geric horizon b. Sulfuric horizon
c. Gleyic horizon d. Lixic horizon

530. Weakly developed coarse textured soil is
a. Acrisols b. Alisols
c. Arenosols d. Plannosols

531. Weakly developed shallow soil is
a. Acrisols b. Alisols
c. Arenosols d. Plannosols

532. Soils with accumulation of clay and strong weathering are
a. Lixisols b. Luvisols
c. Nitisols d. Plannosols

533. Soils group which connotes the accumulation of clay are
a. Kastanozems b. Luvisols
c. Leptosols d. Alisols

534. Soils developed in level or depressed relief with seasonal surface waterlogging are
a. Lithosols b. Leptosols
c. Kastanozems d. Plannosols

535. Soil unit that connotes a horizon which is formed by long continued manuring is
a. Geric b. Eutric
c. Fimic d. Cumulic

536. Soils limited by depth due to continuous hard rock or overlying material are
a. Ferralsols b. Fluvisols
c. Leptosols d. Cryosols

537. Soils having a petroplinthic horizon starting within 30 cm of the soil surface or a plinthic horizon starting within 50 cm of the surface are
a. Ferralsols b. Lixisols
c. Nitisols d. Sesquisols

538. Soils with an agric horizon showing an irregular upper boundary resulting from albelluvic tonguing into the agric horizon are
a. Stagnosols b. Glossisols
c. Luvisols d. Umbrisols

539. The FAO–UNESCO revised legend for Alfisols is
a. Nitisols b. Plannosols
c. Acrisols d. Regosols

540. The FAO–UNESCO revised legend for Oxisols is
a. Nitrosols b. Phaeozems
c. Luvisols d. Ferralsols

541. The FAO–UNESCO revised legend for Histosols is
a. Histosols b. Fluvisols
c. Acrisols d. Plannosols

542. Land capability class was given by
a. Sys
b. Klingebiel and Montgomery
c. Sys and Verhegs
d. Storie an Ricquier

543. Total number of categories in the land capability classification is
a. Three b. Five
c. Eight d. Twelve

544. Colour of the land capability class–I on LCC maps is
a. Yellow b. Pink
c. Green d. Red

545. Colour of the land capability class–II on LCC maps is
a. Yellow b. Pink
c. Green d. Red

Answers						
	529. b	532. a	535. c	538. b	541. a	544. c
	530. c	533. b	536. c	539. a	542. b	545. a
	531. d	534. d	537. d	540. d	543. a	

546. Colour of the land capability class–III on LCC maps is
a. Purple b. Brown
c. Dark grey d. Orange

547. Colour of the land capability class–IV on LCC maps is
a. Yellow b. Pink
c. Green d. Red

548. Colour of the land capability class–V on LCC maps is
a. Yellow b. Pink
c. Green d. Red

549. Colour of the land capability class–VI on LCC maps is
a. Yellow b. Pink
c. Green d. Red

550. Colour of the land capability class–VII on LCC maps is
a. Yellow b. Pink
c. Green d. Red

551. Colour of the land capability class–VIII on LCC maps is
a. Purple b. Brown
c. Dark grey d. Orange

552. What is the total number of land suitability classification for irrigation?
a. 4 b. 6
c. 8 d. 10

553. Land suitable for irrigation with nil or moderate limitations are
a. Class I and II
b. Class I, II and III
c. Class I, II, III and IV
d. All

554. The size range of gravels in diameter is
a. 2–50 mm b. 2–75 mm
c. 2–100 mm d. 5–75 mm

555. In capability index (Ci = A × B × C × D × E × F × G), used for the rating of land suitable for irrigation, B denotes
a. Soil depth b. $CaCO_3$ status
c. Gypsum status d. Topography

556. In capability index (Ci = A × B × C × D × E × F × G), used for the rating of land suitable for irrigation, G denotes
a. Soil depth b. $CaCO_3$ status
c. Gypsum status d. Topography

557. In capability index (Ci = A × B × C × D × E × F × G), used for the rating of land suitable for irrigation, D denotes
a. Soil depth b. $CaCO_3$ status
c. Gypsum status d. Topography

558. The capability index (Ci) rating for the land almost suitable for irrigation is
a. < 20 b. 20–40
c. 40–60 d. 60–80

559. The capability index (Ci) rating for the land unsuitable for irrigation is
a. < 20 b. 20–40
c. 40–60 d. 60–80

560. What is the total number of orders in the land evaluation system given by FAO (1976)?
a. Two b. Three
c. Four d. Five

561. What is the total number of classes in the land evaluation system given by FAO (1976)?
a. Two b. Three
c. Four d. Five

Answers						
	546. b	549. d	552. b	555. a	558. b	561. d
	547. b	550. d	553. b	556. d	559. a	
	548. c	551. a	554. b	557. c	560. a	

562. Example(s) for the crop(s) tolerant to lime is/are
a. Citrus and Potato b. Maize
c. Wheat d. All

563. Example(s) for the crop(s) sensitive to lime is/are
a. Citrus and Potato b. Maize
c. Wheat d. All

564. What is the percentage of gypsum content in the root zone that limits the use of land for crops?
a. Higher than 15%
b. Higher than 20%
c. Higher than 25%
d. Higher than 30%

565. What is the percentage of calcium saturation in soil optimum for plant growth?
a. 60 % or more b. 70 % or more
c. 80 % or more d. 90 % or more

566. What is the total area of soil degraded by water erosion?
a. 148.9 mha b. 132.5 mha
c. 161.2 mha d. 171.9 mha

567. Total area of soil degraded by wind erosion is
a. 13.5 mha b. 13.8 mha
c. 10.1 mha d. 11.6 mha

568. Total area of soil degraded by physical deterioration is
a. 13.5 mha b. 13.8 mha
c. 10.1 mha d. 11.6 mha

569. Total area of soil degraded by chemical deterioration is
a. 13.5 mha b. 13.8 mha
c. 10.1 mha d. 11.6 mha

570. Total area of soil degraded by different degradation types is
a. 185.8 mha b. 187.8 mha
c. 180.8 mha d. 183.8 mha

571. In lateritic soils, soil loss is primarily caused by
a. Sheet erosion b. Rill erosion
c. Splash erosion d. Gully erosion

572. The soil conservation and management practices suitable for humid and sub–humid regions are
a. No tillage or reduced tillage
b. Ridge–furrow system
c. Tied ridges and rough seed bed
d. Both b and c

573. The soil conservation and management practices suitable for arid and semi–arid regions are
a. No tillage or reduced tillage
b. Ridge–furrow system
c. Tied ridges and rough seed bed
d. Both b and c

574. Contour bunding may be adopted for soil water conservation on slopes ranging between
a. 10–12% b. 3–6%
c. 15% d. 6–12%

575. Contour terracing or bench terracing may be adopted for the soil water conservation on slopes ranging between
a. 10–12% b. 6–33%
c. 12–22% d. 22–30%

576. Contour bunds or graded bunds may be adopted for the soil water conservation on slopes ranging between
a. Upto 4% b. 3–6%
c. 10–12% d. 12–24%

Answers					
	562. c	565. c	568. d	571. b	574. b
	563. a	566. a	569. b	572. a	575. b
	564. c	567. a	570. b	573. d	576. a

577. What is the depth of medium gullies?
a. Less than 3.0 m b. 3–9 m
c. 9–12 m d. 12–18 m

578. What is the depth of small gullies?
a. Less than 3.0 m b. 3–9 m
c. 9–12 m d. 12–18 m

579. Total number of physiographic units in India is
a. 3 b. 5
c. 7 d. 9

580. Prominent soils in Peninsular regions of India are
a. Black soils
b. Red soils
c. Alluvial soils
d. Laterite and Lateritic soils

581. The first soil map of India was prepared by
a. Kothandaram
b. Govindaswamy
c. Ramamoorthy
d. Schokalskaya

582. Total Agro Ecological Zones (AEZ) in India given by NBSS and LUP is
a. 8 b. 15
c. 20 d. 21

583. What is the length of growing period in semi–arid regions?
a. 90–150 days b. 150–210 days
c. 210–270 days d. > 270 days

584. Total area of Alfisols in India is
a. 79.7 mha b. 95.8 mha
c. 80.1 mha d. 26.3 mha

585. Total area of Vertisols in India is
a. 79.7 mha b. 95.8 mha
c. 80.1 mha d. 26.3 mha

586. Total area of Entisols in India is
a. 79.7 mha b. 95.8 mha
c. 80.1 mha d. 26.3 mha

587 Total area of Inceptisols in India is
a. 79.7 mha b. 95.8 mha
c. 80.1 mha d. 26.3 mha

588. Total area of Aridisols in India is
a. 26.3 mha b. 14.6 mha
c. 8.0 mha d. 23.1 mha

589. Total area of Mollisols in India is
a. 26.3 mha b. 14.6 mha
c. 8.0 mha d. 23.1 mha

590. Percentage of Alfisols in India is
a. 29.13% b. 24.37%
c. 24.25% d. 7.04%

591. Percentage of Inceptisols in India is
a. 29.13% b. 24.37%
c. 24.25% d. 7.04%

592. Percentage of Vertisols in India is
a. 29.13% b. 24.37%
c. 24.25% d. 7.04%

593. Arrange the following soil orders based on their distribution in India.
a. Alfisols > Vertisols > Inceptisols > Entisols
b. Vertisols > Alfisols > Entisols > Inceptisols
c. Inceptisols > Entisols > Alfisols > Vertisols
d. Inceptisols > Vertisols > Alfisols > Entisols

594. The dominant soil order in India is
a. Vertisols b. Inceptisols
c. Alfisols d. Entisols

Answers						
	577. b	580. b	583. a	586. c	589. c	592. d
	578. a	581. d	584. a	587. b	590. c	593. c
	579. a	582. c	585. d	588. b	591. a	594. b

595. The principle that younger strata overlie older strata is called as
a. Faunal succession
b. Superposition
c. The Milankovich Theory
d. Catastrophism

596. Sedimentary strata that are folded with limbs dipping away from the fold axis are called as
a. Anticlines b. Unconformities
c. Horsts d. Basins

597. Fracturing and faulting of rock are examples of
a. Plastic deformation
b. Chemical weathering
c. Ductile deformation
d. Brittle deformation

598. Structural features associated with compression are
a. Stretching of the crust and normal faulting
b. Strike–slip faults and normal faults
c. Folded strata and reverse faults
d. None

599. An earthquake of magnitude 8
a. Releases 30 times the energy of an earthquake of magnitude 7
b. Releases 8 times the energy of an earthquake of magnitude 1
c. Produces 30 times the ground motion of an earthquake of magnitude 7
d. Occurs approximately 100 times each year

600. Earthquakes of high magnitude are most common
a. At convergent and divergent plate margins
b. At divergent and transform plate margins
c. At convergent and transform plate margins
d. Within lithospheric plates, not at the margin

601. Geologists know that the earth's outer core is liquid because
a. There are s– and p–wave shadow zones
b. Magmas from the outer core are erupted on the surface
c. Seismic wave velocities increase
d. The lithosphere "floats" on it

602. The earth's core is made of
a. Liquid and solid iron metal
b. Silicate minerals
c. Iron and magnesium
d. All

603. The earth's mantle
a. Is composed mainly of the elements oxygen, silicon and magnesium
b. Has regions that are partially molten
c. Is about 2,900 kilometers thick
d. All the above

604. The deepest parts of the ocean floor, reaching depths up to 11 kilometers, are
a. Mid–ocean ridges
b. Deep sea trenches
c. Abyssal plains d. Rift valleys

605. A continental shelf is
a. A part of the continental crust that lies below sea–level
b. A deeply eroded, ancient section of the continental crust
c. A place where two continents have collided and joined together
d. All the above

Answers				
	595. b	598. c	601. a	604. b
	596. a	599. a	602. a	605. a
	597. d	600. c	603. d	

606. A present day site of continent–continent convergence and continental collision is
a. Eastern Africa and the Red Sea
b. Western South America
c. The Himalaya mountains
d. Florida

607. A present-day site of continental rifting and ocean basin formation is
a. Eastern Africa and the Red Sea
b. Western South America
c. The Himalaya mountains
d. Florida

608. A present–day example of a transform plate margin is
a. The Hawaiian Island chain
b. Yellowstone National Park, Wyoming
c. The San Andreas fault, California
d. All the above

609. The most abundant mineral in the earth's crust is
a. Hematite b. Calcite
c. Feldspar d. Quartz

610. Compared with the continental crust, the oceanic crust is
a. Younger, thicker and less dense
b. Younger, thinner and denser
c. Older, thicker and denser
d. Younger, thinner and less dense

611. Which of the following solid substances is not a mineral?
a. Halite b. Feldspar
c. Volcanic glass d. Olivine

612. Which of the following are ferromagnesian (or mafic silicates)
a. Olivine and feldspar
b. Olivine and pyroxene
c. Quartz and feldspar
d. All

613. Igneous rocks are classified on the basis of
a. The content of silica (SiO_2)
b. The abundance of different minerals
c. Their grain size or texture
d. All the above

614. Magma is produced by melting of rock
a. In the earth's core
b. In the mantle, at divergent and convergent plate margins
c. In the mantle at transform plate margins only
d. None of the above

615. Rocks that form when magma cools slowly beneath the earth's surface are called as
a. Intrusive igneous rocks
b. Extrusive igneous rocks
c. Felsic igneous rocks
d. Pyroclastic rocks

616. A volcano composed of alternating layers of lava flows and pyroclastic material is a
a. Cinder cone
b. Volcanic dome
c. Shield volcano
d. Composite volcano

617. Which of the following is a hazard associated with active volcanoes?
a. Pyroclastic flows, moving at up to 200 kilometers per hour
b. Hot, poisonous gases
c. Catastrophic mudflows, triggered by melting snow
d. All the above

Answers				
	606. c	609. c	612. b	615. a
	607. a	610. b	613. d	616. d
	608. c	611. c	614. b	617. d

618. The most explosive volcanic eruptions occur
a. When magma is viscous and has abundant gases
b. When magma is not viscous and has abundant gases
c. When magma is viscous, but contains no gases
d. When magma is not viscous, but contains no gases

619. Hydrolysis and oxidation are examples of
a. Chemical weathering processes
b. Metamorphic processes
c. Lithification processes
d. Mechanical weathering processes

620. Carbonic acid
a. Forms when water reacts with carbon dioxide
b. Promotes chemical weathering processes
c. Is most abundant where there is decomposing vegetation
d. All the above

621. Over time, soil develops a layered structure called as
a. Stratification
b. A soil profile
c. Foliation
d. Cleavage

622. Soils that develop by intense chemical weathering of rock in hot humid climates are
a. Called aridisols
b. Hard and infertile
c. Fertile because they contain many soluble elements
d. Easy to cultivate once the organic layer is removed

623. One of the most effective mechanical weathering processes is
a. Dissolution
b. Lithification
c. The expansion of water when it freezes
d. The wind

624. Grain size, sorting and rounding of sediment particles can be used to interpret
a. The cooling rate of the sediment
b. The environment in which the sediment was transported and deposited
c. The depth of burial of the sediment after it was deposited
d. All the above

625. An example of a coarse–grained, detrital sedimentary rock is
a. Chalk b. Conglomerate
c. Quartzite d. Shale

626. Chemical sediments and sedimentary rocks
a. Are deposited when dissolved ions form minerals and precipitate from water
b. Contain soluble elements that are released during chemical weathering
c. Include, as examples, rock salt (halite. and gypsum
d. All the above

627. Coal forms
a. On the continents, where terrestrial plants are buried and preserved by sediments
b. On abyssal plains, in the deep oceans
c. In shallow ocean basins, where there is a high rate of evaporation
d. At the mid ocean ridges

Answers				
	618. a	621. b	624. b	627. a
	619. a	622. b	625. b	
	620. d	623. c	626. d	

628. Contact metamorphism
a. Occurs along fault surfaces, where rock is heated and pulverized
b. Occurs in rock surrounding magma chambers in the earth's crust
c. Is caused by high pressure, but not necessarily high temperature
d. All the above

629. The alignment of platy minerals, like mica, in a metamorphic rock is called as
a. Stratification
b. Foliation
c. Lithification
d. A pyroclastic texture

630. Regional metamorphism occurs
a. At convergent plate margins
b. At mid–ocean ridges
c. In subsiding basins on the continents
d. In narrow bands near faults and fractures

631. When limestone is metamorphosed it becomes the rock
a. Calcite b. Schist
c. Chalk d. Marble

632. The earth's shape most closely resembles which of the following object?
a. A basketball
b. A pear
c. A ping–pong ball
d. An apple

633. An observer watching a sailing ship at sea notes that the ship appears to be "sinking" as it moves away. Which statement best explains this observation?
a. The surface of the ocean has depressions
b. The earth has a curved surface
c. The earth is rotating
d. The earth is revolving

634. According to the Earth Science Reference Tables, the equatorial radius of the earth is approximately
a. 637 km b. 6370 km
c. 63700 km d. 637000 km

635. At which location would an observer find the greatest force due to the earth's gravity?
a. North Pole b. New York State
c. Tropic of Cancer d. Equator

636. The water sphere of the earth is known as the
a. Atmosphere b. Troposphere
c. Lithosphere d. Hydrosphere

637. Which statement provides the best evidence that the Earth has a nearly spherical shape?
a. The sun has a spherical shape
b. The altitude of Polaris (N. Star) changes with the observer's latitude in the Northern Hemisphere
c. Star trails photographed over a period of time show a circular path
d. The length of noontime shadows change throughout the year

638. If the deepest parts of the ocean are about 10 kilometers and the radius of the Earth is about 6400 kilometers, the depth of the oceans would represent what percent of the earth's radius?
a. Less than 1%
b. About 5%
c. About 25%
d. More than 75%

Answers				
	628. b	631. d	634. b	637. b
	629. b	632. c	635. a	638. a
	630. a	633. b	636. d	

639. The true shape of the earth is best described as a
a. Perfect sphere
b. Perfect ellipse
c. Slightly oblate sphere
d. Highly eccentric ellipse

640. Compared to earth's crust, earth's core is believed to be
a. Less dense, cooler, and composed of more iron
b. Less dense, hotter, and composed of less iron
c. More dense, hotter, and composed of more iron
d. More dense, cooler, and composed of less iron

641. Compared to felsic igneous rocks, mafic igneous rocks contain greater amounts of
a. White quartz b. Aluminum
c. Pink feldspar d. Iron

642. What are the two most abundant elements by mass found in earth's crust?
a. Aluminum and Iron
b. Sodium and Chlorine
c. Calcium and Carbon
d. Oxygen and Silicon

643. The graph below shows the relationship between mass and volume for three samples, A, B, and C, of a given material. What is the density of this material?
a. 2.0 g/cm³ b. 5.0 g/cm³
c. 10.0 g/cm³ d. 20.0 g/cm³

644. Which mineral is white or colorless, has a hardness of 6.5, and splits with cubic cleavage?
a. Calcite b. Halite
c. Pyrite d. Mica

645. Compared to dull and rough rock surfaces, shiny and smooth rock surfaces are most likely to cause sunlight to be
a. Reflected b. Refracted
c. Scattered d. Absorbed

646. Which sedimentary rock is most likely to be changed to slate during regional metamorphism?
a. Breccia b. Conglomerate
c. Dolostone d. Shale

647. Two streams begin at the same elevation and have equal volumes. Which statement best explains why one stream could be flowing faster than the other stream?
a. The faster stream contains more dissolved minerals
b. The faster stream has a much steeper gradient
c. The streams are flowing in different directions
d. The faster stream has a temperature of 10°C, and the slower stream has a temperature of 20°C

648. Which factor has the greatest influence on the weathering rate of earth's surface bedrock?
a. Local air pressure
b. Angle of insulation
c. Age of the bedrock
d. Regional climate

649. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice is called as
a. Moraine
b. Glaciolacustrine deposit
c. Glaciofluvial deposit
d. Outwash plain
e. Kame

Answers				
	639. c	642. d	645. a	648. d
	640. c	643. c	646. d	649. c
	641. d	644. b	647. b	

650. Particles ranging from 0.01 – 0.03 mm diameter would be considered as
a. Sand b. Silt
c. Clay d. Gravel
e. Cobblestones

651. Lacustrine material deposited in contact with glacial ice is called as _____.
a. Lacustrine
b. Glaciomarine deposits
c. Fluvial deposits
d Glaciolacustrine deposits

652. Materials deposited in lake water and later exposed either by lowering of the water level or by uplifting of the land is called as _____.
a. Lacustrine
b. Glaciomarine deposits
c. Fluvial deposits
d Glaciolacustrine deposits

653. Sediments laid down in a sea environment near a glacier is called as _____.
a. Lacustrine
b. Glaciomarine deposits
c. Fluvial deposits
d Glaciolacustrine deposits

654. The metal ion associated with hemoglobin is
a. Copper b. Manganese
c. Iron d. Magnesium

655. The only metal which exists as liquid at room temperature is
a. Silver b. Mercury
c. Tungsten d. Nicrome

656. Which of the following fertilizers are not produced in India?
a. Nitrogen b. Phosphorus
c. Potassium d. Gypsum

657. Which of the following gas contributes the least in green house effect?
a. CO_2 b. CFC
c. Methane d. Nitrous oxide

658. Which of the following soil control measures is a mechanical measure?
a. Stubble cropping
b. Green manuring
c. Strip cropping
d. Basin listing

659. Soil erosion is mostly affected by
a. Rainfall intensity
b. Rainfall variability
c. Rainfall erosivity
d. Total annual rainfall

660. The main effect of raindrop erosion is
a. Transport of soil particles by fast flowing water
b. Detachment of soil particles thus destruction of soil structure
c. Beginning of gully erosion
d. Reducing soil moisture content

661. The parent rock which gives rise to fertile heavy black clay soil is usually
a. Quartz b. Basalt
c. Limestone d. Granite

662. Which of these will add calcium to the soil without changing the soil pH?
a. Lime b. Dolomite
c. Super phosphate d. Gypsum

663. The best foundation on which an earthen embankment can be build
a. Granite b. Basalt
c. Impervious clay d. Sand

Answers				
650. b	653. b	656. c	659. a	662. c
651. d	654. c	657. d	660. b	663. a
652. a	655. b	658. d	661. b	

664. The soil type requiring the most frequent irrigation is that with
a. The highest clay content
b. The highest filed capacity
c. The highest content of sand
d. The highest content of humus

665. The correct order of soil classification is
a. Soil orders, Soil suborders, Soil families, Soil types
b. Soil orders, Soil suborders, Soil types, Soil families
c. Great soil groups, Soil families, Soil series, Soil types
d. Great soil groups, Soil types, Soil orders, Soil series

666. Tillage is most important to crop production because it
a. Destroy soil structure
b. Prepares a good seed bed
c. Improves soil colour
d. Increases the acidity of the soil

667. Micro organisms such as bacteria and fungi are useful in the soil because they
a. Are fed by plants
b. Remove carbon dioxide
c. Increase pore space
d. Decay organic matter

668. Nitrification
a. Does not involve bacterial activity
b. Is associated with ammonification
c. Is the application of nitrogen fertilizer
d. Includes the conversion of organic matter to nitrates

669. Legumes are planted in a pasture to
a. Remove soil minerals
b. Build up soil nitrate levels
c. Bring moisture to the surface
d. Provide large amounts of dry matter

670. The property that is not affected by the amount of organic matter in the soil
a. Cation exchange capacity
b. Soil texture
c. Biological activity
d. Soil structure

671. A green manure crop would
a. Lower water penetration
b. Decrease aeration
c. Increase nitrogen content
d. None of the above

672. The role of earthworms in soil could be described as
a. Causing plant diseases
b. Breaking down organic matter
c. Destroying soil structure
d. Raising little earthworms

673. Basic andesites are
a. Volcanic igneous rock
b. Plutonic igneous rock
c. Metamorphic rock
d. Sedimentary rock

674. The definition 'Soil is a natural body of mineral and organic constituents' was given by
a. Buckman and Brady
b. Hilgard
c. Dokuchaiev
d. Joffe (1949)

675. The definition 'Soil is a dynamic natural body' was given by
a. Buckman and Brady
b. Hilgard
c. Dokuchaiev
d. Joffe (1949)

Answers				
664. c	667. d	670. b	673. a	
665. c	668. b	671. c	674. c	
666. b	669. b	672. b	675. c	

676. The definition 'Soil is a loose and friable materials' was given by
a. Buckman and Brady
b. Hilgard
c. Dokuchaiev
d. Joffe(1949))

677. The definition 'Soil is a superficial layer of the earth' was given by
a. Buckman and Brady
b. Hilgard
c. Dokuchaiev
d. Joffe(1949))

678. The rate of sedimentation of soil particles is directly proportional to the square root of
a. Diameter b. Radius
c. Volume d. Weight

679. The percentage of organic matter in organic soils should be greater than
a. 30 b. 40
c. 20 d. 10

680. The most abundant minerals in the earth is
a. Quartz b. Feldspar
c. Pyroxenes and Amphiboles
d. Both a and b
e. All the above

681. The size of the clay fraction is less than
a. 0.02 mm b. 0.002 mm
c. 0.2 mm d. 0.0002 mm

682. Clay minerals are called as _____ minerals.
a. Primary minerals
b Secondary minerals
c. Tertiary minerals
d. Accessory minerals

683. Weathering sequence of minerals was given by
a. Joffey (1912)
b. Page and Baver (1940)
c. Jenny (1941)
d. Jackson (1964)

684. What is the pH range of calcareous soils?
a. 8.0 – 8.5 b. 7.0 – 7.5
c. 8.5 – 9.0 d. 6.5 – 7.5

685. Soil order characterized by excess weathering with dominant iron and aluminum oxide clays, common in tropics is
a. Entisols b. Mollisols
c. Oxisols d. Alfisols

686. What is the unit of electrical conductivity (a mean of salinity determination)?
a. dSm^{-1} b. mmho cm^{-1}
c. cmho cm^{-1} d. Sm^{-1}
e. Both a and b

687. The original mineral component of a rock is known as
a. Primary minerals
b. Secondary minerals
c. Tertiary minerals
d. Accessory minerals

688. Minerals, which form the chief constituents of a rock, are called as
a. Essential minerals
b. Secondary minerals
c. Tertiary minerals
d. Accessory minerals

689. Of the following, which are the minerals called as essential minerals?
a. Quartz and Feldspars
b. Amphiboles and Pyroxenes
c. Olivines and Mica
d. All

Answers					
	676. b	679. c	682. b	685. c	688. a
	677. b	680. b	683. d	686. e	689. d
	678. b	681. b	684. a	687. a	

690. Of the following, which are the minerals called as accessory minerals?
a. Apatite, Epitode, Garnets, Ilmenite and Kyanite
b. Sillimanite, Andalusite, Pyrites and Magnetite
c. Rutile, Anatase, Zircon, Sphene and Topaz,
d. Staurolite and Tourmaline

691. A series of monoclinic and triclinic silicates of aluminium with either K, Na or Ca are collectively known as
a. Quartz
b. Feldspar
c. Pyroxenes and Amphiboles
d. Mica

692. Of the following, which is sodium feldspar mineral ?
a. Orthoclase b. Microcline
c. Albite d. Anorthite

693. Of the following, which is calcium feldspar mineral?
a. Orthoclase b. Microcline
c. Albite d. Anorthite

694. Pyroxenes are more basic than amphiboles (True/False).

695. Amphiboles weather faster than pyroxenes (True/False).

696. General chemical formula for pyroxenes is
a. $R_2 (Si_2O_6)$ b. $RSiO_3$
c. R_2SiO_4 d. SiO_2

697. General formula for quartz is
a. $R_2 (Si_2O_6)$ b. $RSiO_3$
c. R_2SiO_4 d. SiO_2

698. What is the general formula for amphiboles?
a. $R_2 (Si_2O_6)$ b. $RSiO_3$
c. R_2SiO_4 d. SiO_2

699. Which is the most abundant amphibole found in soils?
a. Hypersthene b. Augite
c. Horneblende d. Diapside

700. Augite is a _____ group mineral.
a. Quartz b. Pyroxenes
c. Amphiboles d. Olivine

701. Foresterite and Fayalite are the examples for _____ group minerals.
a. Quartz b. Pyroxenes
c. Amphiboles d. Olivine

702. Of the following, which is dark coloured mica?
a. Illite
b. Muscovite
c. Biotite
d. Montmorillonite

703. Of the following, which is light coloured mica?
a. Illite b. Muscovite
c. Biotite
d. Montmorillonite

704. Apatite is a _____ mineral.
a. Primary b. Secondary
c. Tertiary d. Accessory

705. What is the percentage of SiO_2 in quartz?
a. 80 b. 90
c. 100 d. 95

706. Of the following, which one is the example for phosphate mineral?
a. Anorthite b. Apatite
c. Augite d. Biotite

Answers						
	690. a	693. d	696. a	699. c	702. c	705. c
	691. b	694. F	697. d	700. b	703. b	706. b
	692. c	695. T	698. b	701. d	704. b	

707. Of the following, which one is the magnesium containing mineral?
a. Hornblende b. Olivine
c. Muscovite d. Albite

708. Of the following, which one is the high calcium containing mineral?
a. Apatite b. Albite
c. Anorthite d. Augite

709. Orthoclase minerals can be identified by
a. Zoning b. Cleavage
c. Partial alteration d. Inclusion

710. Plagioclase minerals can be identified by
a. Partial alteration b. Zoning
c. Cleavage d. Inclusion

711. Mica and gypsum can be identified by
a. Partial alteration b. Zoning
c. Cleavage d. Inclusion

712. Plutonic igneous rock that is deficient in silica is
a. Andesite b. Diorite
c. Granodiorite d. Nepheline

713. Albite and anorthite can be identified by
a. Cleavage b. Inclusion
c. Zoning
d. Partial alteration

714. In reflected light, which mineral shows black coloured surface?
a. Apatite b. Magnetite
c. Haematite d. Muscovite

715. In reflected light, which mineral shows silvery appearance?
a. Ilmenite b. Muscovite
c. Olivine d. Both a and b

716. Pleochroism is a characteristic feature of
a. Biotite b. Hornblende
c. Tourmaline d. All

717. Which mineral(s) can be identified by the angle of extinction?
a. Apatite b. Muscovite
c. Augite d. Both a and b
e. All the above

718. Orthoclase feldspar can be distinguished from the quartz and plagioclase feldspar by
a. Zoning b. Twinning
c. Angle of extinction
d. Pleochroism

719. Which of the following is more stable mineral?
a. Zircon b. Tourmaline
c. Quartz d. Magnetite

720. Which of the following is easily weatherable mineral?
a. Olivine b. Hornblende
c. Augite d. Biotite

721. Arrange the following minerals based on their stability in increasing order.
a. Albite > Zircon > Magnetite > Muscovite
b. Magnetite > Muscovite > Albite > Zircon
c. Magnetite > Zircon > Albite > Muscovite
d. Albite > Muscovite > Magnetite > Zircon

722. Arrange the following minerals based on their stability in decreasing order.
a. Biotite > Apatite > Anorthite > Olivine
b. Anorthite > Apatite > Biotite > Olivine
c. Anorthite > Biotite > Apatite > Olivine
d. Biotite > Anorthite > Apatite > Olivine

Answers						
	707. b	710. b	713. c	716. d	719. a	722. b
	708. c	711. c	714. b	717. e	720. a	
	709. c	712. d	715. a	718. b	721. d	

723. Which one of the following is the light mineral?
a. Quartz b. Feldspar
c. Mica d. Microcline
e. All the above

724. Which one of the following is the heavy mineral?
a. Apatite b. Hornblende
c. Tourmaline d. Zircon
e. All the above

725. Of the following, which one is the secondary mineral?
a. Clay minerals
b. Amorphous silicates
c. Oxides of iron, aluminium and silicon
d. All the above

726. Formula for tetrahedral unit is
a. Si_2O_6 b. SiO_2
c. Si_4O_8 d. SiO_4

727. When an oxygen is shared by two adjacent tetrahedral unit, the unit negative charge will be
a. Increased b. Decreased
c. Unaltered d. All

728. Dioctahedral structure will be formed when two thirds of octahedral position is filled with _____ ions.
a. Trivalent b. Divalent
c. Monovalent d. Both a and b

729. Trioctahedral structure will be formed when all the octahedral position are filled with _____ ions.
a. Trivalent b. Divalent
c. Monovalent d. Both a and b

730. Which is an amorphous clay mineral?
a. Kaolinite b. Smectite
c. Allophane d. Chlorite

731. Of the following, which is/are example(s) for 1 : 1 dioctahedral clay minerals?
a. Serpentine b. Kaolinite
c. Halloysite d. Both a and b
e. Both b and c

732. Of the following, which is/are example(s) for 1 : 1 trioctahedral clay minerals?
a. Greenalite b. Serpentine
c. Chrysolite d. All

733. The most widely occurring 1 : 1 type clay minerals is
a. Kaolinite b. Halloysite
c. Serpentine d. Greenalite

734. What is the basal spacing of kaolinite?
a. 10.25 °A b. 7.2 °A
c. 10 °A d. 14 °A

735. What is the basal spacing of halloysite?
a. 10.25 °A b. 7.2 °A
c. 10 °A d. 14 °A

736. The most dominant and important clay mineral identified in vertisols is
a. Vermiculite
b. Montmorillonite
c. Beidellite
d. Nontronite

737. Beidellite and nontronite are the examples of _____ group minerals.
a. Kaolin b. Smectite
c. Mica d. Chlorite

738. Crystal units of montmorillonite are held together by
a. Potassium b. Water
c. Sodium d. Brucite

Answers						
	723. e	726. d	729. b	732. d	735. a	738. b
	724. e	727. b	730. c	733. a	736. b	
	725. d	728. a	731. e	734. b	737. b	

739. What is the basal spacing of montmorillonite?
a. 10 °A b. 10.25 °A
c. 7.2 °A d. 14 °A

740. Of the following, which one is ferric end member of the smectite group series?
a. Montmorillonite b. Beidellite
c. Nontronite d. Vermiculite

741. Of the following, which one is aluminium end member of the smectite group series?
a. Montmorillonite b. Beidellite
c. Nontronite d. Vermiculite

742. _____ is an example for expanding group of clay minerals.
a. Kaoline b. Smectite
c. Mica d. Chlorite

743. _____ is an example for 2:1 type of non–expanding clay minerals.
a. Mica b. Smectite
c. Chlorine d. Kaoline

744. _____ is an example for 2:1 type of non–expanding clay mineral.
a. Montmorillonite b. Vermiculite
c. Beidellite d. Nontronite

745. Crystal units of mica group minerals are held together by
a. Water b. Potassium
c. Magnesium d. Both a and b
e. All the above

746. What is the basal spacing of illite or hydrous mica?
a. 7.2 °A b. 14 °A
c. 10 °A d. 10.25 °A

747. Muscovite is a _____ clay mineral.
a. 2 : 1 dioctahedral
b. 2 : 1 trioctahedral
c. 1 : 1 trioctahedral
d. 2 : 1 : 1 dioctahedral

748. _____ is an example for 2: 1 trioctahedral, non–expanding clay mineral.
a. Glauconite b. Illite
c. Beidellite d. Phlogobite

749. Of the following, which is/are the example(s) for 2: 1 dioctahedral, non–expanding clay minerals?
a. Muscovite b. Glauconite
c. Illite d. All

750. The 2 : 1 non–expanding clay mineral _____ exists both in dioctahedral and trioctahedral forms.
a. Chlorite b. Glauconite
c. Vermiculite d. Illite

751. Crystal units of vermiculite are held together by
a. Water b. Potassium
c. Magnesium d. Both b and c

752. Which clay mineral has high net negative charge?
a. Montmorillonite b. Vermiculite
c. Illite d. Kaolinite

753. Chlorite is a _____ type clay mineral.
a. 2 : 1 : 1 b. 2 : 1
c. 1 : 1 d. Both a and b

754. Crystals units of chlorite are held together by
a. Water b. Brucite
c. Potassium d. Magnesium

Answers						
739. d	742. b	745. e	748. d	751. c	754. b	
740. c	743. a	746. c	749. d	752. c		
741. b	744. b	747. a	750. c	753. a		

755. Dominant element present in the octahedral sheets of chlorite is
a. Potassium b. Sodium
c. Aluminium d. Magnesium

756. Charge density is high for which of the following clay minerals ?
a. Montmorillonite b. Illite
c. Kaolinite d. Chlorite

757. Charge density is low for which of the following clay minerals ?
a. Montmorillonite b. Illite
c. Kaolinite d. Chlorite

758. Which clay mineral is hexagonal in shape?
a. Kaolinite b. Halloysite
c. Montmorillonite d. Vermiculite

759. Elongated tubles is the shape of _____ mineral.
a. Kaolinite b. Halloysite
c. Montmorillonite d. Vermiculite

760. Irregular flakes are the shape of _____ mineral.
a. Kaolinite b. Halloysite
c. Montmorillonite d. Vermiculite

761. What is the SiO_2/ Al_2O_3 ratio of kaolinite?
a. Less than 2 b. Greater than 2
c. Equal to 2 d. None

762. What is the SiO_2/ Al_2O_3 ratio of montmorillonite ?
a. Less than 2 b. Greater than 2
c. Equal to 2 d. None

763. What is/are the chemical(s) used for the determination of surface area of clay minerals ?
a. Ethylene glycol
b. EG monoethyl ether
c. Aluminium oxide
d. Both a and b
e. All the above

764. Mineral which has more internal surface area is
a. Vermiculite b. Illite
c. Montmorillonite d. Kaolinite

765. Mineral which has more external surface area is
a. Vermiculite b. Illite
c. Montmorillonite d. Kaolinite

766. What is the total surface area of montmorillonite ($m^2\ kg^{-1}$) ?
a. $580 - 750 \times 10^3$
b. $130 - 180 \times 10^3$
c. $780 - 900 \times 10^3$
d. $120 - 170 \times 10^3$

767. What is the external surface area of montmorillonite ($m^2\ kg^{-1}$) ?
a. $50 - 70 \times 10^3$
b. $70 - 100 \times 10^3$
c. $80 - 100 \times 10^3$
d. $80 - 150 \times 10^3$

768. Total surface area of chlorite ($m^2\ kg^{-1}$) is
a. $37 - 45 \times 10^3$
b. $130 - 180 \times 10^3$
c. $120 - 170 \times 10^3$
d. $580 - 750 \times 10^3$

769. CEC of montmorillonite clay mineral (cmol (p+) kg^{-1}) is
a. 69 – 81 b. 57 – 64
c. 80 – 150 d. 30 – 40

770. What is the CEC of kaolinite (cmol (p+) kg^{-1}) ?
a. 30 – 40 b. 3 – 15
c. 18 – 22 d. 57 – 64

Answers						
755. d	758. a	761. a	764. c	767. d	770. b	
756. b	759. b	762. b	765. a	768. b		
757. c	760. c	763. e	766. a	769. c		

771. Clay minerals can be identified by
a. X – ray Diffraction Analysis
b. Electron Diffraction Analysis
c. Differential Thermal Analysis
d. All

772. What Inert material is used in Differential Thermal Analysis for clay minerals identification ?
a. Ceramic oxide
b. Hydrogen peroxide
c. Aluminium oxide
d. Ethylene glycol

773. Crystallization of clay minerals is a _____ process.
a. Exothermic b. Endothermic
c. Both a and b d. Inert

774. What is the differential thermal peak of montmorillonite ?
a. 850 – 900 °C b. 500 – 550 °C
c. 400 – 525 °C d. 480 °C–530 °C

775. Particles less than _____ cannot be resolved under ordinary microscope.
a. 0.2 μ b. 0.02 μ
c. 2.0 μ d. 20 μ

776. K_2O content in illite clay mineral is
a. 5 – 7 % b. 8 – 10 %
c. 10 – 15 % d. 6 – 10%

777. MgO content is more in
a. Montmorillonite b. Kaolinite
c. Chlorite d. Illite

778. Y – index was given by
a. Martin and Russell
b. Ramamoorthy and Subramanian
c. Larsen
d. Schofield

779. In the Y– index {1/3[A × 10/6 + B × 10/20 + C × 10/25]}, A indicates
a. MgO content b. Al_2O_3 content
c. Fe_2O_3 content d. K_2O content

780. In the Y– index {1/3[A × 10/6 + B × 10/20 + C × 10/25]}, B indicates
a. Total surface area
b. Internal surface area
c. External surface area
d. All

781. In the Y– index {1/3[A × 10/6 + B × 10/20 + C × 10/25]}, C indicates
a. Anion exchange capacity
b. Phosphate buffering capacity
c. Cation exchange capacity
d. All

782. Y– index value of montmorillonite is
a. 0 – 5 b. 5 – 25
c. Greater than 25 d. None

783. Y– index value of illite is
a. 0 – 5 b. 5 – 25
c. Greater than 25 d. None

784. Clay minerals are most commonly identified by
a. X – ray Diffraction
b. Electron Diffraction
c. DTA and Electron Microscope
d. All

785. Potassium fixation is more in
a. Vermiculite b. Illite
c. Montmorillonite d. Chlorite

786. Of the following, which one is non–crystalline alumino–silicates mineral ?
a. Allophane
b. Montmorillonite
c. Vermiculite d. Halloysite

Answers						
	771. d	774. a	777. c	780. b	783. c	786. a
	772. c	775. a	778. a	781. c	784. d	
	773. b	776. d	779. d	782. c	785. b	

787. What is the Y– index value of kaolinite ?
a. 0 – 5 b. 5 – 25
c. Greater than 25 d. None

788. Illuvial horizon of clay, silt and humus is
a. Argillic horizon b. Agric horizon
c. Umbric horizon d. Mollic horizon

789. $KFe_3(OH)_6(SO_4)_2$ is the structural formula of
a. Diorite b. Syenite
c. Alunite d. Jarosite

790. In Jackson's (1964) weathering sequence, the first easily weatherable mineral series is
a. Olivine b. Gypsum
c. Calcite d. Biotite

791. Of the following, which are the minerals formed at the initial stage of weathering?
a. Gypsum and calcite
b. Olivine, Hornblende and pyroxenes
c. Biotite and Glauconite
d. All the above

792. Of the following, which are the minerals formed at the advanced stages of weathering ?
a. Rutile, Zircon and Anatase
b. Kaolinite, Gibbsite
c. Boehmite, Haematite and Goethite
d. All

793. Of the following, which are the minerals formed at the intermediate stages of weathering ?
a. Albite and Anorthite
b. Muscovite and Illite
c. Vermiculite and Montmorillonite
d. All

794. In Jackson's (1964) weathering sequence, quartz is formed at the
a. Initial weathering stage
b. Intermediate weathering stage
c. Advanced weathering stage
d. All the above

795. Total number of series in Jackson's (1964) weathering sequence of minerals is
a. 10 b. 11
c. 12 d. 13

796. What is the size of the clay mineral, illite?
a. 0.1 – 5 m b. 0.01 – 1 m
c. 0.1 – 2 m d. 0.1 – 0.5 m

797. Soil classification on the basis of zonality was given by
a. Dokuchaiev
b. Joffey
c. Marbut
d. Baldwin and associate

798. Soil classification on the basis of morphology was given by
a. Dokuchaiev
b. Joffey
c. Marbut
d. Baldwin and associates

799. Soil classification on the basis of own properties was given by
a. Dokuchaiev
b. Joffey
c. Marbut
d. Baldwin and associates

800. The number of soil classification in world soil classification given by FAO, UNESCO (1988) is
a. 20 b. 21
c. 22 d. 23

Answers					
	787. a	790. b	793. d	796. c	799. b
	788. b	791. d	794. b	797. c	800. d
	789. d	792. d	795. d	798. c	

801. Orthoclase and monocline are
a. K – Feldspar b. Na – Feldspar
c. Ca – Feldspar d. Mg – Feldspar

802. Orthoclase and monocline are
a. Valconic origin
b. Plutonic origin
c. Valconic and metamorphic origin
d. Plutonic and metamorphic origin

803. The last layer in the soil profile is the
a. A Horizon b. B Horizon
c. C Horizon d. R Horizon

804. Adularia and sanidine are
a. K – Feldspar b. Na – Feldspar
c. Ca – Feldspar d. Mg – Feldspar

805. Examples for well ordered and perfect mica are
a. Biotite and muscovite
b. Phlogobite and paragonite
c. Biotite and paragonite
d. All

806. Garnet is a
a. Igneous rock
b. Sedimentary rock
c. Metamorphic rock d. None

807. The soil orders which have highest suborder (7) are
a. Mollisols and Andosols
b. Mollisols and vertisols
c. Vertisols and Andosols
d. Inceptisols and Alfisols

808. In 'n' value, = A – 0.2 R/L + 3H, R indicates
a. Water b. Clay
c. Sand + Silt d. Humus

809. In 'H' value, = A – 0.2 R/L + 3H, R indicates
a. Water b. Clay
c. Sand + Silt d. Humus

810. In 'L' value, = A – 0.2 R/L + 3H, R indicates
a. Water b. Clay
c. Sand + Silt d. Humus

811. What is the 'n' value of mollic epipedon?
a. 0.3 b. 0.5
c. 0.7 d. 0.9

812. Before the ingredients of soil are broken down and form soil they are known as
a. Felsic mix
b. Presoil mix
c. Parent material
d. Organic material

813. What is the C: N ratio of agric horizon ?
a. < 4 : 1 b. < 6 : 1
c. < 8 : 1 d. < 10 : 1

814. Which of the following is used as soil mapping units for detailed soil survey ?
a. Soil series b. Soil types
c. Soil phases d. All

815. In the world soil classification, given by FAO–UNESCO (1988), what is the number of soil class ?
a. 21 b. 23
c. 25 d. 28

816. What is the percentage of Ca in albite ?
a. 0 – 9 b. 0 – 4
c. 2 – 20% d. 0 – 12%

817. What is the percentage of Ca in anorthite ?
a. 6 – 9 b. 8 – 11
c. 10 – 20 d. 27 – 51

818. What is the percentage of P_2O_5 in apatite?
a. 54 – 55 % b. 40 – 42 %
c. 48 – 52 % d. 35 – 38%

Answers						
	801. a	804. a	807. a	810. b	813. c	816. a
	802. d	805. d	808. c	811. c	814. d	817. c
	803. d	806. c	809. d	812. c	815. d	818. a

819. In vermiculite,
a. Both octahedral and tetrahedral sheets exhibits high isomorphous substitution
b. Tetrahedral substitution is more than octahedral substitution
c. Tetrahedral substitution is less than octahedral substitution
d. None of the above

820. _____ is a light mineral.
a. Mica b. Pyrite
c. Magnetite d. Quartz

821. What is the hardness of the mineral 'diamond' in mho's scale?
a. 7 b. 8
c. 9 d. 10

822. Of the following, which one is least resistant dark mineral?
a. Talc b. Gypsum
c. Olivine d. Anorthite

823. Of the following, which one is least resistant light mineral?
a. Talc b. Gypsum
c. Olivine d. Anorthite

824. The new name for A_3 horizon is
a. A/B or E/B b. AB or EB
c. E d. B

825. In soil classification, the subordinate 'b' denotes
a. Physical root restriction
b. Burried horizon
c. Ploughing
d. Plinthite

826. In soil classification, the subordinate 'Z' denotes
a. Soluble salts
b. $CaCO_3$ accumulation
c. Fragipan
d. Frozen soil

827. In soil classification, the subordinate 'm' denotes
a. Concretion/nodules
b. Structure and colour development
c. Illuvial accumulation R_2O_3 + organic matter
d. Cementation/induration

828. In soil classification, the subordinate 'q' denotes
a. Accumulation of silica
b. Residual accumulation of R_2O_3
c. Illuvial accumulation of R_2O_3 and organic matter
d. Illuvial accumulation of organic matter/ humus

829. In soil classification, the subordinate 'V' denotes
a. Physical root restriction
b. Burried horizon
c. Ploughing
d. Plinthite

830. In soil classification, the subordinate 'X' denotes
a. Soluble salts
b. $CaCO_3$ accumulation
c. Fragipan
d. Frozen soil

831. In soil classification, the subordinate 'S' denotes
a. Concretion/nodules
b. Structure and colour development
c. Illuvial accumulation of R_2O_3 + Organic matter
d. Cementation/induration

Answers					
	819. a	822. c	825. b	828. a	831. c
	820. d	823. d	826. a	829. d	
	821. d	824. a	827. d	830. c	

832. In soil classification, the subordinate 'O' denotes
a. Accumulation of silica
b. Residual accumulation of R_2O_3
c. Illuvial accumulation of R_2O_3 and org. matter
d. Illuvial accumulation of organic matter/ humus

833. In land capability classification, the old alluvial plain with aeolian cover is classified under which classes?
a. Class I to IV
b. Class II or III
c. Class III or IIV
d. Class IV or VI

834. In land capability classification, the old alluvial plain without aeolian cover is classified under which classes?
a. Class I to IV
b. Class II or III
c. Class III or IIV
d. Class IV or VI

835. The soil which has strong erosion is classified under
a. Class II
b. Class III or IV
c. Class IV or VI
d. Class VI or VIII

836. The soil which has slight erosion is classified under
a. Class II
b. Class III or IV
c. Class IV or VI
d. Class VI or VIII

837. Quartzite is an example for
a. Foliated rocks
b. Unfoliated rocks
c. Granular rocks
d. None

838. Gneiss, schist, phyllite and slate are the examples of
a. Foliated rocks
b. Unfoliated rocks
c. Granular rocks
d. None

839. Anorthite, talc and amphibolite are
a. Foliated rocks
b. Unfoliated rocks
c. Granular rocks
d. None

840. Amphibolite is metamorphosized from
a. Granite b. Sand stone
c. Hornblende d. Sandstone

841. The common minerals found in humid temperate zone are
a. Gypsum and calcite
b. Quart, muscovite and orthoclase
c. Kaolinite, Gibbsite and Hematite
d. Quartz, Gypsum and calcite.

842. The common minerals found in humid tropic zone are
a. Gypsum and calcite
b. Quart, muscovite and orthoclase
c. Kaolinite, Gibbsite and Hematite
d. Quartz, Gypsum and calcite.

843. Serpentine, Fe–oxides and magnetite are the altered products of
a. Olivine b. Orthoclase
c. Quartz d. Anorthite

844. Gibbsite or clay and silicic acid are the altered products of
a. Olivine b. Orthoclase
c. Quartz d. Anorthite

Answers					
	832. b	835. c	838. a	841. b	844. b
	833. c	836. b	839. b	842. c	
	834. b	837. c	840. c	843. a	

845. Chlorite and/or serpentine, epidote, calcite and hornblende are the altered products of
a. Muscovite b. Quartz
c. Amphiboles d. Pyroxenes

846. Chert (Quartz without clay) is the altered products of
a. Olivine b. Orthoclase
c. Quartz d. Anorthite

847. Serpentine and/or chlorite is the altered products of
a. Muscovite b. Quartz
c. Amphiboles d. Pyroxenes

848. Clay and carbonate are the altered products of
a. Olivine b. Orthoclase
c. Quartz d. Anorthite

849. The surface soil horizon developed under acid litter and humus coniferous and heath vegetation is called as
a. Mor b. Mull
c. Sward d. Orterdes

850. A humus rich B – horizon in podzols is
a. Mor b. Mull
c. Sward d. Orterdes

851. A surface soil horizon formed by the mixture of mineral matter and amorphous humus is
a. Mor b. Mull
c. Sward d. Orterdes

852. Dealkalization is an example for
a. Zonal soil forming process
b. Intrazonal soil forming process
c. Azonal soil forming process
d. None

853. The resulted soils after the removal of Na ions from the exchange complex of alkali soils by treating with gypsum is called as
a. Sodic soils b. Saline soils
c. Alkaline soils d. Soloth

854. Soil temperature regimes prevalent in India are
a. Mesic and thermic
b. Thermic and megathermic
c. Megathermic and Hyperthermic
d. Thermic and hyperthermic

855. The percentage of hyperthermic and megathermic soil temperature regimes in India is
a. > 55 % b. > 65 %
c. > 75 % d. > 80 %

856. Soils rich in organic matter with mollic/ umbric epipedon are called as
a. Regosols b. Phaeozems
c. Planosols d. Kastanozems

857. Soils with accumulation of clay and strong weathering are
a. Leptosols b. Lixisols
c. Luvisols d. Nitisols

858. Soils with loose materials overlying hard core of earth are
a. Andisols b. Gleyzems
c. Alfisols d. Regosols

859. Soils with shining ped faces are
a. Leptosols b. Lixisols
c. Luvisols d. Nitisols

860. Soils with high organic matter are
a. Regosols b. Phaeozems
c. Planosols d. Kastanozems

861. Shallow soils are
a. Leptosols b. Lixisols
c. Luvisols d. Nitisols

Answers						
	845. d	848. d	851. a	854. c	857. b	860. d
	846. c	849. a	852. b	855. c	858. d	861. a
	847. c	850. d	853. d	856. b	859. d	

862. Soils with accumulation of clay are
a. Acrisols b. Alfisols
c. Luvisols d. Planosols

863. Soils with high Al content are
a. Aridisols b. Gleyzems
c. Alfisols d. Regosols

864. Soils with strong acids are
a. Acrisols b. Alfisols
c. Luvisols d. Planosols

865. Land capability classification was first given by
a. Schokalskaya (1932)
b. Govindarajan (1971)
c. Krishnamoorthy *et al.*
d. Klingebiel and Montgomery (1961)

866. The dominant soil order in India is
a. Entisols b. Alfisols
c. Inceptisols d. Vertisols

867. Arrange the following based on their dominance of distribution in India.
a. Inceptisols > Vertisols > Alfisols > Entisols
b. Inceptisols > Entisols > Alfisols > Vertisols
c. Inceptisols > Entisols > Vertisols > Alfisols
d. Inceptisols > Alfisols > Entisols > Vertisols

868. What is the total area of inceptisols in India?
a. 97.8 mha b. 96.8 mha
c. 80.1 mha d. 95.8 mha

869. What is the total area of entisols in India?
a. 97.8 mha b. 96.8 mha
c. 80.1 mha d. 95.8 mha

870. What is the total area of alfisols in India?
a. 79.7 b. 80.1
c. 95.8 d. 97.8

871. Which is the most important chemical weathering process?
a. Hydration b. Solution
c. Hydrolysis
d. Oxidation-Reduction

872. By which process the mineral serpentine is formed from olivine?
a. Hydration
b. Solution
c. Hydrolysis
d. Oxidation-Reduction

873. Of the following chemical weathering processes, which one is the forerunner of clay formation?
a. Hydration
b. Solution
c. Hydrolysis
d. Oxidation-Reduction

874. Illite is formed from mica by
a. Hydration
b. Solution
c. Hydrolysis
d. Oxidation-Reduction

875. Stability series of mineral was given by
a. Jackson
b. Goldich
c. Mohr and van Baren
d. Jenny

876. What is the mean annual soil temperature (MAST) limit used to separate the frigid soils from mesic soils in India?
a. 4° C b. 5° C
c. 6° C d. 8° C

Answers					
	862. c	865. d	868. d	871. c	874. c
	863. c	866. c	869. c	872. a	875. b
	864. a	867. b	870. a	873. c	876. b

877. What is the mean annual soil temperature (MAST) limit used to separate the thermic and hyperthermic soils?
a. 8° C b. 20° C
c. 22° C d. 28° C

878. What is the mean annual soil temperature (MAST) limit used to separate the hyperthermic and megathermic?
a. 8° C b. 20° C
c. 22° C d. 28° C

879. How many categories are used for the classification of soil in soil taxonomy?
a. Four b. Five
c. Six d. Eight

880. In which of the following category, the soil properties that are important for plant growth, soil temperature and pH are used as differentiating characteristics?
a. Suborder b. Family
c. Subgroup d. Series

881. Red-Yellow podzolic, Grey wooded and associated planosols and Half-bog soils are under the soil order _____.
a. Histosols b. Oxisols
c. Alfisols d. Ultisols

882. The percentage of cracking-clay mineral containing vertisols is
a. > 15 % b. > 20 %
c. > 25 % d. > 30 %

883. _____ are the soils of grassland (tall or short) vegetation under sub humid to humid environment.
a. Mollisols b. Vertisols
c. Alfisols d. Inceptisols

884. _____ are the mineral soils of areas having high ground water table.
a. Inceptisols b. Aridisols
c. Entisols d. Vertisols

885. Alfisols are more strongly weathered than _____ but less so than _____.
a. Ultisols.....Inceptisols
b. Oxisols..... Inceptisols
c. Oxisols..... Ultisols
d. Inceptisols.....Oxisols

886. What is the percent base saturation in alfisols?
a. > 20 % b. > 25 %
c. > 30 % d. > 35 %

887. _____ are the mineral soils with accumulation of sesquioxides and humus in the subsurface horizons.
a. Ultisols b. Spodosols
c. Oxisols d. Alfisols

888. The soils developed under cool, humid climate and coarse-textured silicious parent materials are
a. Ultisols b. Spodosols
c. Oxisols d. Alfisols

889. _____ has an illuvial horizon, enriched with free sesquioxides (Bs) and humus (Bh) underlying a bleached wood-ash-coloured eluvial E-horizon.
a. Ultisols b. Spodosols
c. Oxisols d. Alfisols

890. Ultisols are comparable with alfisols except for having low
a. Base saturation b. Organic matter
c. Clay content d. All

Answers					
	877. c	880. b	883. a	886. d	889. b
	878. d	881. d	884. d	887. b	890. a
	879. c	882. d	885. c	888. b	

891. Peat soils are generally characterized as
a. Black, heavy and acidic
b. Red, light and acidic
c. Black, light and alkaline
d. Black, heavy and neutral

892. Of the following soil order, _____ have not been observed or reported so far in India.
a. Andisols b. Gelisols
c. Histosols d. Both a and b
e. All the above

893. _____ is the major constraint of alluvial soils.
a. High clay content
b. High drainage
c. Stratification
d. High acidity

894. In black soils, churning causes vertical mixing in deep soils and leads to the development of cracks with _____ deep and _____ wide.
a. > 10 cm..... > 1 cm
b. > 50 cm..... > 1 cm
c. > 25 cm..... > 1 cm
d. > 1 cm..... > 1 cm

895. _____ do not exhibits any eluviation and illuviation processes.
a. Black soils
b. Red soils
c. Forest and Hilly soils
d. Laterite and Latish soils

896. The very dark colour in black soils is due to clay – humus complexes and/or the presence of _____.
a. Haematite b. Limonite
c. Goethite d. Magnetite

897. The SiO_2/sesquioxides (R_2O_3) ratio of red soils varies from
a. 1.5 – 2.0 b. 2.0 – 2.5
c. 2.5 – 3.0 d. 1 – 2.0

898. _____ soils are typically formed in tropical climate with alternate wet and dry conditions.
a. Laterite b. Lateritic
c. Red soils d. Both a and b

899. Of the plutonic rocks, _____ and _____ are more plentiful than all others.
a. Granites, Syenites
b. Granites, Foidal syenites
c. Granites, Granodiorites
d. Granite, Gabbro

900. Of the volcanic rocks, _____ and _____ are more plentiful than all others.
a. Basalts, Basic andesites
b. Basalts, Nepheline
c. Basalts, Diorite
d. Basalts, Granodiorite

901. _____ was formed when the proportion of Fe and Mg were high in volcanic molten magma.
a. Nepheline b. Mica
c. Olivine
d. Basic andesites

902. The elemental composition of rocks mainly controls the nature of _____.
a. Primary minerals
b. Secondary minerals
c. Tertiary minerals
d. All the above
e. None of the above

Answers				
	891. a	894. c	897. c	900. a
	892. b	895. a	898. a	901. c
	893. c	896. d	899. c	902. b

903. Volcanic ash is the example of
a. Igneous rocks
b. Sedimentary rocks
c. Metamorphic rocks
d. None

904. A_2 horizon of podzols is
a. Ashy – grey
b. Reddish – grey
c. Bluish – grey
d. None of the above

905. Accumulation of $CaCO_3$ and $CaSO_4 \cdot 2H_2O$ imparts
a. Grayish white b. Bluish white
c. Reddish white d. All

906. An ideal soil contains a mineral fraction, organic matter, water and
a. Rocks b. Colluvium
c. Air d. Alluvium

907. The soil horizon of maximum biological activity is
a. A b. B
c. C d. E

908. An example of physical weathering is
a. Minerals dissolved by water
b. Oxidation
c. Frost wedging
d. Carbonation

909. A well-developed O horizon is more likely to be found in
a. A forest b. A desert
c. A coastal region d. None

910. By definition a soil must
a. Contain living matter
b. Contain rocks
c. Contain minerals
d. All

911. An example of a primary mineral is
a. Granite b. Feldspar
c. Clay d. Basalt

912. The horizon of maximum clay accumulation or illuviation is
a. A b. B
c. C d. D

913. The C horizon is also called as
a. Solum b. Topsoil
c. Zone of loss d. Parent material

914. Pedology refers to
a. Study of soils as natural bodies in the landscape
b. Using soils to grow plants
c. Adaptation of plants to different soil types
d. All the above

915. A solid homogenous crystalline chemical element or compound is a
a. Mineral b. Rock
c. Regolith d. Pedon

916. Minerals that crystallize from cooling magma are
a. Primary minerals
b. Secondary minerals
c. Tertiary minerals
d. Rocks

917. A two-dimensional vertical section of a soil showing its horizons is a
a. Profile b. Pedon
c. Polypedon d. Regolith

918. An example of a secondary mineral is
a. Granite b. Quartz
c. Clay d. Basalt

Answers						
	903. a	906. c	909. a	912. b	915. a	918. c
	904. a	907. a	910. a	913. d	916. a	
	905. a	908. c	911. b	914. a	917. a	

919. The most common soil parent material in the mountains of North India is
a. Unconsolidated sediment
b. Residual rock
c. Organic deposits
d. None

920. Which of the following is an igneous rock?
a. Gneiss b. Feldspar
c. Granite d. Schist

921. Which type of weathering process is dominant in areas with temperate climates and adequate rainfall?
a. Chemical b. Physical
c. Biological d. All

922. The soil parent material not found in coastal regions of India is
a. Glacial outwash
b. Marine sediments
c. Sedimentary rocks
d. Alluvial deposits

923. Alluvium is
a. Deposited on flood plains of rivers
b. Wind blown sand
c. Wind deposited silt
d. Material accumulated at the bottom of steep hills

924. Colluvium is
a. Deposited on flood plains
b. Wind blown sand
c. Moved by gravity and accumulates at the foot of a slope
d. Wind deposited silt

925. A greater supply of plant nutrients would be expected in soils formed from
a. Light coloured igneous rocks
b. Dark coloured igneous rocks
c. Light coloured sedimentary rocks
d. Dark coloured sedimentary rocks

926. Loess is deposited by wind. Its dominant particle size is
a. Sand b. Silt
c. Clay d. None

927. Organic parent material generally accumulates under
a. Saturated conditions
b. Well drained conditions
c. Tropical climates
d. Coastal climates

928. The material responsible for red and yellow colour in soils is
a. Quartz a. Mica
c. Oxidized iron d. Feldspar

929. The five soil forming factors _____ to determine soil characteristics.
a. Interact
b. Act independently
c. Are active
d. None

930. The percentage of organic matter in the A horizons of well drained soils is greater in
a. Tropical climates
b. Temperate climates
c. Subtropical climates
d. Dry climates

931. As snow melts, north facing slopes remain covered longer than south facing slopes. This illustrates the effects of
a. Soil colour
b. Depth to the water table
c. Slope aspect
d. Soil temperature

Answers					
	919. b	922. a	925. b	928. c	931. c
	920. c	923. a	926. b	929. a	
	921. a	924. c	927. a	930. b	

932. Which vegetation type is more likely to develop thick A horizons with greater amounts of organic matter?
a. Grasslands b. Forests
c. Valley lands d. None

933. Which process of horizon differentiation is illustrated by illuviation?
a. Translocation
b. Transformation
c. Pedoturbation
d. None

934. Which process of horizon differentiation is illustrated by formation of clay minerals from primary minerals?
a. Translocation
b. Transformation
c. Pedoturbation
d. None

935. Sand grains consist primarily of
a. Quartz b. Iron oxides
c. Gneiss d. Al oxides

936. Rocks formed from pre-existing rocks by heat and pressure is
a. Igneous b. Metamorphic
c. Sedimentary d. None

937. A deposit formed where a river flows into a larger body of water is
a. Colluvium b. Aeolian
c. A delta d. Loess

938. Decomposition of plant residue by soil microorganisms may
a. Improve soil texture
b. Improve soil structure
c. Both of the above
d. None

939. Soil texture could be changed in a flower bed by
a. Adding sand, silt or clay
b. Adding peat
c. Either of the above
d. None

940. The surface area of the particles in a given volume is greater for
a. Sand b. Silt
c. Clay d. None

941. Which textural class has the capacity to hold the greatest amount of water and nutrients?
a. Sandy loam b. Clay
c. Sandy clay loam d. Silt

942. In a soil profile with O, A, E and B horizons the least amount of clay will be in the _____ horizon.
a. A b. B
c. E d. O

943. The natural aggregation of soil separates into peds is called as
a. Soil textural class
b. Soil separates
c. Soil structure
d. Soil consistency

944. The structural type most common in the B horizon of soils of tropical regions is
a. Platy b. Blocky
c. Prism like d. Granular

945. Soil permeability refers to
a. Stickiness and plasticity of soil
b. Total pore space
c. Movement of air and water through soil
d. None

Answers					
	932. a	935. a	938. b	941. b	944. b
	933. a	936. b	939. a	942. c	945. c
	934. b	937. c	940. c	943. c	

946. Soil consistency refers to
a. The degree of plasticity and stickiness of a soil
b. Movement of air and water through soil
c. The occurrence of similar soil profiles in similar landscape positions
d. Total pore space

947. Incorporating crop residues into the soil
a. Improves soil structure
b. Improves soil texture
c. Improves both of the above
d. None

948. Soil permeability is affected mainly by
a. Soil texture
b. Soil structure
c. Soil texture and structure
d. Soil colour

949. Soil bulk density relates the oven dry weight of solids to total volume of soil. How is bulk density calculated?
a. Weight of oven dry soil/Volume
b. Volume/ Weight of oven dry soil
c. Weight of oven dry soil × Volume
d. None of the above

950. If 100 cm^3 of soil has an oven dry weight of 135 grams, what is its bulk density?
a. 13,500 g/cm^3 b. 0.75 cm^3/g
c. 1.35 g/cm^3 d. 1.53 g/cm^3

951. Soil bulk density is greatest for
a. Sand b. Clay
c. Peat d. Muck

952. Soil compaction results in (an) _____ in soil bulk density.
a. Increase b. Decrease
c. No change d. None

953. A soil with a large total amount of pore space is always permeable (True/False).

954. Soil colour is used as an indicator of
a. Soil texture b. Structure
c. Consistence d. Drainage

955. Sandy loam is an example of
a. Soil texture b. Soil structure
c. Soil textural class d. Soil

956. Which kind of soil parent material is not found in India?
a. Transported b. Residual
c. Glacial outwash d. None

957. The smallest volume that represents the range of characteristics of a soil in the landscape is
a. Ped b. Pedon
c. Order d. Regolith

958. An example of a soil separate is
a. Sandy b. Sand
c. Loam d. Silt loam

959. Soils named for locations, such as Hebbal and Nagapatinam, are examples of
a. Soil series
b. Soil orders
c. Soil suborders
d. Great soil group

960. The soil order most common to the southeastern India is
a. Spodosols b. Mollisols
c. Ultisols d. Aridisols

961. If a soil is classified as a typic fluvaquent, what is the soil order?
a. Ultisols b. Entisols
c. Aridisols d. Alfisols

Answers										
	946. a	947. a	948. c	949. a	950. c	951. a	952. a	953. F	954. d	955. c
	956. d	957. b	958. b	959. a	960. c	961. b				

962. The volume used to calculate soil bulk density includes
a. The solid material and the pore space
b. Density of the solid particles only
c. Only the pore space
d. Moisture percentage

963. Particle density is the
a. Solid material and the pore space
b. Density of the solid particles only
c. Total pore space
d. None of the above

964. If a 100 cm^3 soil sample is saturated (all the pore space is filled with water) contains 40 grams of water, what is the percent pore space?
a. 60% b. 40%
c. 30% d. 50%

965. Gray colours throughout the B horizon of a soil profile are an indication of
a. Well drained soil
b. Very poorly drained soil
c. Soil colour doesn't mean anything
d. None

966. Which of the following is not a process of weathering which breaks down rocks?
a. Wetting b. Hammering
c. Freezing d. Thawing

967. $KAl_3(OH)_6(SO_4)_2$ is the structural formula of
a. Diorite b. Syenite
c. Alunite d. Jarosite

968. Alunite mottles are found in
a. Melanic horizon
b. Salic horizon
c. Sulphuric horizon
d. Anthropic horizon

969. What is the percentage of base saturation in sombric diagnostic endopedon?
a. < 30% b. < 40%
c. < 50% d. < 60

970. Presence of artifacts is a characteristic feature of
a. Anthropic epipedon
b. Plaggen epipedon
c. Melanic epipedon
d. Mollic epipedon

971. Highest hierarchy in the classification of USDA soil classification is
a. Soil order b. Soil suborder
c. Great soil group d. Soil family

972. Soil forming processes are used as primary criteria in the classification of
a. Soil order
b. Soil suborder
c. Great soil group
d. Soil family

973. Granodiorite is a
a. Volcanic igneous rock
b. Plutonic igneous rock
c. Metamorphic rock
d. Sedimentary rock

Answers										
	962. a	963. b	964. b	965. b	966. b	967. c	968. c	969. c	970. b	971. a
	972. a	973. b								

5

Soil Chemistry

Questions :

1. Black soils have high content of
   a. R_2O_3 b. Al_2O_3
   c. Fe_2O_3 d. Silica
2. Primary form(s) of nitrogen in soil is/are
   a. Organic b. Inorganic
   c. Both a and b d. All
3. Predominant form(s) of phosphorous in soil is/are
   a. Organic b. Inorganic
   c. Both a and b d. All
4. Predominant form(s) of sulphur in soil is/are
   a. Organic b. Inorganic
   c. Both a and b d. All
5. Primary inorganic form of phosphorous in soil is
   a. Iron and aluminium phosphate minerals
   b. Apatite
   c. Augite
   d. Anorthite
6. What are the two main sources of inorganic sulphur in soil ?
   a. Gypsum and Epsum
   b. Pyrites and Epsum
   c. Gypsum and Pyrites
   d. Gypsum and Schoenite
7. In the determination of carbon content, the carbon dioxide produced can be estimated by
   a. Colorimetric method
   b. Walkley and Black method
   c. Wet combustion method
   d. Dry combustion method
8. Total carbon in soil is measured by
   a. Colorimetric method
   b. Walkley and Black method
   c. Wet combustion method
   d. Dry combustion method
9. What is the percentage of organic carbon in organic matter ?
   a. 48 b. 58
   c. 78 d. 68
10. Organic matter = Organic carbon × _____.
    a. 1.724 b. 2.724
    c. 3.724 d. 4.724
11. What is the C : N ratio of Indian soils ?
    a. 30 - 32 : 1 b. 100 : 1
    c. 20 - 22 : 1 d. 10 - 12 : 1
12. Climatic conditions conducive for the accumulation of organic matter in soil are
    a. Low temperature and low rainfall
    b. Low temperature and high rainfall
    c. High temperature and low rainfall
    d. High temperature and high rainfall
13. When the NSQ (Neiderslag Sattingungsdruck Quotient) is high, organic matter and nitrogen content in soil will be
    a. High b. Medium
    c. Low d. Equal
14. The beneficial effect of organic matter is very high in
    a. Fine textured soils
    b. Medium textured soils
    c. Coarse textured soils
    d. All
15. Humic acid is soluble in
    a. Dilute acid
    b. Dilute alkali
    c. Concentrated acid
    d. Concentrated alkali

Answers														
	1.	d	4.	a	7.	d	10.	a	13.	a
	2.	a	5.	b	8.	d	11.	d	14.	c
	3.	b	6.	c	9.	b	12.	b	15.	b

16. Precipitation of humic acid takes place in
    a. Dilute acid
    b. Dilute alkali
    c. Concentrated acid
    d. Concentrated alkali

17. Compound(s) obtained from the precipitated humic acid when refluxed with ethanol is/are
    a. Fulvic acid
    b. Humin
    c. Hymatomelanic acid
    d. Both a and d

18. Humin can be extracted by
    a. 2N HCl b. 2N NaOH
    c. 2N Na_2CO_3 d. 4% H_2O_2

19. Insoluble fraction of organic matter is
    a. Humin
    b. Fulvic acid
    c. Humic acid
    d. Hymatomelanic acid

20. Organic compound that contain more oxygen but less carbon and nitrogen is
    a. Humic acid
    b. Fulvic acid
    c. Humin
    d. Hymatomelanic acid

21. Organic compound that contain less oxygen but more carbon and nitrogen is
    a. Humic acid
    b. Fulvic acid
    c. Humin
    d. Hymatomelanic acid

22. Of the following, which is/are the more stable metal-organic interactions found in soil ?
    a. Metal - humic acid
    b. Metal - fulvic acid
    c. Metal - humin
    d. Both a and b
    e. All the above

23. What is the upper limit of colloidal particles?
    a. 0.02 microns b. 0.2 microns
    c. 2 microns d. 0.1 microns

24. What is the cation exchange capacity of humus ?
    a. 150 – 250 meq / 100g soils
    b. 250 – 1500 meq / 100g soils
    c. 100 – 1500 meq / 100g soils
    d. 100 – 150 meq / 100g soils

25. Ion exchange phenomenon was discovered by
    a. Thompson & Way b. Schofield
    c. Adams & Holmes d. Weighner

26. What is unit of cation exchange capacity ?
    a. meq/100g b. cmol(p+)/kg
    c. mmho/100g d. All

27. What is the SI unit of cation exchange capacity ?
    a. meq/100g b. cmol(p+)/kg
    c. mmho/100g d. All

28. Equivalency, reversibility and stoichiometry are the characteristics of which of the following ?
    a. Anion exchange capacity
    b. Cation exchange capacity
    c. Both a and b
    d. None

29. Polymerization of phenols in the presence of formaldehyde will yield which of the following ?
    a. Anion exchange resin
    b. Cation exchange resin
    c. Both a and b
    d. None

Answers								
	16. a	19. a	22. d	25. a	28. c
	17. c	20. b	23. c	26. d	29. b
	18. c	21. a	24. b	27. b	

30. Polymerization of p-phenylenediamines in the presence of formaldehyde will yield which of the following ?
    a. Anion exchange resin
    b. Cation exchange resin
    c. Both a and b
    d. None

31. Ion exchange reactions can be used for
    a. Separation of ions
    b. Deionization of water
    c. Ion activity measurements
    d. All

32. Softening of water can be done by the use of
    a. Calcium saturated exchange resins
    b. Magnesium saturated exchange resins
    c. Sodium saturated exchange resins
    d. All the above

33. What are the elements responsible for the hardness of water ?
    a. N and K
    b. Ca and Mg
    c. Na and K
    d. Ca, Mg and Na

34. Permutit is a synthetic _____, which has cation exchange properties.
    a. Aluminosilicates
    b. Ca - exchange resins
    c. Mg - exchange resins
    d. Na - exchange resins

35. $X/m = KC^n$ is
    a. Langmuir's equation
    b. Freundlich's equation
    c. Gapon's equation
    d. Vanselow's equation

36. $X/m = K_1K_2C/1+K_2C$ is
    a. Langmuir's equation
    b. Freundlich's equation
    c. Gapon's equation
    d. Vanselow's equation

37. What is/are the equation(s) used for homovalent exchange reactions ?
    a. Gapon's
    b. Krishnamoorthy, Davis and Overstreet's
    c. Vanselow's
    d. Kerr's
    e. All the above

38. What is/are the equation(s) used for heterovalent exchange reactions ?
    a. Gapon's
    b. Vanselow's
    c. Krishnamoorthy, Davis and Overstreet's
    d. All the above

39. "Nearest-neighbour" model was proposed by
    a. Vanselow
    b. Krishnamoorthy, Davis and Overstreet
    c. Gapon
    d. Kerr

40. Langmuir adsorption equation gives
    a. Hyperbolic curve
    b. Parabolic curve
    c. Linear curve
    d. All

41. $K = N_B/N_A \times mA/(mB)^{1/2}$ is
    a. Kerr's equation
    b. Vanselow's equation
    c. Gapon's equation
    d. KDO's equation

42. Oscillation volume was proposed by
    a. Gapon
    b. Vanselow
    c. Ramamoorthy and Subramanian
    d. Jenny

Answers								
	30. a	33. b	36. a	39. b	42. d
	31. d	34. a	37. d	40. a	
	32. c	35. b	38. d	41. c	

43. In per cent base saturation, [BS (%)= S/T × 100], S denotes
a. Total cations
b. Basic cations
c. Total anions
d. Total cations and anions

44. Sum of the exchangeable bases (Ca^{2+}, Mg^{2+}, Na^{+} and K^{+}) extracted by 1M ammonium acetate and 1M KCl extracted Al is called as
a. Per cent base saturation
b. Cation exchange capacity
c. Effective CEC
d. Total equivalent acidity

45. Soil physical and chemical properties are mainly influenced by
a. Sodium b. Calcium
c. Hydrogen d. All

46. Which one of the following is responsible for the dispersion of soil particles ?
a. Exchangeable calcium
b. Exchangeable magnesium
c. Exchangeable sodium
d. Exchangeable potassium

47. Stable aggregates of particles in soils are formed by
a. Exchangeable calcium
b. Exchangeable magnesium
c. Exchangeable sodium
d. Exchangeable potassium

48. Degree of weathering is indicated by
a. Base saturation b. CEC
c. Soil acidity d. All

49. What is the number of classifications in size groups of soil particles by International Society of Soil Science (ISSS) ?
a. Three b. Four
c. Six d. Seven

50. Amendment used for the reclamation of acidic soils is
a. Lime b. Gypsum
c. Ferrous sulphate d. Elemental S

51. The pH was given by
a. Sorensen b. Schofield
c. White and Beckett d. Thomas Way

52. Activity = _____ × Activity co-efficient.
a. pH b. Concentration
c. Valency d. Ionic strength

53. In pure water and in dilute solutions, ionic strength is
a. Low b. Medium
c. High d. Unity

54. What is the range of pH in pH scale ?
a. 0 – 14 b. 1 – 14
c. – 14 to + 14 d. None

55. The emf of a cell can be measured by
a. Hydrogen electrode
b. Reference electrode
c. Calomel electrode
d. Indicator electrode

56. $pH = (E - E_{ref}) \times$ _____.
a. 0.0692 b. 0.0592
c. 0.0492 d. 0.0792

57. Quinhydrone electrode and glass electrode which can be combined with a _____ for the estimation of emf of a cell.
a. Hydrogen electrode
b. Indicator electrode
c. Calomel electrode
d. Reference electrode

Answers										
43.	b	46.	c	49.	b	52.	b	55.	c
44.	c	47.	a	50.	a	53.	a	56.	b
45.	d	48.	d	51.	a	54.	a	57.	d

58. Glass electrode can be used for the pH estimation in the pH range of
a. 0 – 14 b. 1 – 14
c. 0 – 9 d. 1 – 9

59. What is/are the inert material(s) used in glass electrode ?
a. Platinum b. Gold
c. Silver d. Both a and b
e. Platinum or gold

60. What is the commonly used soil: water ratio for pH determination ?
a. 1 : 1 b. 1 : 2
c. 1 : 2.5 d. 1 : 5

61. Of the following, which soil suspension has high pH ?
a. Soil : water b. Soil : 1M KCl
c. Soil : 0.01M $CaCl_2$ d. None

62. Concentration of a solution causes less dissociation of ions present in that solution (True/False)

63. At pH 5.0 and above, the main source(s) of hydrogen ions in soil is/are
a. Exchangeable Al^{3+}
b. Exchangeable H^{+}
c. Exchangeable Al^{3+}, Fe^{2+} and Mn^{2+}
d. Exchangeable Both a and b

64. At pH below 5.0, the main source(s) of hydrogen ions in soil is/are
a. Exchangeable Al^{3+}
b. Exchangeable H^{+}
c. Exchangeable Al^{3+} and Fe^{2+}
d. Exchangeable Both a and b

65. With increase in soil pH, negative charges of clay will be
a. Increased b. Decreased
c. Unaltered d. None

66. What is the pH of acid sulphate soils ?
a. < 2.5 b. < 3.5
c. < 4.5 d. < 5.5

67. Acidity in acid sulphate soils is due to presence of
a. Sulphuric acid
b. Ferric sulphate
c. Aluminium sulphate
d. Both b and c
e. All

68. Buffering capacity is high for
a. Sand b. Silt
c. Clay d. Humus

69. Buffering capacity is high for the soils with
a. 1 : 1 clay minerals
b. 2 : 1 clay minerals
c. 2 : 1 : 1 clay minerals
d. All

70. Soil reaction is alkaline when the pH of the soil is more than
a. 7.0 b. 8.0
c. 7.5 d. 9.0

71. What is the number of classifications in size groups of soil particles by United State Department of Agriculture (USDA) ?
a. Three b. Four
c. Six d. Seven

72. Soil alkalinity may be due to
a. Sodium b. $CaCO_3$
c. Na_2CO_3 d. All

73. The pH of calcareous soil may be as high as 8.3 and it is due to
a. High partial pressure of CO_2
b. Formation of undissociated carbonic acid
c. Reduced hydrolysis of $CaCO_3$
d. All

Answers										
58.	d	61.	a	64.	c	67.	d	70.	a	73. d
59.	e	62.	T	65.	a	68.	d	71.	d	
60.	c	63.	b	66.	b	69.	b	72.	d	

74. High pH generally lowers the availability of all nutrient elements except
a. Molybdenum b. Boron
c. Cu and Zn d. Both a and b
e. All

75. What is the optimum soil pH for rice and tea ?
a. 4.0 – 6.0 b. 5.0 – 6.5
c. 5.5 – 7.0 d. 6.0 – 7.5

76. What is the optimum pH for cotton and millets ?
a. 4.0 – 6.0 b. 5.0 – 6.5
c. 5.5 – 7.0 d. 6.0 – 7.5

77. What is the optimum pH for wheat and sugarcane ?
a. 4.0 – 6.0 b. 5.0 – 6.5
c. 5.5 – 7.0 d. 6.0 – 7.5

78. Potassium fixation is more in which of the following clay minerals ?
a. Montmorillonite b. Vermiculite
c. Illite d. Chlorite

79. What is/are the major reaction product(s) of single super phosphate in soil ?
a. Brushite
b. Monetite
c. Octacalcium phosphate
d. All

80. Which amendment is used for the reclamation of sodic or alkali soils ?
a. Agricultural lime
b. Gypsum
c. Burned lime
d. Quick lime

81. What is the common name for $CaHPO_4$?
a. Octacalcium phosphate
b. Monetite
c. Newberyte
d. Struvite

82. Struvite and newberyte are the compounds containing _____.
a. Calcium
b. Magnesium
c. Potassium
d. Sodium

83. $MgNH_4PO_4.6H_2O$ is commonly called as
a. Struvite b. Newberyte
c. Monetite d. Overite

84. Phosphate fixation in soils takes place by
a. Adsorption
b. Isomorphous replacement
c. Double decomposition
d. All

85. Which adsorption isotherm used when the phosphate concentration is low in soil solution ?
a. Freunlich b. Langmuir
c. BET equation d. Both a and b

86. Phosphate fixation is influenced by
a. pH
b. Nature and amount of clay
c. Free oxides of iron and aluminium
d. All

87. What is/are the principle phosphate ion(s) when the soil pH is between 4.0 and 8.0?
a. $H_2PO_4^-$ b. HPO_4^{2-}
c. PO_4^{3-} d. Both a and b
e. All the above

88. What is the ionic form of phosphorous when soil pH is more than 9.0 ?
a. $H_2PO_4^-$ b. HPO_4^{2-}
c. PO_4^{3} d. H_3PO_4

Answers									
	74.	d	77.	d	80.	b	83.	a	86.	d
	75.	a	78.	c	81.	b	84.	d	87.	d
	76.	b	79.	a	82.	b	85.	d	88.	c

89. At the pH range of 2.0 – 5.0, phosphates are mainly fixed by
a. Iron and aluminium
b. Soil clays
c. Calcium and magnesium
d. All

90. At the pH range of 4.5 – 7.0, phosphates are mainly fixed by
a. Iron and aluminium
b. Soil clays
c. Calcium and magnesium
d. All

91. Phosphates are fixed by calcium and magnesium as Ca and Mg-phosphates at the pH range of
a. 2.0 – 5.0 b. 4.5 – 7.0
c. 6.0 – 10 d. 8.0 – 10

92. Arrange the following clay minerals based on their phosphate fixing capacity in decreasing order.
a. Smectite > Vermiculite > Kaolinite > Muscovite
b. Smectite > Vermiculite > Muscovite > Kaolinite
c. Vermiculite > Smectite > Muscovite > Kaolinite
d. Vermiculite > Muscovite > Smectite > Kaolinite

93. Phosphate fixing capacity is high in
a. Black soils b. Red soils
c. Alluvial soils d. Laterite soils

94. Taranakite is a _____ containing compound.
a. Phosphate b. Nitrate
c. Ammonium d. Sulphate

95. Cations that cause lattice expansion in clay minerals are
a. Ca and Mg b. Ca and Na
c. Mg and H d. All

96. Cations that cause lattice contraction in clay minerals are
a. K and Rb b. K and Cs
c. Rb and Cs d. All

97. Replacing power of cations to replace the fixed ammonium ions in clay minerals follows in the order of
a. Ca > Mg > H > Na
b. H > Na > Ca > Mg
c. Ca > Mg > Na > H
d. H > Ca > Mg > Na

98. Hexagonal cavity in clay minerals for the fixation of potassium and ammonium ions is created by
a. Double layered silicate clay minerals
b. Three layered silicate clay minerals
c. Four layered silicate clay minerals
d. All the above

99. Hexagonal cavity in clay minerals for the fixation of potassium and ammonium ions is surrounded by
a. Eight oxygen atoms
b. Ten oxygen atoms
c. Twelve oxygen atoms
d. Six oxygen atoms

100. Release of K^+ ions from mica leads to the formation of
a. Illite
b. Vermiculite
c. Montmorillonite
d. Chlorite

Answers									
	89.	a	92.	a	95.	d	98.	b	
	90.	b	93.	a	96.	d	99.	c	
	91.	c	94.	c	97.	b	100.	a	

101. Of the following, which is the correct order of clay minerals formation from mica?
a. Illite → Mica → Montmorillonite → Vermivulite
b. Mica → Illite → Montmorillonite → Vermivulite
c. Mica → Montmorillonite → Vermiculite Illite
d. Mica → Illite → Vermiculite → Montmorillonite

102. Decrease in pH of soil is associated with reduction in
a. Phosphate fixation
b. Potassium fixation
c. Ammonium fixation
d. All

103. What is the range of diameter of nucleous of an atom ?
a. 1×10^{-13} and 1×10^{-12} cm
b. 1×10^{-12} and 1×10^{-11} cm
c. 1×10^{-14} and 1×10^{-13} cm
d. 1×10^{-15} and 1×10^{-14} cm

104. An atom, which loses one or more electrons from the outer shell, is called as
a. Ion b. Element
c. Cation d. Anion

105. Masses of atoms on the chemical scale are smaller than a weighted average of physical mass by a factor of
a. 0.99970 b. 0.99973
c. 0.99975 d. 0.99979

106. Nucleons consist of
a. Protons and Electrons
b. Protons and Neutrons
c. Electrons and Neutrons
d. All

107. Which of the following is the heaviest atom of any of the naturally occurring atoms ?
a. Thorium b. Actinium
c. Lanthanum d. Uranium

108. Avogadro's number is
a. 6.0×10^{23} b. 6.0×10^{24}
c. 6.0×10^{22} d. 6.0×10^{25}

109. What is the ionic radius of Al^{3+} ion?
a. 0.42 Å b. 1.42 Å
c. 0.64 Å d. 0.51 Å

110. One angstrom (1 Å) is equal to
a. 1×10^{-8} cm b. 1×10^{-9} cm
c. 1×10^{-10} cm d. 1×10^{-12} cm

111. One angstrom (1 Å) is equal to
a. 0.1 nm b. 0.01 nm
c. 1.0 nm d. 10 nm

112. Equivalent weight =
a. Molecular weight /No. of electrons lost or gained
b. Atomic weight /No of electrons lost or gained
c. Molecular weight /Valency
d. Atomic weight /Valency

113. Number of equivalents of a substances dissolved in 1 L of a solution is called as
a. Molarity b. Molality
c. Normality d. None

114. What is the ionic radius of potassium ?
a. 1.33 Å b. 1.48 Å
c. 0.98 Å d. 0.66 Å

115. $E = RT/nF \ln K/M^n$ is called as
a. Chemical potential
b. Electrochemical potential
c. Donan potential
d. Nernst equation

Answers					
101. d	104. c	107. d	110. a	113. c
102. b	105. b	108. a	111. a	114. a
103. a	106. b	109. d	112. a	115. d

116. What is the diameter of water molecules?
a. 1 Å b. 2 Å
c. 3 Å d. 4 Å

117. What is the angle of hydrogen atoms from oxygen atoms in water molecules ?
a. 100° b. 105°
c. 108° d. 110°

118. What is the amount of energy released when water freezes into ice ?
a. 70 cal b. 80 cal
c. 90 cal d. 100 cal

119. The energy released when ions become hydrated is called as
a. Heat of solution
b. Heat of wetting
c. Heat capacity
d. Specific heat capacity

120. When clay particles are hydrated, the energy released is called as
a. Heat of solution
b. Heat of wetting
c. Heat capacity
d. Specific heat capacity

121. The term, water potential was introduced by
a. Brady (1974)
b. Hillel (1972)
c. Buckingham (1907)
d. Weast (1972)

122. The term, capillary potential was introduced by
a. Brady (1974)
b. Hillel (1972)
c. Buckingham (1907)
d. Weast (1972)

123. Under normal filed conditions, the soil water potential is
a. Positive b. Negative
c. Zero d. Unity

124. Potential developed due to the attraction of water molecules by soil solids is called as
a. Matric potential
b. Pressure potential
c. Osmotic potential
d. Gravitational potential

125. Matric potential of soil is measured by
a. Hygrometer b. Psychrometer
c. Potentiometer d. Tensiometer

126. In a saturated soil, the pressure potential is
a. Positive b. Negative
c. Zero d. Unity

127. In a water unsaturated soil, the pressure potential is
a. Positive b. Negative
c. Zero d. Unity

128. Solute potential is also called as
a. Gravitational potential
b. Osmotic potential
c. Pressure potential
d. Water potential

129. Water potential, Ψw =
a. $\Psi m + \Psi o$
b. $\Psi m + \Psi o + \Psi s$
c. $\Psi m + \Psi p + \Psi s$
d. $\Psi m + \Psi p + \Psi s + \Psi g$

130. Total soil water potential, Ψt =
a. $\Psi m + \Psi o$
b. $\Psi m + \Psi o + \Psi s$
c. $\Psi m + \Psi p + \Psi s$
d. $\Psi m + \Psi p + \Psi s + \Psi g$

Answers					
116. c	119. a	122. b	125. d	128. b
117. b	120. b	123. b	126. a	129. c
118. b	121. c	124. a	127. c	130. d

131. Soil water potential of –5 J/kg is equal to volumetric potential of
a. –0.05 bars b. 0.05 bars
c. 0.5 bars d. –0.5 bars

132. Soil water potential of –10 J/kg is equal to soil water suction of
a. –0.10 bars b. 0.10 bars
c. 1.0 bar d. –1.0 bar

133. Osmotic potential is a combination of
a. Gravitational and Matric potential
b. Matric and pressure potential
c. Pressure and Solute potential
d. Solute and Matric potential

134. For an ideal solution, the chemical potential can be formulated as
a. $\mu = \mu^o + RT \ln m$
b. $\mu = \mu^o + RT \ln a$
c. $\mu = \mu^o + RT \ln c$
d. All

135. For a non-ideal solution, the chemical potential can be formulated as
a. $\mu = \mu^o + RT \ln m$
b. $\mu = \mu^o + RT \ln a$
c. $\mu = \mu^o + RT \ln c$
d. All

136. For a very dilute solution, the chemical potential can be formulated as
a. $\mu = \mu^o + RT \ln m$
b. $\mu = \mu^o + RT \ln a$
c. $\mu = \mu^o + RT \ln c$
d. All

137. The law of mass action was first reported by
a. Henderson
b. Guldberg and Waage
c. Van't Hoff
d. Hasselbalch

138. What is the dissociation constant of water?
a. 1.8×10^{-12} b. 1.8×10^{-14}
c. 1.8×10^{-15} d. 1.8×10^{-16}

139. Concentration of pure water is
a. 55.5 mol/L b. 45.5 mol/L
c. 48.5 mol/L d. 57.5 mol/L

140. Ionic product of water is
a. 1.01×10^{-7} b. 1.01×10^{-14}
c. 1.01×10^{14} d. 1.01×10^{7}

141. Ionization constant of acidic acid is
a. 1.8×10^{-5} b. 1.8×10^{-11}
c. 1.8×10^{-13} d. 1.8×10^{-9}

142. $pH = pKa + \log (A^-)/(HA)$ is called as
a. Van't Hoff equation
b. Nernst equation
c. Henderson-Hasselbalch equation
d. Schofield equation

143. Which bonds are responsible for a weak dissociation in weak electrolytes ?
a. Ionic bonds
b. Covalent bonds
c. Co-ordinate bonds
d. Metallic bonds

144. $Eh = E^o + 0.059/n \log Keq$ is
a. Electrode potential
b. Oxidation potential
c. Nernst equation
d. Donan potential

145. A measure of the effective concentration of a reactant or product in a chemical reaction is called as
a. Activity
b. Activity co-efficient
c. Ionic strength
d. None

Answers					
	131. a	134. a	137. b	140. b	143. b
	132. b	135. b	138. b	141. a	144. b
	133. d	136. c	139. a	142. c	145. a

146. In very dilute solution, the activity co-efficient is
a. Increased b. Decreased
c. Unity d. Zero

147. Ion activity co-efficient is calculated by
a. Donan equation
b. Debye-Huckel equation
c. Henderson-Hasselbalch equation
d. Van't Hoff equation

148. The concept of ionic strength was introduced by
a. Waage and Guldberg
b. Garrels and Christ
c. Debye-Huckel
d. Lewis and Randall

149. Lower size limit of soil colloid is
a. 40 Å b. 50 Å
c. 60 Å d. 70 Å

150. Braunner, Emmet and Teller equation is used for the calculation of
a. Adsorption of ions
b. Cation Exchange Capacity
c. Quantity factors
d. Intensity factors

151. When dispersed phase does not interact with dispersion medium, the colloid is considered as
a. Lyophilic colloidal system
b. Lyophobic colloidal system
c. Hydrophilic colloidal system
d. Hydrophobic colloidal system

152. Plant colloids are
a. Lyophillic colloids
b. Lyophobic colloids
c. Hydrophilic colloids
d. Hydrophobic colloids

153. Clay minerals are
a. Lyophillic colloids
b. Lyophobic colloids
c. Hydrophilic colloids
d. Hydrophobic colloids

154. The material in which sorption occurs is called as
a. Sorbent b. Sorbate
c. Adhesive d. Cohesive

155. What is the conversion factor for the conversion of nitrogen into protein?
a. 6.25 b. 6.724
c. 6.75 d. 6.50

156. The term humic acid was given by
a. Oden b. Miescher
c. Berzelius d. Mulder

157. Ulmic acid is also referred as
a. Humin
b. Humic acid
c. Fulvic acid
d. Hymatomelanic acid

158. Which of the following is also referred as Ulmin ?
a. Humin
b. Humic acid
c. Fulvic acid
d. Hymatomelanic acid

159. The terms crenic and apocrenic acids refer the name of
a. Humin
b. Humic acid
c. Fulvic acid
d. Hymatomelanic acid

160. Crenic and apocrenic acids are soluble in
a. Alkali b. Acid
c. Alcohol d. Water

Answers					
	146. c	149. b	152. c	155. a	158. a
	147. b	150. a	153. d	156. c	159. c
	148. d	151. b	154. a	157. b	160. d

161. Humic acids are soluble in
a. Alkali b. Acid
c. Alcohol d. Water

162. Fulvic acid is soluble in
a. Acid and Alkali
b. Acid and Alcohol
c. Alkali and Alcohol
d. Water
e. All the above

163. Humin is insoluble in
a. Acid and Alkali
b. Acid and Alcohol
c. Alkali and Alcohol
d. Water
e. All the above

164. Hymatomelanic acid is soluble in
a. Acid and Alkali
b. Acid and Alcohol
c. Alkali and Alcohol
d. Water
e. All the above

165. Brown humic acid is soluble in
a. Alkali b. Acid
c. Alcohol d. NaCl

166. Approximate humus content in soil is
a. 1.5 % b. 2.5 %
c. 3.5 % d. 5 %

167. What is the nitrogen content of humic acid?
a. 2 – 5 % b. 0.7 – 2.6 %
c. 1.0 – 2.0 % d. 1.3 – 2.5 %

168. Chemical extractant(s) most widely used for the extraction and isolation of humic substances is/are
a. NaOH b. $Na_4P_2O_7$
c. HCl d. Both a and b

169. Most effective chemical extractant(s) for the extraction and isolation of humic substances is/are
a. NaOH
b. $Na_4P_2O_7$
c. HCl
d. H_3BO_3 and HF

170. Chemical extractant(s) used for the extraction of humic fractions from soils high in sesquioxide content is/are
a. NaOH
b. $Na_4P_2O_7$
c. HCl
d. H_3BO_3 and HF

171. What is the total acidity of humic acids ?
a. 5 – 6 meq/100g
b. 7 – 9 meq/100g
c. 10 – 12 meq/100g
d. 13 – 15 meq/100g

172. What is the total acidity of fulvic acids ?
a. 5 – 6 meq/100g
b. 7 – 9 meq/100g
c. 10 – 12 meq/100g
d. 13 – 15 meq/100g

173. The colour ratio or E4/E6 value of fulvic acid is
a. 1 – 3 b. 3 – 5
c. 5 – 7 d. 7 – 8

174. The colour ratio or E4/E6 value of humic acid is
a. 1 – 3 b. 3 – 5
c. 5 – 7 d. 7 – 8

175. Humic acids are amphoteric and _____ in nature.
a. Monobasic b. Polybasic
c. Monoacidic d. Polyacidic

Answers										
	161.	a	164.	c	167.	a	170.	b	173.	d
	162.	a	165.	d	168.	d	171.	a	174.	b
	163.	e	166.	c	169.	a	172.	c	175.	b

176. Humic compounds are identified by
a. Ultraviolet and visible light spectrometry
b. Infrared spectroscopy
c. EPR and NMR
d. All the above

177. Method that is very useful in identifying the three different types of humic fractions is
a. Infrared spectroscopy
b. Electron Paramagnetic Resonance
c. Nuclear Magnetic Resonance
d. Magnetic Resonance Spectroscopy

178. Method that analyses the hydrogen atoms or proton resonance, of humic molecules is
a. Infrared spectroscopy
b. Electron Paramagnetic Resonance
c. Nuclear Magnetic Resonance
d. Magnetic Resonance Spectroscopy

179. Method that analyses the unpaired electron spins in paramagnetic organic materials is
a. Infrared spectroscopy
b. Electron Paramagnetic Resonance
c. Nuclear Magnetic Resonance
d. Magnetic Resonance Spectroscopy

180. The solvents frequently used in Nuclear Magnetic Resonance method of humic acids fractionation is/are
a. CCl_4 and $CDCl_3$
b. $CDCl_3$ and D_2O
c. Aluminium oxides and D_2O
d. All

181. Materials used in gel chromatography as the gel substance in the study of humic materials are
a. Polysaccharides and Polystyrenes
b. Polyamides and Al-oxides
c. Cellulose, Agar and Glass beads
d. All

182. Who were the first to try electron microscopy in the study of humic acids?
a. Tan and Giddens (1972)
b. Tan and McCreery (1970)
c. Flaig and Beutelspachev (1951)
d. Schnitzer and Khan (1972)

183. Fulvic acid can be biologically degraded by
a. *Penicillium* sp b. *Aspergillus* sp
c. *Trichoderma* sp d. All

184. In Kononova's opinion, _____ can be both predecessor or the decomposition product of humic acid.
a. Fulvic acid
b. Humin
c. Hymatomelanic acid
d. All

185. Generally, polysaccharides of fulvic acids are comparatively less branched than those of humic acids (True or False).

186. According to Flaig hypothesis, _____ to be the source, or starting point, for the formation of fulvic and humic acids.
a. Lignin
b. Phenols
c. Quinone
d. Quinhydrone

187. What is the common formula for neosilicates ?
a. SiO_3, Si_2O_5
b. SiO_3, SiO_4O_{11}
c. SiO_4
d. Si_2O_5

Answers										
	176.	d	179.	b	182.	c	185.	T		
	177.	a	180.	a	183.	d	186.	a		
	178.	c	181.	d	184.	a	187.	c		

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188. What is the common formula for phyllosilicates ?
a. SiO_3, Si_2O_5
b. SiO_3, SiO_4O_{11}
c. SiO_4
d. Si_2O_5

189. What is the common formula for cyclosilicates ?
a. SiO_3, Si_2O_5
b. SiO_3, SiO_4O_{11}
c. Si_2O_7, Si_5O_{16}
d. SiO_2

190. What is the common formula for inosilicates ?
a. SiO_3, Si_2O_5
b. SiO_3, SiO_4O_{11}
c. Si_2O_7, Si_5O_{16}
d. SiO_2

191. What is the common formula for tectosilicates ?
a. SiO_3, Si_2O_5
b. SiO_3, SiO_4O_{11}
c. Si_2O_7, Si_5O_{16}
d. SiO_2

192. What is the common formula for sorosilicates ?
a. SiO_3, Si_2O_5
b. SiO_3, SiO_4O_{11}
c. Si_2O_7, Si_5O_{16}
d. SiO_2

193. Zircon and topaz are the examples for
a. Sorosilicates b. Neosilicates
c. Inosilicates d. Tectosilicates

194. Examples for soil clay minerals that are chain structured one are
a. Polygorskite-Sepiolite
b. Pyrophyllite- Talc
c. Titanium oxides
d. All

195. What is the charge per unit formula of kaolinite and halloysite ?
a. ~ 0 b. ~ 1
c. 0.25 – 0.6 d. 2

196. What is the charge per unit formula of illite ?
a. ~ 0 b. ~ 1
c. 0.25 – 0.6 d. 2

197. What is the charge per unit formula of mica ?
a. ~ 0 b. ~ 1
c. ~ 2 d. 2

198. What is the charge per unit formula of brittle mica ?
a. ~ 0 b. ~ 1
c. ~ 2 d. 2

199. What is the charge per unit formula of pyrophyllite - talc ?
a. ~ 0 b. ~ 1
c. 0.25 – 0.6 d. 0.6 – 1.9

200. What is the charge per unit formula of margarite and clintonite ?
a. ~ 0 b. ~ 1
c. ~ 2 d. 2

201. What is the charge per unit formula of biotite and phlogobite ?
a. ~ 0 b. ~ 1
c. 0.25 – 0.6 d. 0.6 – 1.9

Answers					
	188. d	191. d	194. a	197. b	200. c
	189. a	192. c	195. a	198. c	201. b
	190. b	193. b	196. d	199. a	

202. What is the charge per unit formula of muscovite and paragonite ?
a. ~ 0 b. ~ 1
c. ~ 2 d. 2

203. What is the charge per unit formula of montmorillonite, beidellite and nontronite?
a. ~ 0 b. ~ 1
c. 0.25 – 0.6 d. 0.6 – 1.9

204. What is the charge per unit formula of saponite, hectorite and sauconite ?
a. ~ 0 b. ~ 1
c. 0.25 – 0.6 d. 2

205. What is the approximate volume of a unit cell in a lattice structure of soil clay minerals ?
a. 1 μm^3 b. 0.1 μm^3
c. 5 μm^3 d. 0.5 μm^3

206. Of the following, which is a tetramorphic clay mineral ?
a. Kaolinite b. Halloysite
c. Montmorillonite d. Chlorite

207. Of the following, which is a 2:2 types of clay minerals ?
a. Chlorite b. Polygorskite
c. Sepiolite d. All

208. Of the following, which are the examples of 2 : 1 : 1 types of clay minerals ?
a. Polygorskite and Sepiolite
b. Chlorite and Hectorite
c. Chlorite and Sauconite
d. Saponite and Sauconite

209. If all the octahedral positions are occupied by Mg^{2+} ions, it is called as
a. Tetrhedral subgroup
b. Octahedral subgroup
c. Trioctahedral subgroup
d. Dioctahedral subgroup

210. If all the octahedral positions are occupied by Al^{3+} ions, it is called as
a. Tetrhedral subgroup
b. Octahedral subgroup
c. Trioctahedral subgroup
d. Dioctahedral subgroup

211. Which of the following is an example expanding 1 : 1 clay mineral ?
a. Kaolinite b. Halloysite
c. Dickite d. Nackrite

212. Among the 1 : 1 clay minerals, the most widely distributed one in Indian soils is
a. Kaolinite b. Halloysite
c. Dickite d. Nackrite

213. Kaolinite is an important fraction of the clays of
a. Alfisols and Vertisols
b. Ultisols and Alfisols
c. Oxisols and Alfisols
d. Ultisols and Oxisols
e. All the above

214. Kaolinite is an accessory fraction of the clays of
a. Alfisols and Vertisols
b. Ultisols and Alfisols
c. Oxisols and Alfisols
d. Ultisols and Oxisols
e. All the above

215. $Al_2O_3.2SiO_2.4H_2O$ is the structural formula of
a. Kaolinite b. Halloysite
c. Dickite d. Nackrite

216. $Al_2O_3.4SiO_2.H_2O + xH_2O$ is the structural formula of
a. Montmorillonite b. Vermiculite
c. Illite d. Chlorite

Answers					
	202. b	205. a	208. a	211. b	214. a
	203. c	206. d	209. c	212. a	215. b
	204. c	207. a	210. d	213. d	216. a

217. $Mg_3Si_4O_{10}(OH)_2.xH_2O$
a. Montmorillonite b. Vermiculite
c. Illite d. Chlorite

218. $22MgO.5Al_2O_3.Fe_2O_3.22SiO_2.40H_2O$ is the structural formula of
a. Montmorillonite b. Vermiculite
c. Illite d. Chlorite

219. Which of the following is the correct weathering sequence in the formation of soil clay minerals?
a. Igneous rock → Montmorillonite → Halloysite → Metahalloysite → Kaolinite
b. Igneous rock → Metahalloysite → Halloysite → Montmorillonite → Kaolinite
c. Igneous rock → Halloysite → Metahalloysite → Montmorillonite → Kaolinite
d. Igneous rock → Montmorillonite → Metahalloysite → Halloysite → Kaolinite

220. Commercial grade montmorillonite is also often referred as
a. Beidellite b. Nontronite
c. Bentonite d. Sauconite

221. Principle end members in the dioctahedral subgroup of montmorillonite group are
a. Bentonite and Montmorillonite
b. Beidellite and Nontronite
c. Montmorillonite and Beidellite
d. Hectorite and Saponite
e. All the above

222. Among the montmorillonite group clay minerals, Al content is high in
a. Montmorillonite b. Beidellite
c. Nontronite d. Bentonite

223. Principle end members in the trioctahedral subgroup of montmorillonite group are
a. Bentonite and Montmorillonite
b. Beidellite and Nontronite
c. Montmorillonite and Beidellite
d. Hectorite and Saponite
e. All the above

224. Basal spacing of oven-dried (105 °C) montmorillonite is
a. 10 Å b. 12.4 Å
c. 12.4 – 14.0 Å d. 14 Å

225. In air-dried condition, the basal spacing of montmorillonite is
a. 10 Å b. 12.4 Å
c. 12.4 – 14.0 Å d. 14 Å

226. After intercalation with ethylene glycol or glycerol, the basal spacing of montmorillonite expands to
a. 14 Å b. 14.7 Å
c. 16 Å d. 17 Å

227. Montmorillonite is characteristic constituents of clays of
a. Vertisols and Mollisols
b. Alfisols and Vertisols
c. Vertisols, Mollisols and Entisols
d. All

228. Coarse particles of illitic mica group are called as
a. Illite b. Hydrous mica
c. Muscovite d. Biotite

229. Fine-grained minerals of illitic mica group are called as
a. Illite
b. Hydrous mica
c. Muscovite
d. Biotite

Answers									
	217. b	220. c	223. d	226. d	229. a
	218. b	221. b	224. a	227. d	
	219. a	222. b	225. c	228. b	

230. Illite contains _____ SiO_2 and _____ potassium when compared to muscovite.
a. Less, More b. Less, Less
c. More, Less d. More, More

231. Cation exchange capacity of illite is
a. 10 meq/100g b. 20 meq/100g
c. 30 meq/100g d. 40 meq/100g

232. The physical properties of illite is more closer to
a. Kaolinite
b. Montmorillonite
c. Vermiculite
d. Chlorite

233. What is the percentage value of potassium as the diagnostic criteria of illite?
a. 10.0 b. 9.0
c. 8.0 d. 7.0

234. What is the percentage of potassium frequently found in illitic clay?
a. 9.0–10.0 b. 5.0–8.0
c. 10.0–13.0 d. 13.0–15.0

235. Illite has been found as an important constituent of clays of
a. Mollisols and Alfisols
b. Aridisols, Inceptisols and Entisols
c. Spodosols, Mollisols and Alfisols
d. All the above

236. In soils affected by high precipitation, the illite mineral tends to be altered into
a. Kaolinite b. Montmorillonite
c. Vermiculite d. Chlorite

237. In soils affected by warmer climates or higher temperatures, the illite mineral tends to be altered into
a. Kaolinite
b. Montmorillonite
c. Vermiculite
d. Chlorite

238. The mineral hydrobiotite belongs to
a. Kaolinite group
b. Smectite group
c. Illite group
d. None

239. True vermiculite is a
a. Clay mineral
b. Rock-forming mineral
c. Primary mineral
d. All

240. The mineral hydrobiotite is formed from the weathering of
a. Biotite b. Muscovite
c. Vermiculite d. Illite

241. After heating, vermiculite usually expands to _____ times its original size.
a. 5–10 b. 10–15
c. 15–25 d. 20–30

242. The clay vermiculite is a
a. Manganese aluminium silicate mineral
b. Magnesium aluminium silicate mineral
c. Iron aluminium silicate mineral
d. All the above

243. The structure of vermiculite shows close similarities with that of
a. Kaolinite
b. Montmorillonite
c. Illite
d. Chlorite

244. What is the thickness of water molecules as layer occupying the intermicellar spaces of vermiculite?
a. 2 Å b. 3 Å
c. 4 Å d. 5 Å

Answers									
	230. c	233. d	236. b	239. a	242. b
	231. c	234. b	237. a	240. b	243. d
	232. a	235. d	238. c	241. d	244. d

245. Tetrahedral layer isomorphous substitution is more in
a. Kaolinite
b. Montmorillonite
c. Vermiculite
d. Illite

246. Among the inorganic colloids, _____ has the largest cation exchange capacity.
a. Kaolinite
b. Montmorillonite
c. Vermiculite
d. Illite

247. CEC of dioctahedral vermiculite is more than that of trioctahedral vermiculite (True/False).

248. CEC of dioctahedral vermiculite is _____ times more than that of trioctahedral vermiculite.
a. 1.00 b. 1.05
c. 1.10 d. 1.25

249. Most of the soil vermiculites are
a. Dioctahedral b. Trioctahedral
c. Both d. None

250. Potassium and ammonium fixation is more in
a. Chlorite
b. Montmorillonite
c. Vermiculite
d. Illite

251. In clay mineral identification, X-ray diffraction peak for vermiculite is
a. 11.8 Å b. 9.3 Å
c. 12.0 Å d. 14.0 Å

252. Vermiculite usually occurs as secondary minerals in the clay fractions of
a. Ultisols, Mollisols and Aridisols
b. Ultisols, Oxisols and Mollisols
c. Mollisols, Aridisols and Inceptisols
d. Mollisols, Aridisols and Alfisols

253. Structurally chlorite minerals are more related to
a. Pyrophyllite b. Sepiolite
c. Talc d. Sauconite

254. The $Mg(OH)_2$ sheet in chlorite was formerly called as
a. Goethite b. Brucite
c. Gibbsite d. Lepidochrosite

255. $(Mg, Fe, Al)_6 (Si, Al)_4 O_{10} (OH)_8$ is the chemical formula of
a. Vermiculite b. Illite
c. Brucite d. Chlorite

256. In mica, the development of positive charge is due to the
a. Replacement of Mg by Al occurring in the brucite sheet
b. Replacement of Mg by Fe occurring in the brucite sheet
c. Replacement of Si by Al occurring in the brucite sheet
d. Replacement of Si by Fe occurring in the brucite sheet

257. In mica, the sites of anion retention are
a. Oxy-hydroxy interlayers
b. Brucite layers
c. Hydroxy interlayers
d. All

258. In mica, fixation of K+ and/or NH4+ ions can be reduced by the presence of
a. Oxy-hydroxy interlayers
b. Brucite layers
c. Hydroxy interlayers
d. All

Answers										
	245. c	248. b	251. d	254. b	257. c
	246. c	249. a	252. a	255. d	258. c
	247. T	250. c	253. c	256. a	

259. The basal spacing of swelling chlorite is
a. 14 Å b. 28 Å
c. 32 Å d. 22 Å

260. The basal spacing of swelling chlorite increases from 28 Å to _____ by salvation process.
a. 32 Å b. 36 Å
c. 40 Å d. 38 Å

261. Chlorite is usually detected as necessary minerals in the clays of
a. Inceptisols, Mollisols and Aridisols
b. Inceptisols, Entisols and Mollisols
c. Mollisols, Inceptisols and Alfisols
d. Alfisols, Mollisols and Aridisols
e. All the above

262. Most of the chlorite minerals are
a. Dioctahedral b. Trioctahedral
c. Tetrahedral d. None

263. The interstratified clays cannot be separated by physical means (True/False).

264. _____ is considered as regularly interstratified chlorite-montmorillonite clay.
a. Brucite b. Brushite
c. Corrensite d. Bayerite

265. The basal spacing of corrensite varies from
a. 26.4 – 32.0 Å b. 26.4 – 30.0 Å
c. 26.4 – 31.0 Å d. 26.4 – 33.0 Å

266. Silica minerals are distinguished as
a. Phyllosilicates b. Cyclosilicates
c. Orthosilicates d. Tectosilicates

267. The types of minerals distinguished in the category of silica minerals are
a. Quartz, Tridymite and Crystobalite
b. Quartz and Tridymite
c. Quartz and Crystobalite
d. Quartz, Tridymite, Crystobalite and Diaspore

268. Silica minerals formed in the low temperature are in which of the following forms ?
a. α-form b. β-from
c. γ-form d. All

269. Silica minerals formed in the high temperature are in which of the following forms ?
a. α-form b. β-from
c. γ-form d. All

270. Example for hexagonal silica mineral is
a. Quartz b. Tridymite
c. Crystobalite d. Diaspore

271. Example for trigonal silica mineral is
a. Quartz b. Tridymite
c. Crystobalite d. Diaspore

272. The surface area of silica minerals is
a. 1 – 5 m^2/g b. 2 – 5 m^2/g
c. 2 – 10 m^2/g d. 2 – 3 m^2/g

273. Silica will dissolve when the pH of the soil is
a. > 8.0 b. > 9.0
c. > 9.5 d. > 10.0

274. Arrange the silica minerals based on their solubility in increasing order.
a. Quartz > Opal > Crystobalite > Amorphous silica
b. Quartz > Crystobalite > Opal > Amorphous silica
c. Quartz < Crystobalite < Opal < Amorphous silica
e. Quartz < Opal < Crystobalite < Amorphous silica

Answers										
	259. b	262. b	265. c	268. a	271. a	274. d
	260. a	263. T	266. d	269. b	272. d	
	261. d	264. c	267. a	270. b	273. b	

275. _____ is called as biogenic silica since it is mostly originated from plant.
a. Quartz
b. Crystobalite
c. Opal
d. Amorphous silica

276. In the diagnosis of quartz by X-ray diffraction, the basal spacing of quartz is
a. 4.26 Å b. 3.34 Å
c. 4.04 Å d. 2.84 Å

277. For the calibration of DTA instrument, _____ is often used as a stable reference material.
a. Quartz
b. Opal
c. Crystobalite
d. Amorphous silica

278. In X-ray diffraction, a strong 4.04 °A peak accompanied by a relatively weak 3.14 °A peak suggests the presence of
a. Quartz
b. Opal
c. Crystobalite
d. Amorphous silica

279. Quartz is usually an important mineral in
a. Spodosols b. Inceptisols
c. Alfisols d. Ultisols

280. Quartz may be absent in the clay fractions of
a. Alfisols b. Ultisols
c. Inceptisols d. Oxisols

281. Among the silica minerals, which one is considered as volcanic origin ?
a. Quartz
b. Crystobalite
c. Tridymite
d. Opal

282. Among the following, which one is an anhydrous ferric oxide mineral ?
a. Goethite
b. Lepidocrosite
c. Ferrihydrite
d. Maghemite

283. Among the following, which one is a monohydrate ferric oxide mineral ?
a. Goethite b. Maghemite
c. Haematite d. Ferrihydrite

284. The most common aluminium hydrous oxide mineral in soil is
a. Diaspore b. Boehmite
c. Gibbsite d. Bayerite

285. Which aluminium hydrous oxide mineral is also called as hydrargillite ?
a. Diaspore b. Boehmite
c. Gibbsite d. Bayerite

286. In gibbsite, the two crystal layers are held together by
a. H-bonds b. OH-bonds
c. Al-bonds d. Fe-bonds

287. The adsorption which is related to a covalent type of bonding of ions is called as
a. Chemisorption
b. Specific adsorption
c. Non-specific adsorption
d. All

288. Adsorption of phosphate ions and heavy metals is as
a. Chemisorption
b. Specific adsorption
c. Non-specific adsorption
d. All

Answers					
275. c	278. c	281. b	284. a	287. b	
276. b	279. a	282. d	285. c	288. b	
277. a	280. d	283. d	286. a		

289. In X-ray diffraction method of clay minerals identification, the diffraction peak for gibbsite and goethite is _____ and _____, respectively.
a. 4.30 Å, 4.18 Å b. 4.18 Å, 4.82 Å
c. 4.82 Å, 4.18 Å d. 4.18 Å, 4.30 Å

290. Reddish-brown colour of the soils is due to the presence of
a. Gibbsite b. Magnetite
c. Hematite d. Goethite

291. Red colour of the soils is due to the presence of
a. Gibbsite b. Magnetite
c. Hematite d. Goethite

292. _____ is the major mineral in highly weathered Ultisols and Oxisols of the humid tropical and sub-tropical regions.
a. Gibbsite b. Magnetite
c. Hematite d. Goethite

293. Which of the following mineral is the most important iron oxide mineral in many soils?
a. Hematite b. Goethite
c. Magnetite d. Lepidocrosite

294. Allophane mineral was formerly classified as
a. Kaolin clay b. Smectite clay
c. Illite clay d. None

295. The molecular Al : Si ratio of allophane is
a. 1 : 1 or 1 : 1.5 b. 1 : 1 or 1 : 1.8
c. 1 : 1 or 1 : 2 d. 1 : 1 or 1 : 2.5

296. $SiO_2.Al_2O_3.2H_2O$ is the chemical formula of
a. Imogolite b. Hydrargillite
c. Allophane d. None

297. The structure of imogolite is
a. Crystalline
b. Paracrystalline
c. Amorphous
d. None

298. CEC of allophane is approximately between
a. 18–25 meq/100g
b. 5–30 meq/100g
c. 10–30 meq/100g
d. 20–30 meq/100g

299. CEC of imogolite is approximately between
a. 10–30 meq/100g
b. 18–25 meq/100g
c. 100 meq/100g
d. 135 meq/100g

300. Anion exchange capacity of allophane is approximately between
a. 100 meq/100g b. 135 meq/100g
c. 196 meq/100g d. 206 meq/100g

301. The interaction processes of minerals with organic compounds are called as
a. Adsorption
b. Retention or Fixation
c. Complex formation or Chelation
d. None

302. The method commonly used in the identification of amorphous mineral is
a. X-ray diffraction analysis
b. Differential thermal analysis (DTA)
c. Infrared spectroscopy
d. All

303. Standard or reference material used in the Differential Thermal Analysis (DTA) method of clay mineral identification is
a. Calcined kaolinite
b. Calcined montmorillonite
c. Calcined chlorite
d. Calcined mica

Answers					
289. c	292. a	295. c	298. d	301. c	
290. d	293. b	296. c	299. d	302. b	
291. c	294. a	297. b	300. c	303. a	

304. In which of the following method, calcined Al_2O_3 is used as standard or reference material ?
a. X-ray diffraction analysis
b. Differential thermal analysis (DTA)
c. Infrared spectroscopy
d. All

305. In clay minerals identification, which method is commonly used for qualitative analysis ?
a. X-ray diffraction analysis
b. Differential thermal analysis (DTA)
c. Infrared spectroscopy
d. All

306. In clay minerals identification, X-ray diffraction analysis is a
a. Destructive method
b. Semi-destructive method
c. Non-destructive method
d. None

307. In X-ray diffraction analysis, kaolinite clay exhibits a characteristic first order diffraction at angle of 2Q = ____.
a. 7.13° b. 12.4°
c. 12.3° d. 10.1°

308. In X-ray diffraction analysis, montmorillonite clay exhibits a characteristic first order diffraction at angle of 2Q = ____.
a. 7.13° b. 12.4°
c. 12.3° d. 10.1°

309. In X-ray diffraction analysis, illite clay exhibits a characteristic first order diffraction at angle of 2Q = ____.
a. 7.13° b. 10.1°
c. 17.7° d. 18.4°

310. Of the following, what are the methods used to distinguish expanding and non-expanding minerals in X-ray diffraction analysis ?
a. K-saturation and Mg-saturation
b. Solvation of Mg-saturated samples
c. K-saturation and Heating at 500°C
d. Both a and b
e. All the above

311. _____ is usually done to distinguish between vermiculite, chlorite and kaolinite in X-ray diffraction analysis.
a. K-saturation
b. Mg-saturation
c. Solvation
d. Heating at 500°C

312. The most widely used method for mounting soil samples in infrared analysis is
a. Mull method
b. KBr pellet technique
c. Clay film technique
d. None of the above

313. Of the following, which one is called as siloxane bond by Sticher and Bach (1966)?
a. Si-O-Si b. O-Al-OH
c. –Si-OH d. –Al-OH

314. Siloxane bond (Si-O-Si) is typical of _____ types of clay.
a. 1 : 1 b. 2 : 1
c. 2 : 1 : 1 d. Amorphous

315. Of the following clay minerals, which one has siloxane surfaces on one basal plane, and oxyhydroxide surfaces on the other basal plane ?
a. 1 : 1 b. 2 : 1
c. 2 : 1 : 1 d. Amorphous

Answers				
	304. b	307. b	310. d	313. a
	305. a	308. c	311. d	314. b
	306. c	309. b	312. b	315. a

316. _____ and _____ are typically present in soils containing large amounts of amorphous gel and/or allophane.
a. Siloxane surfaces...Silanol surfaces
b. Siloxane surfaces...Aluminol surfaces
c. Silanol surfaces... Aluminol surfaces
d. Siloxane surfaces...Oxyhydroxide surfaces

317. Which of the following chemical compounds are commonly used for the measurement of surface areas of clay ?
a. Water, N_2 gas and Cetyl pyridinium bromide
b. Water, N_2 gas and Cetyl pyridinium chloride
c. N_2 gas and Cetyl pyridinium bromide
d. N_2 gas and Cetyl pyridinium chloride

318. Al^{3+} ions in the crystal layers of clays can be replaced by
a. Si^{4+} and Mg^{2+}
b. Mg^{2+} and Fe^{3+}
c. Mg^{2+}, Fe^{3+} and Si^{4+}
d. Mg^{2+}, Fe^{3+}, Mn^{2+} and Si^{4+}

319. _____ is important types of charge for 1: 1 clays, iron and aluminium oxide clays, and organic colloids.
a. pH-dependent charge
b. Permanent charge
c. Zero point charge
d. Both a and b

320. _____ and _____ ions are also called as potential determining ions.
a. Si^{4+} ....Al^{3+} b. O^{2-}...OH^-
c. H^+...OH^- d. None

321. At the pH values above zero point charge, the colloid is _____.
a. Positively charged
b. Negatively charged
c. Neutral
d. None

322. The formula $\Delta pH = pH_{H_2O} - pH_{KCl}$ is used for the calculation of
a. Positive charges
b. Negative charges
c. Zero point charges
d. None

323. Of the following, which theory is also called as diffuse-double layer theory ?
a. Helmholtz double layer theory
b. Gouy-Chapman double layer theory
c. Stern double layer theory
d. None

324. Because of the presence of opposite charges on the colloidal surfaces and in the liquid phase, an electrical potential develops at the solid-liquid interface, and is called as
a. Zeta potential
b. Stern potential
c. Repulsive potential
d. Surface potential

325. In which double layer theory, electrochemical potential at the colloidal surface drops linearly with increasing distance from the surface within the double layer ?
a. Helmholtz double layer theory
b. Gouy-Chapman double layer theory
c. Stern double layer theory
d. None of the above

Answers				
	316. c	319. a	322. d	325. a
	317. a	320. c	323. b	
	318. c	321. b	324. d	

326. In which double layer theory, electrochemical potential at the colloidal surface drops exponentially with increasing distance from the surface within the double layer ?
a. Helmholtz double layer theory
b. Gouy-Chapman double layer theory
c. Stern double layer theory
d. None of the above

327. If the valency of the ion increases, the thickness of double layer _____.
a. Increases
b. Decreases
c. Does not change
d. None

328. If the concentration of the bulk solution decreases, the thickness of double layer _____.
a. Increases b. Decreases
c. Does not change d. None

329. The diffused double layer theory was developed by Gouy and Chapman (1913) for the application on
a. Flat surface
b. Rounded surface
c. Spheroidal surfaces
d. All

330. Na and K are responsible for relatively thicker double layers than Ca and Mg (True/False).

331. The zeta potential may be expected to decrease with increasing electrolyte concentration (True/False).

332. Among the adsorption equation, which equation describes adsorption processes in relation to surface tension ?
a. Langmuir equation
b. Freundlich equation
c. BET equation
d. Gibbs equation

333. A _____ occurs when the ligand donates electron pairs to a metal ion.
a. Van der Waals force
b. Hydrogen bonding
c. Electrostatic bonding
d. Coordination reactions

334. Heat of adsorption is high for
a. Illite
b. Montmorillonite
c. Vermiculite
d. Kaolinite

335. Of the following functional groups in organic matter, the most important sites for water adsorption is
a. Carboxylic groups
b. Phenolic and alcoholic groups
c. Amino acid groups
d. Aldehyde groups

336. Coordinated water is held more strongly by organic matter than is water held by a single bond (True/False).

337. Adsorption of non-electrolytes by non-polar adsorbents increases as molecular weights of the substances increases (True/False).

338. Van der Waals forces of adsorption decreases with increasing molecular size (True/False).

339. Adsorption increase because of steric hindrance (True/False).

340. Generally ions with smaller hydrated size are preferably adsorbed (True/False).

Answers					
326. b	329. d	332. d	335. a	338. F
327. b	330. T	333. d	336. T	339 F
328. a	331. T	334. d	337. T	340. T

341. Which equation considers the activity of adsorbed cations proportional to the mole fraction of total occupying cations present?
a. Kerr's equation
b. Vanselow's equation
c. Freundlich's equation
d. Langmuir' equation

342. Eriksson cation exchange equation is a combination of
a. Donnan and Kerr theories
b. Donnan and Vanselow theories
c. Donnan and Freundlich theories
d. Kerr and Vanselow theories

343. What is the optimum Ca: Mg ratio in soil ?
a. 5 – 10 : 1 b. 10 – 15 : 1
c. 15 – 20 : 1 d. 20 – 25 : 1

344. What is the optimum ratio of calcium to total cations in soils ?
a. 1/5 to 1/10 b. 1/10 to 1/15
c. 1/10 to 1/20 d. 1/20 to 1/30

345. What is the percentage of zinc in $ZnSO_4$?
a. 20 b. 25
c. 30 d. 35

346. $KAl_3Si_3O_{10}(OH)_2$ is the chemical formula of
a. Biotite b. Muscovite
c. Phlogobite d. Attapulgite

347. $KMg_2Al_2Si_3O_{10}(OH)_2$ is the chemical formula of
a. Biotite b. Muscovite
c. Phlogobite d. Attapulgite

348. $K(MgFe)_3AlSi_3O_{10}(OH)_2$ is the chemical formula of
a. Biotite b. Muscovite
c. Phlogobite d. Attapulgite

349. Chemical formula of wulfenite is
a. $(Fe,Ni)_9 S_8$ b. CoAsS
c. $(MgFe)_2 SiO_4$ d. $PbMoO_4$

350. Chemical formula of olivine is
a. $(Fe,Ni)_9 S_8$ b. CoAsS
c. $(MgFe)_2 SiO_4$ d. $PbMoO_4$

351. Chemical formula of pentlandite is
a. $(Fe,Ni)_9 S_8$ b. CoAsS
c. $(MgFe)_2 SiO_4$ d. $PbMoO_4$

352. $Na_2SO_4.10H_2O$ is the chemical formula of
a. Glauconite b. Hectorite
c. Greenalite d. Mirabilite

353. Examples for 1 : 1 trioctahedral clay minerals are
a. Serpentine and Greenalite
b. Kaolinite and Halloysite
c. Kaolinite and Serpentine
d. Kaolinite and Greenalite
e. All the above

354. Examples for 1 : 1 dioctahedral clay minerals are
a. Serpentine and Greenalite
b. Kaolinite and Halloysite
c. Kaolinite and Serpentine
d. Kaolinite and Greenalite
e. All the above

355. Examples for 2 : 1 dioctahedral clay minerals are
a. Montmorillonite, Hectorite and Saponite
b. Sauconite, Sepiolite and Hectorite
c. Montmorillonite, Nontronite and Beidellite
d. Beidellite, Nontronite and Hectorite
e. All the above

Answers					
341. b	344. c	347. c	350. c	353. a
342. b	345. d	348. a	351. a	354. b
343. b	346. b	349. d	352. d	355. c

356. Examples for 2: 1 trioctahedral clay minerals are
a. Montmorillonite, Hectorite and Saponite
b. Sauconite, Sepiolite and Hectorite
c. Montmorillonite, Nontronite and Beidellite
d. Beidellite, Nontronite and Hectorite
e. All the above

357. Pyrophyllite and polygorskite are
a. 1:1 dioctahedral clay minerals
b. 1:1 trioctahedral clay minerals
c. 2:1 dioctahedral clay minerals
d. 2:1 trioctahedral clay minerals
e. 2:1:1 dioctahedral clay minerals

358. Amesite and Chrysolite are
a. 1:1 dioctahedral clay minerals
b. 1:1 trioctahedral clay minerals
c. 2:1 dioctahedral clay minerals
d. 2:1 trioctahedral clay minerals
e. 2:1:1 dioctahedral clay minerals

359. Pimelite and saponite are
a. 1:1 dioctahedral clay minerals
b. 1:1 trioctahedral clay minerals
c. 2:1 dioctahedral clay minerals
d. 2:1 trioctahedral clay minerals
e. 2:1:1 dioctahedral clay minerals

360. The 2: 1 trioctahedral clay mineral that has zinc ion in its octahedral layer is
a. Sepiolite b. Pimelite
c. Sauconite d. Saponite

361. The 2:1 trioctahedral clay mineral that has nical ion in its octahedral layer is
a. Sepiolite b. Pimelite
c. Sauconite d. Saponite

362. Which one of the following is the example for 2:1 clay mineral that has zero electrical charge ?
a. Talc b. Pyrophyllite
c. Polygorskite d. Beidellite

363. _____ is the 1:1 clay mineral with zero electrical charge.
a. Kaolinite b. Halloysite
c. Chrysolite d. Serpentine

364. Examples for 2: 1 trioctahedral mica group clay minerals are
a. Muscovite and Illite
b. Muscovite and Biotite
c. Biotite and Phlogobite
d. Biotite and Illite

365. Examples for 2:1 dioctahedral mica group clay minerals are
a. Muscovite, Illite and Glauconite
b. Biotite, Phlogobite and Chlorite
c. Muscovite, Illite and Chlorite
d. Muscovite, Biotite and Illite

366. Vermiculite is a
a. 2:1 dioctahedral mica
b. 2:1 trioctahedral mica
c. Both a and b
d. None

367. Trioctahedral vermiculite is formed from
a. Biotite b. Phlogobite
c. Chlorite d. All

368. Dioctahedral vermiculite is formed from
a. Illite b. Muscovite
c. Glauconite d. All

369. Among the 2:1 clay minerals, octahedral substitution is more in
a. Montmorillonite
b. Nontronite and Beidellite
c. Pyrophyllite and Polygorskite
d. Saponite and Sauconite

Answers					
	356. b	359. d	362. a	365. a	368. a
	357. c	360. c	363. d	366. c	369. a
	358. b	361. b	364. c	367. d	

370. Among the 2:1 clay minerals, tetrahedral substitution is more in
a. Montmorillonite
b. Nontronite and Beidellite
c. Pyrophyllite and Polygorskite
d. Saponite and Sauconite

371. Among the 2: 1 dioctahedral clay minerals, Al3+ is replaced by Fe3+ in trioctahedral layer of
a. Montmorillonite b. Beidellite
c. Pyrophyllite d. Nontronite

372. Percentage of boron in borax is
a. 11 b. 15
c. 10 d. 17

373. Percentage of boron in sodium borate is
a. 11 b. 15
c. 10 d. 17

374. Percentage of boron in boric acid is
a. 11 b. 15
c. 10 d. 17

375. What is the percentage of boron in colemenite ?
a. 11 b. 15
c. 10 d. 17

376. What is the percentage of molybdenum in molybdenum trioxide (MoO_4) ?
a. 54 b. 39
c. 30 d. 66

377. What is the percentage of molybdenum in sodium molybdate ($Na_2MoO_4.2H_2O$)?
a. 54 b. 39
c. 30 d. 66

378. What is the percentage of molybdenum in ammonium molybdate [$(NH_4)_6Mo_7O_{24}$)?
a. 54 b. 39
c. 30 d. 66

379. What is the percentage of silica in calcium silicate ($CaSiO_3$)?
a. 18-21 b. 23
c. 31 d. 20-21

380. What is the percentage of silica in calcium silicate slag?
a. 18-21 b. 23
c. 31 d. 20-21

381. Which is an example of short range order alumino-silicate minerals?
a. Montmorillonite b. Biotite
c. Chlorite d. Allophane

382. What is the size of the cavity formed in-between the two layer units of clay minerals in NH_4^+/K^+ fixation?
a. 2.2 °A b. 2.4 °A
c. 2.8 °A d. 3.2 °A

383. The difference in dimensions of substituted ions in isomorphous substitution in clay minerals was reported to be not more than
a. 5 % b. 10 %
c. 15 % d. 20 %

384. The valency between those substituted ions in isomorphous substitution in clay minerals should not differ more than
a. One unit b. Two units
c. Three units d. Four units

385. In octahedral isomorphous substitution of clay minerals, the substituting ions should be _____ times larger than the substituted ions.
a. 0.61 b. 0.73
c. 0.58 d. 0.41

Answers						
	370. b	373. b	376. d	379. c	382. c	385. b
	371. d	374. d	377. b	380. a	383. c	
	372. a	375. c	378. a	381. d	384. a	

386. In tetrahedral isomorphous substitution of clay minerals, the substituting ions should be _____ times larger than the substituted ions.
a. 0.61 b. 0.73
c. 0.58 d. 0.41

387. Arrange the monovalent cations according to their unhydrated diameter (°A) in decreasing order.
a. Rb > Cs > K > NH_4 > Na > Li
b. Cs > Rb > NH_4 > K > Na > Li
c. Cs > Rb > K > NH_4 > Na > Li
d. Li > Na > K > NH_4 > Rb > Cs

388. Arrange the divalent cations according to their unhydrated diameter (°A) in decreasing order.
a. Ca > Mg > Ba b. Ba > Ca > Mg
c. Mg > Ca > Ba d. Ba > Mg > Ca

389. Arrange the monovalent cations based on their strength of adsorption
a. Rb > Cs > K = NH_4 > Na > Li
b. Cs > Rb > K = NH_4 > Na > Li
c. Na > K = NH_4 > Li > Rb > Cs
d. Cs > Rb > NH_4 = K > Na > Li

390. Arrange the clay minerals based on their K^+/NH_4^+ fixing power in soil in decreasing order.
a. Vermiculite > Illite > Kaolinite
b. Kaolinite > Illite > Vermiculite
c. Vermiculite > Kaolinite > Illite
d. Illite > Vermiculite > Kaolinite

391. Arrange the cations according to their potassium fixing strength in soil in decreasing order.
a. NH_4 > Ca > Mg > Na
b. Ca > Mg > NH_4 > Na > H
c. Na > Mg > Ca > NH_4 > H
d. Na > Mg > NH_4 > H > Ca

392. Arrange the cations according to their power to release fixed potassium in soil in decreasing order.
a. NH_4 > Ca > Mg > Na
b. Ca > Mg > NH_4 > Na > H
c. Na > Mg > Ca > NH_4 > H
d. Na > Mg > NH_4 > H > Ca

393. Examples for crops highly tolerant to boron are
a. Sugarbeet, Cotton and Turnip
b. Sugarbeet, Barley and Grasses
c. Barley, Sugarbeet and Cotton
d. All

394. Examples for crops highly tolerant to sodium are
a. Sugarbeet, Cotton and Turnip
b. Sugarbeet, Barley and Grasses
c. Barley, Sugarbeet and Cotton
d. All

395. Examples for crops highly tolerant to high salt are
a. Sugarbeet, Cotton and Turnip
b. Sugarbeet, Barley and Grasses
c. Barley, Sugarbeet and Cotton
d. All

396. ESP initial – ESP final/ 100 x CEC =
a. Liming requirement
b. Gypsum requirement
c. Leaching requirement
d. Calcium Carbonate Equivalent

397. What is the gypsum equivalent of elemental sulphur?
a. 1.62 b. 0.75
c. 0.57 d. 0.18

Answers				
	386. d	389. d	392. a	395. c
	387. d	390. a	393. a	396. b
	388. b	391. c	394. b	397. d

398. What is the gypsum equivalent of CaS_2?
a. 1.62 b. 0.75
c. 0.57 d. 0.18

399. What is the gypsum equivalent of sulphuric acid?
a. 1.62 b. 0.75
c. 0.57 d. 0.18

400. What is the gypsum equivalent of $FeSO_4.7H_2O$?
a. 1.62 b. 0.75
c. 0.57 d. 0.39

401. Match the following

1. Basic slag	(i) 130
2. $Ca(OH)_2$	(ii) 108
3. CaO	(iii) 80
4. Dolomite	(iv) 176

a. 1-(iii), 2-(ii), 3-(iv), 4-(i)
b. 1-(ii), 2-(i), 3-(iii), 4-(iv)
c. 1-(i), 2-(ii), 3-(iii), 4-(iv)
d. 1-(iv), 2-(iii), 3-(i), 4-(ii)

402. Secondary clay mineral that has high surface area is
a. Vermiculite b. Montmorillonite
c. Illite d. Kaolinite

403. Vermiculite has more isomorphous substitution in tetrahedral layer than octahedral layer (True/False).

404. Montmorillonite has more isomorphous substitution in octahedral layer than octahedral layer (True/False).

405. In vermiculite, interlayer units are joined together by
a. Oxygen-Oxygen bonding
b. Cation-Oxygen bonding
c. Magnesium bonding
d. Water bonding (H-bonding)
e. All the above

406. Cation exchange capacity of illite clay mineral is
a. 3-15 cmol (p+) kg^{-1}
b. 20-40 cmol (p+) kg^{-1}
c. 80-120 cmol (p+) kg^{-1}
d. 120-150 cmol (p+) kg^{-1}

407. Cation exchange capacity of chlorite clay mineral is
a. 3-15 cmol (p+) kg^{-1}
b. 20-40 cmol (p+) kg^{-1}
c. 80-120 cmol (p+) kg^{-1}
d. 120-150 cmol (p+) kg^{-1}

408. Cation exchange capacity of kaolinite clay mineral is
a. 3-15 cmol (p+) kg^{-1}
b. 20-40 cmol (p+) kg^{-1}
c. 80-120 cmol (p+) kg^{-1}
d. 120-150 cmol (p+) kg^{-1}

409. Cation exchange capacity of montmorillonite clay mineral is
a. 3-15 cmol (p+) kg^{-1}
b. 20-40 cmol (p+) kg^{-1}
c. 80-120 cmol (p+) kg^{-1}
d. 120-150 cmol (p+) kg^{-1}

410. What is the cation exchange capacity of vermiculite clay mineral ?
a. 3-15 cmol (p+) kg^{-1}
b. 20-40 cmol (p+) kg^{-1}
c. 80-120 cmol (p+) kg^{-1}
d. 120-150 cmol (p+) kg^{-1}

411. Lignin theory of humus formation was given by
a. Waksman (1932)
b. Stevenson (1982)
c. Flaig (1932)
d. None

Answers					
	398. b	401. a	404. T	407. b	410. d
	399. c	402. b	405. c	408. a	411. a
	400. a	403. T	406. b	409. c	

412. Polyphenol theory of humus formation was given by
a. Waksman (1932)
b. Stevenson (1982)
c. Flaig (1932)
d. None

413. Sugar-amine condensation theory of humus formation was given by
a. Waksman (1932)
b. Stevenson (1982)
c. Flaig (1932)
d. None

414. When lignins are warmed with aqueous alkali, they are transformed into
a. Fulvic acids b. Humic acids
c. Humins d. All

415. Humic acids are having the similar properties of oxidized
a. Lignin b. Hemicellulose
c. Cellulose d. Both a and b

416. In polyphenol theory of humic substances formation, polyphenols are converted into quinones by which of the following enzymes?
a. Quinoloxidases
b. Phenoloxidases
c. Dextrinases
d. Proteinases

417. In the soils with poor drainage and sediments (swamps), which theory of humic substances formation will be predominant?
a. Lignin theory of humus formation
b. Polyphenol theory of humus formation
c. Sugar-amine condensation theory of humus formation
d. All the above

418. In the soils with dramatic and frequent changes in the environment especially temperature and moisture, which theory of humic substances formation will be predominant?
a. Lignin theory of humus formation
b. Polyphenol theory of humus formation
c. Sugar-amine condensation theory of humus formation
d. All the above

419. In the forest soils, which theory of humic substances formation will be predominant?
a. Lignin theory of humus formation
b. Polyphenol theory of humus formation
c. Sugar-amine condensation theory of humus formation
d. All the above

420. In mica, one Al^{3+} ion will be submitted to every _____ ions.
a. Two Si^{4+} b. Three Si^{4+}
c. Four Si^{4+} d. Five Si^{4+}

421. What is the percentage of pH dependent charges on 2:1 clay minerals?
a. Up to 5 % b. 5-10 %
c. 10-15 % d. 10-20 %

422. What is the percentage of pH dependent charges on 1:1 clay minerals?
a. 40 % or more b. 30% or more
c. 50 % or more d. 60 % or more

423. Arrange the soil textural classes according to their CEC (meq/100g) in decreasing order.
a. Clay loam > Silt loam > Loam > Sand
b. Clay loam > Loam > Silt loam > Sand
c. Silt loam > Loam > Clay loam > Sand
d. Loam > Silt loam > Clay loam > Sand

Answers				
	412. b	415. a	418. c	421. b
	413. b	416. b	419. b	422. c
	414. b	417. a	420. c	423. a

424. What is the range of CEC of clay and clay loam textural classes?
a. 10-15 cmol (p+) kg^{-1}
b. 50-100 cmol (p+) kg^{-1}
c. 10-20 cmol (p+) kg^{-1}
d. 20-50 cmol (p+) kg^{-1}

425. What is the range of CEC of clay and loam textural classes?
a. 10-15 cmol (p+) kg^{-1}
b. 50-100 cmol (p+) kg^{-1}
c. 10-20 cmol (p+) kg^{-1}
d. 20-50 cmol (p+) kg^{-1}

426. What is the root CEC range of dicotyledons?
a. 10-15 meq/100g
b. 50-100 meq/100g
c. 10-20 meq/100g
d. 20-50 meq/100g

427. What is the root CEC range of monocotyledons?
a. 10-15 meq/100g
b. 50-100 meq/100g
c. 10-20 meq/100g
d. 20-50 meq/100g

428. The formula, dc/dx = - DA dc/dx is called as
a. Darcy's law
b. Furier's law
c. Fick's law
d. Gibbs equation

429. Nitrogen ion in soil can move _____ mm by diffusion.
a. 0.2 b. 2.0
c. 5.0 d. 10.0

430. Phosphate ion in soil can move _____ mm by diffusion.
a. 0.2 b. 2.0
c. 5.0 d. 10.0

431. Potassium ion in soil can move _____ mm by diffusion.
a. 0.2 b. 2.0
c. 5.0 d. 10.0

432. Arrange the following based on their ease of calcium replacement.
a. Montmorillonite > Illite > Kaolinite > Peat
b. Kaolinite > Illite > Montmorillonite > Peat
c. Peat > Kaolinite > Montmorillonite > Illite
d. Peat > Kaolinite > Illite > Montmorillonite

433. The formula, BS (%) x CEC / 100 =
a. Leaching requirement
b. Exchangeable Sodium Percentage
c. Sodium Adsorption Ratio
d. Exchangeable bases

434. In ion-carrier hypothesis, mechanism-I is applicable at what concentration of ions?
a. Below 1mM b. Below 1M
c. Above 1mM d. Above 1mM

435. In ion-carrier hypothesis, mechanism-II is applicable at what concentration of ions?
a. Below 1mM b. Below 1M
c. Above 1mM d. Above 1mM

436. Brag cultivar of soybean is tolerant to
a. Boron stress b. Ion stress
c. Manganese stress d. Zinc stress

437. Jarosite mottles are found in
a. Melanic horizon
b. Salic horizon
c. Sulphuric horizon
d. Anthropic horizon

Answers					
	424. d	427. a	430. a	433. d	436. b
	425. a	428. c	431. b	434. a	437. c
	426. b	429. d	432. d	435. c	

438. $NaAlSi_3O_8$ is the chemical formula of
a. Orthoclase b. Microcline
c. Albite d. Anorthite
e. Both a and b

439. $CaAl_2Si_2O_8$ is the chemical formula of
a. Orthoclase b. Microcline
c. Albite d. Anorthite
e. Both a and b

440. $KAlSi_3O_8$ is the chemical formula of
a. Orthoclase b. Microcline
c. Albite d. Anorthite
e. Both a and b

441. Albite and oligoclase are found in
a. Igneous rocks
b. Sedimentary rocks
c. Metamorphic rocks
d. All

442. Anorthite is formed by the metamorphism of
a. Shale b. Sandstone
c. Limestone d. Mica

443. First weathering product of plagioclase feldspar is
a. Dioctahedral smectite
b. Trioctahedral smectite
c. Dioctahedral mica
d. Dioctahedral mica

444. Example for basic pyroxene mineral is
a. Tremolite b. Actinolite
c. Hornblende d. Hypersthene

445. Diapside and augite are _____ group minerals.
a Pyroxenes
b. Amphiboles
c. Tectosilicates
d. Phyllosilicates

446. Trimolite, actinolite and hornblende are _____ group minerals.
a. Pyroxenes
b. Amphiboles
c Tectosilicates
d. Phyllosilicates

447. Silicate group minerals that has no oxygen sharing in its formation is
a. Neosilicates
b. Inosilicates
c. Tectosilicates
d. Phyllosilicates

448. Foresterite and fayalite are the example of
a. Neosilicates
b. Inosilicates
c. Tectosilicates
d. Phyllosilicates

449. Chemical formula for foresterite is
a. Fe_2SiO_4 b. Al_2SiO_4
c. Mn_2SiO_4 d. Mg_2SiO_4

450. Chemical formula for fayalite is
a. Fe_2SiO_4 b. Al_2SiO_4
c. Mn_2SiO_4 d. Mg_2SiO_4

451. _____ is a group of phosphate minerals found in India.
a. Leucoxenes
b. Apatite
c. Plumbogumonite
d. Rock phosphate

452. Tourmaline and beryne are the examples of
a. Inosilicates
b. Cyclosilicates
c. Phyllosilicates
d. Tectosilicates

Answers					
	438. c	441. c	444. d	447. a	450. a
	439. d	442. c	445. a	448. a	451. c
	440. e	443. a	446. b	449. d	452. b

453. $FeTiO_3$ is the chemical formula of
a. Jarosite b. Alunite
c. Zeolite d. Illmenite

454. Chemical formula of fool's gold is
a. $FeCO_3$ b. $MgCO_3$
c. FeS_2 d. Fe_2O_3

455. Analcime and hendlandite are _____ group of minerals.
a. Zeolite b. Ilmenite
c Rutile d. Anatase

456. Isomorph of gibbsite mineral is
a. Maghemite b. Martite
c. Diasporite d. Bayerite

457. Isomorph of boehmite mineral is
a. Maghemite b. Martite
c. Diasporite d. Bayerite

458. Isomorph of goethite mineral is
a. Martite
b. Lepidochrosite
c. Maghimite
d. Magnetite

459. Mineral that has structure similar to haematite is
a. Martite
b. Lepidochrosite
c. Maghimite
d. Magnetite

460. Isomorph of haematite is
a. Martite
b. Lepidochrosite
c. Maghimite
d. Magnetite

461. Mineral containing titanium inherited from parent rock is
a. Rutile b. Anatase
c. Leucoxenes d. Enstatite

462. Amorphous titanium containing mineral is
a. Rutile b. Anatase
c. Leucoxenes d. Enstatite

463. Mineral containing titanium formed by pedogenic processes is
a. Rutile b. Anatase
c. Leucoxenes d. Enstatite

464. Chemical formula of maghemite is
a. Fe_2O_3 b. α-Fe_2O_3
c. γ-Fe_2O_3 d. α-FeOOH

465. Chemical formula of haematite is
a. Fe_2O_3 b. α-Fe_2O_3
c. γ-Fe_2O_3 d. α-FeOOH

466. Chemical formula of goethite is
a. Fe_2O_3 b. α-Fe_2O_3
c. γ-Fe_2O_3 d. α-FeOOH

467. Chemical formula of boehimite is
a. Fe_2O_3 b. α-Fe_2O_3
c. γ-Fe_2O_3 d. α-FeOOH

468. Chemical formula of gibbsite is
a. α-AlOOH b. β-AlOOH
c. α-Al $(OH)_3$ d. β-Al $(OH)_3$

469. Jarosite and alunite are formed by the reaction of _____ with soil minerals.
a. Ferrous sulphate
b. Aluminium sulphate
c. Sulphuric acid
d. Nitric acid

470. Equation deals with multi-layer adsorption in soil is
a. Freundlich equation
b. Langmuir equation
c. BET equation
d. Kerr equation

Answers									
	453. d	456. d	459. a	462. c	465. b	468. d
	454. c	457. c	460. c	463. b	466. d	469. c
	455. a	458. b	461. a	464. c	467. c	470. c

471. For the calculation of activity co-efficient, $-\log -\gamma = 0.5\, Zi^2 \sqrt{I} / 1+\sqrt{I}$ is used when ionic strength (I) is
a. = 0.1 mol/L
b. 0.1 – 0.5 mol/L
c. > 0.5 mol/L
d. 1.0 mol/L

472. For the calculation of activity co-efficient, $-\log -\gamma = -0.5Zi^2 [\sqrt{I} / 1+\sqrt{I} - 0.3I]$ is used when ionic strength (I) is
a. = 0.1 mol/L
b. 0.1 – 0.5 mol/L
c. > 0.5 mol/L
d. 1.0 mol/L

473. Equation used for the heterovalent ion exchange study is
a. Gapon's equation
b. Vanselow equation
c. KDO equation
d. All

474. Arrange the cations on the basis of lyotrophic series.
a. $Li > Na > NH_4 = K > Rb > Cs$
b. $Rb > Cs > NH_4 = K > Li > Na$
c. $Cs > Rb > K = NH_4 > Na > Li$
d. $Na > Li > K = NH_4 > Cs > Rb$

475. Relationships among Gapon's, Vanselow's and KDO's equation is
a. $K_2G = \frac{(1+N1)Kv}{8(1-N1)} = \frac{(N1+3)K_{KDO}}{4(1-N1)}$
b. $K_2G = \frac{(1+N1)Kv}{4(1-N1)} = \frac{(N1+3)K_{KDO}}{8(1-N1)}$
c. $K_2G = \frac{(1+N1)K_{KDO}}{8(1-N1)} = \frac{(N1+3)Kv}{4(1-N1)}$
d. $K_2G = \frac{(1+N1)K_{KDO}}{4(1-N1)} = \frac{(N1+3)Kv}{8(1-N1)}$

476. Clay minerals that has high surface area will have lower surface charge density (True/False).

477. Clay mineral that has high surface charge density is
a. Kaolinite
b. Montmorillonite
c. Vermiculite
d. Illite

478. Hydrated ions are more preferred than unhydrated ions by clay minerals in adsorption (True/False).

479. When the total electrolytes concentration is lower, the volume exclusion in clay minerals will be higher (True/False)

480. Lyotrophic series for anions is
a. $PO_4^{3-} > SiO_4^{4-} > NO_3^- > SO_4^{2-} > Cl^-$
b. $Cl^- > NO_3^- > SO_4^{2-} > SiO_4^{4-} > PO_4^{3-}$
c. $SiO_4^{4-} > PO_4^{3-} > SO_4^{2-} > NO_3^- > Cl^-$
d. $SiO_4^{4-} > PO_4^{3-} > SO_4^{2-} > NO_3^- = Cl^-$

481. Adsorption equation used for the calculation of total surface area is
a. Langmuir equation
b. Freundlich equation
c. BET equation
d. Kerr equation

482. BET adsorption equation is used when the relative pressure is
a. 0.5 - 0.75
b. 0.5 - 1.0
c. 0.05 - 0.45
d. 0.005 - 0.45

483. Widely used chemical for the calculation of surface area of clay minerals is
a. N_2
b. NH_3
c. H_2O_2
d. Formic acid

Answers					
471. a	474. c	477. a	480. d	483. b	
472. b	475. b	478. F	481. c		
473. d	476. T	479. T	482. c		

484. When ΔG^o (Gibb's free energy) is more for a particular cation, the preference of adsorption by clay minerals is more (T/F).

485. Selectivity of positive (+ve) sites with respect to different anions is much larger than selectivity of negative sites (-ve) sites for different cations (True/False).

486. A-value was given by
a. Fried and Dean
b. Russell
c. Larsen
d. Baule

487. Which of the following rules state that "in stable coordination structure, the total strength of valency bonds which reach an anion from all neighbouring cations equals the charge of anion"?
a. Pauling's first rule
b. Pauling's second rule
c. Pauling's third rule
d. None

488. K_2SO_4 $2MgSO_4$ is the chemical formula of
a. Pelophos
b. Basic slag
c. Schoenite
d. Longbeinite

489. K_2SO_4 $MgSO_4$. $7H_2O$ is the chemical formula of
a. Pelophos
b. Basic slag
c. Schoenite
d. Longbeinite

490. Potassium percentage in schoenite is
a. 10 – 14 %
b. 18 – 20 %
c. 22 – 24 %
d. 28 – 30 %

491. Arrange the clay minerals on the basis of boron adsorption in decreasing order.
a. Mica > Montmorillonite > Kaolinite
b. Montmorillonite > Mica > Kaolinite
c. Kaolinite > Montmorillonite > Mica
d. Kaolinite > Montmorillonite > Mica

492. Form of zinc in the pH ranger of 7.0 – 9.0 in soil is
a. $Zn(OH)^+$
b. $Zn(OH)_2$
c. $Zn(OH)_3^-$
d. Zn^{2+}

493. Form of zinc at pH greater than 9.0 in soil is
a. $Zn(OH)^+$
b. $Zn(OH)_2$
c. $Zn(OH)_3^-$
d. Zn^{2+}

494. Form of zinc in the pH less than 7.0 in soil is
a. $Zn(OH)^+$
b. $Zn(OH)_2$
c. $Zn(OH)_3^-$
d. Zn^{2+}

495. Form of copper at pH greater than 7.0 in soil is
a. Cu^{2+}
b. $Cu(OH)^+$
c. $Cu(OH)_2$
d. $Cu(OH)_3^-$

496. A low phosphate potential suggests
a. Low availability of phosphates
b. High availability of phosphates
c. Medium availability of phosphates
d. None

497. Soil colloids, such as clay, adsorb H^+ ions by
a. Selective process
b. Non-selective process
c. Both a and b
d. None

498. Arrange the minerals on the basis of cobalt adsorption in decreasing order.
a. Kaolinite > Bentonite > Haematite > Muscovite
b. Kaolinite = Muscovite > Bentonite > Haematite
c. Muscovite > Haematite > Bentonite = Kaolinite
d. Muscovite > Haematite > Bentonite > Kaolinite

Answers					
484. T	487. b	490. c	493. b	496. b	
485. T	488. d	491. a	494. d	497. a	
486. a	489. c	492. a	495. c	498. c	

499. The pH measurements of soil give variable results since they are affected by
a. Suspension effect
b. Soil-water ratio
c. Electrolytes levels
d. All

500. The equation, pH – ½ pCa = Constant, is called as
a. Lime potential
b. Phosphate potential
c. Potassium potential
d. None

501. Which of the following equation characterizes the composition of the exchange complex with respect to its saturation by H^+ and Ca^{2+} ions?
a. Lime potential
b. Phosphate potential
c. Potassium potential
d. None

502. Which of the following minerals have both permanent charge as well as pH dependent charge?
a. Montmorillonite b. Vermiculite
c. Chlorite d. All

503. Lattice theory of clay mineral was given by
a. Hevesy and Hoffer
b. Page and Baver
c. Jenny and Overstreet
d. Thompson and Way

504. During the contraction of lattice layer clay minerals, the interspace is contacted from ___ to ___.
a. 1.2 nm, 1.0 nm b. 1.3 nm, 1.0 nm
c. 1.4 nm, 1.0 nm d. 1.5 nm, 1.0 nm

505. Radius of tetrahedral layer of secondary clay minerals is
a. 0.035 nm b. 0.045 nm
c. 0.050 nm d. 0.060 nm

506. Radius of octahedral layer of secondary clay minerals is
a. 0.035 nm b. 0.045 nm
c. 0.050 nm d. 0.060 nm

507. Examples for expanding clay minerals are
a. Smectite and Nontronite
b. Beidellite and Saponite
c. Smectite, Beidellite and Nontronite
d. All

508. Size of kaolinite clay mineral is
a. 0.1 – 5.0 μm b. 0.2 – 2.0 μm
c. 0.01 – 1.0 μm d. 0.5 – 2.0 μm

509. Size of montmorillonite clay mineral is
a. 0.1 – 5.0 μm b. 0.2 – 2.0 μm
c. 0.01 – 1.0 μm d. 0.5 – 2.0 μm

510. $Al_2O_3.2SiO_2.H_2O$ is the chemical formula of
a. Kaolinite b. Halloysite
c. Hectorite d. Allophane

511. $Al_2O_3.3H_2O$ is the chemical formula of
a. Goethite b. Gibbsite
c Bayerite d. Diasporite

512. When Mg^{2+} occupies the trioctahedral sheet of chlorite (2: 1: 1), the mineral is called as
a. Chamosite b. Nimite
c Clinochlore d. Pennanite

513. When Fe^{2+} occupies the trioctahedral sheet of chlorite (2: 1: 1), the mineral is called as
a. Chamosite b. Nimite
c Clinochlore d. Pennanite

Answers					
	499. d	502. d	505. a	508. a	511. b
	500. a	503. b	506. c	509. c	512. c
	501. a	504. c	507. d	510. d	513. a

514. When Mn^{2+} occupies the trioctahedral sheet of chlorite (2: 1: 1), the mineral is called as
a. Chamosite b. Nimite
c Clinochlore d. Pennanite

515. When Ni^{2+} occupies the trioctahedral sheet of chlorite (2: 1: 1), the mineral is called as
a. Chamosite b. Nimite
c Clinochlore d. Pennanite

516. What is the Y-index of illite clay mineral?
a. < 5.0 b. 5.0 –25.0
c. > 25.0 d. None

517. What is the Y-index of kaolinite clay mineral?
a. < 5.0 b. 5.0 –25.0
c. > 25.0 d. None

518. What is the Y-index of montmorillonite clay mineral?
a. < 5.0 b. 5.0 –25.0
c. > 25.0 d. None

519. C-axis for halloysite clay mineral is
a. 7.2 Å b. 10.0 Å
c. 10.1 Å d. 12 - 18 Å

520. C-axis for illite clay mineral is
a. 7.2 Å b. 10.0 Å
c. 10.1 Å d. 12 - 18 Å

521. C-axis for montmorillonite clay mineral is
a. 10.0 Å b. 10.1 Å
c. 12 – 18 Å d 14.0 Å

522. C-axis for chlorite clay mineral is
a. 10.0 Å b. 10.1 Å
c. 12 – 18 Å d 14.0 Å

523. C-axis for vermiculite clay mineral is
a. 10.0 Å b. 10.1 Å
c. 12 – 18 Å d 14.0 Å

524. Margonite is a
a. Dioctahedral mica
b. Trioctahedral mica
c. Dioctahedral smectite
d. Trioctahedral smectite

525. In margarite, octahedral positions are occupied by
a. Ca^{2+} b. Al^{3+}
c. Fe^{3+} d. Fe^{2+}

526. $[Mg_2 Al (OH)_6]^+$ is the layer formula of
a. Illite b. Chlorite
c. Gibbsite d. Vermiculite

527. In illite clay mineral, tetrahedral substitution is more than the octahedral substitution (True/False)

528. Chemical formula of salt peter is
a. $NaNO_3$ b. KNO_3
c. KCl d. NaCl

529. Chemical formula of nitre is
a. $NaNO_3$ b. KNO_3
c. KCl d. NaCl

530. What is the electronegativity of hydrogen ion ?
a. 2.8 b. 2.6
c. 2.1 d. 3.6

531. For the formation of ionic bond, the value of electronegativity should be
a. More than 2.1 b. Less than 2.1
c. More than 2.8 d. Less than 2.8

532. For the formation of covalent bond, the value of electronegativity should be
a. More than 2.1 b. Less than 2.1
c. More than 2.8 d. Less than 2.8

533. Who is the father of soil chemistry?
a. Dokuchaiev b. J.W. Leather
c. Von Liebig d. J. Thomas

Answers					
	514. d	518. c	522. d	526. b	530. c
	515. b	519. c	523. d	527. F	531. a
	516. b	520. b	524. b	528. b	532. b
	517. a	521. c	525. a	529. a	533. d

534. Who is the father of soil science?
a. Dokuchaiev b. J.W. Leather
c. Von Liebig d. J. Thomas

535. Who is the father of Indian soil science?
a. J.W. Leather b. Von Liebig
c. Bousingault d. Jenny

536. Who is the father of agricultural chemistry?
a. J.W. Leather b. Von Liebig
c. Bousingault d. Jenny

537. Who is the father of filed experiment?
a. J.W. Leather b. Von Liebig
c. Bousingault d. Jenny

538. What is the percentage ratio of ionic bond and covalent bond in Si-tetrahedra?
a. 50 : 50 b. 60 : 40
c. 40 : 60 d. 55 : 45

539. What is the percentage ratio of ionic bond and covalent bond in Al-octahedra?
a. 50 : 50 b. 60 : 40
c. 40 : 60 d. 55 : 45

540. What is the observed co-ordination number of Al^{3+} ion?
a. 4, 6 b. 6, 8
c. 8, 12 d. 4

541. What is the observed co-ordination number of Si^{4+} ion?
a. 4, 6 b. 6, 8
c. 8, 12 d. 4

542. What is the observed co-ordination number of Fe^{3+} ion?
a 4, 6 b. 4
c. 6 d. 6, 8

543. What is the observed co-ordination number of NH_4^+ and K^+ ions?
a 4, 6 b. 4
c. 6 d. 6, 8

544. What is the ionic radius of Si^{4+} ion?
a. 0.051 nm b. 0.143 nm
c. 0.133 nm d. 0.039 nm

545. What is the ionic radius of Al^{3+} ion?
a. 0.051 nm b. 0.143 nm
c. 0.133 nm d. 0.039 nm

546. What is the ionic radius of O_2 ion?
a. 0.143 nm b. 0.132 nm
c. 0.133 nm d. 0.064 nm

547. What is the ionic radius of NH_4^+ ion?
a. 0.143 nm b. 0.132 nm
c. 0.133 nm d. 0.064 nm

548. What is the ionic radius of K^+ ion?
a. 0.143 nm b. 0.132 nm
c. 0.133 nm d. 0.064 nm

549. What is the radius ratio of Si^{4+} ion?
a. 0.950 b. 0.457
c. 0.364 d. 0.279

550. What is the radius ratio of Al^{3+} ion?
a. 0.950 b. 0.457
c. 0.364 d. 0.279

551. Radius ratio of NH_4^+ and K^+ ions is
a. 0.950 b. 0.457
c. 0.471 d. 0.451

552. When the radius ratio is between _____, the co-ordination number of the ion will be 3.0.
a. 1.0 b. 0.15 – 0.22
c. 0.22 – 0.41 d. 0.41 – 0.73

553. When the radius ratio is between _____, the co-ordination number of the ion will be 8.0.
a. 1.0 b. 0.73 – 1.0
c. 0.41 – 0.73 d. 0.22 – 0.41

Answers					
534. a	538. a	542. c	546. b	550. c	
535. a	539. b	543. c	547. a	551. a	
536. b	540. a	544. d	548. c	552. b	
537. c	541. d	545. a	549. d	553. b	

554. When the radius ratio is between _____, the co-ordination number of the ion will be 6.0.
a. 1.0 b. 0.73 – 1.0
c. 0.41 – 0.73 d. 0.22 – 0.41

555. When the radius ratio is between _____, the co-ordination number of the ion will be 4.0.
a. 1.0 b. 0.73 – 1.0
c. 0.41 – 0.73 d. 0.22 – 0.41

556. What is the Silica: Oxygen ratio in phyllosilicates structure?
a. 1 : 2 b. 1 : 4
c 1 : 2.5 d. 1 : 3

557. What is the Silica: Oxygen ratio in neso/ ortho/neo-silicate structure?
a. 1 : 2 b. 1 : 4
c. 1 : 2.5 d. 1 : 3

558. What is the Silica: Oxygen ratio in sorosilicate structure?
a. 1 : 2 b. 1 : 3
c. 1 : 3.5 d. 1 : 2.75

559. What is the Silica: Oxygen ratio in cyclosilicates structure?
a. 1 : 2 b. 1 : 3
c. 1 : 3.5 d. 1 : 2.75

560. What is the Silica: Oxygen ratio in single chain inosilicate structure?
a. 1 : 2 b. 1 : 3
c. 1 : 3.5 d. 1 : 2.75

561. What is the Silica: Oxygen ratio in double chain inosilicate structure?
a. 1 : 2 b. 1 : 3
c. 1 : 3.5 d. 1 : 2.75

562. What is the Silica: Oxygen ratio in tectosilicates structure?
a. 1 : 2 b. 1 : 4
c. 1 : 2.5 d. 1 : 3

563. Asbestos is a
a. Single chain inosilicate
b. Tectosilicate
c. Double chain inosilicate
d. Cyclosilicate

564. Augite is a
a. Single chain inosilicate
b. Tectosilicate
c Double chain inosilicate
d. Cyclosilicate

565. What is the chemical formula of bayerite?
a. α-AlOOH b. β-AlOOH
c. α-$Al(OH)_3$ d. β-$Al(OH)_3$

566. What is the chemical formula of diaspore?
a. α-AlOOH b. β-AlOOH
c. α-$Al(OH)_3$ d. β-$Al(OH)_3$

567. What is the chemical formula of lepidochrosite ?
a. α-FeOOH b. γ-FeOOH
c. γ-Fe_2O_3 d. α-Fe_2O_3

568. What is the chemical formula of magnetite?
a. Fe_3O_4 b. Fe_2O_3
c. FeOOH d. $Fe_2(OH)_3$

569. Brown to yellowish colour of soil is due to the presence of
a. Goethite b. Haematite
c. Magnetite d. Maghemite

570. Brown to yellowish colour of soil is due to the presence of
a. Lepidochrosite b. Magnetite
c. Maghemite d. Haematite

Answers						
554. c	557. b	560. b	563. a	566. a	569. a	
555. d	558. c	561. d	564. a	567. b	570. d	
556. c	559. b	562. a	565. c	568. a		

571. Dark brown to yellowish colour of soil is due to the presence of
a. Lepidochrosite b. Magnetite
c. Maghemite d. Haematite

572. Surface charge density of vermiculite is
a. Zero b. 0.3 – 0.6
c. 0.6 – 0.9 d. ≅2.0

573. Surface charge density of montmorillonite is
a. Zero b. 0.3 – 0.6
c. 0.6 – 0.9 d. ≅2.0

574. Surface charge density of illite is
a. Zero b. 0.3 – 0.6
c. 0.6 – 0.9 d. ≅2.0

575. Surface charge density of kaolinite is
a. Zero b. 0.3 – 0.6
c. 0.6 – 0.9 d. ≅2.0

576. Surface area of allophane is
a. 600 – 800 m^2/kg
b. 100 – 800 m^2/kg
c. 25 - 150 m^2/kg
d. 60 –100 m^2/kg

577. Surface area of vermiculite is
a. 600 – 800 m^2/kg
b 100 – 800 m^2/kg
c. 25 – 150 m^2/kg
d. 60 –100 m^2/kg

578. Surface area of montmorillonite is
a. 600 – 800 m^2/kg
b 100 – 800 m^2/kg
c. 25 – 150 m^2/kg
d. 60 – 100 m^2/kg

579. Surface area of kaolinite is
a. 10 – 45 m^2/kg
b. 7.0 – 30 m^2/kg
c. 60 – 100 m^2/kg
d. 40 – 100 m^2/kg

580. Surface area of halloysite is
a. 10 – 45 m^2/kg
b. 7.0 – 30 m^2/kg
c. 60 – 100 m^2/kg
d. 40 – 100 m^2/kg

581. Surface area of chlorite is
a. 600 – 800 m^2/kg
b. 100 – 800 m^2/kg
c. 25 – 150 m^2/kg
d. 60 – 100 m^2/kg

582. Surface area of biotite is
a. 10 – 45 m^2/kg
b. 7.0 – 30 m^2/kg
c. 60 – 100 m^2/kg
d. 40 – 100 m^2/kg

583. Surface area of muscovite is
a. 10 – 45 m^2/kg
b. 7.0 – 30 m^2/kg
c. 60 – 100 m^2/kg
d. 40 – 100 m^2/kg

584. Zeta potential of lithium-saturated clay (L-clay) is
a. 56.0 b. 56.4
c. 57.6 d. 58.8

585. Zeta potential of ammonium-saturated clay (L-clay) is
a. 56.0 b. 56.4
c. 57.6 d. 58.8

586. Zeta potential of hydrogen-saturated clay (L-clay) is
a. 56.4 b. 48.4
c. 52.6 d. 57.6

Answers						
	571. b	574. d	577. a	580. a	583. c	586. b
	572. c	575. a	578. a	581. c	584. d	
	573. b	576. b	579. b	582. d	585. a	

587. Zeta potential of calcium-saturated clay (L-clay) is
a. 56.4 b. 48.4
c. 52.6 d. 57.6

588. Flocculation value of lithium is
a. 5.4 b. 7.8
c. 11.2 d. 21.6

589. Flocculation value of ammonium is
a. 5.4 b. 7.8
c. 11.2 d. 21.6

590. Flocculation value of hydrogen is
a. 1.5 b. 3.0
c. 5.4 d. 11.2

591. Flocculation value of calcium is
a. 1.5 b. 3.0
c. 5.4 d. 11.2

592. Flocculation value of sodium is
a. 1.5 b. 3.0
c. 5.4 d. 11.2

593. On the basis of Lewis concept, acid is one which
a. Accepts electrons
b. Donates electrons
c. Accepts protons
d. Donates protons

594. On the basis of Arheneous concept, acid is one which
a. Donates protons
b. Donates hydrogen
c. Accepts protons
d. Accepts hydrogen

595. On the basis of Bronsted-Lowry concept, acid is one which
a. Donates protons
b. Donates hydrogen
c. Accepts protons
d. Accepts hydrogen

596. On the basis of Lewis concept, base is one which
a Accepts electrons
b. Donates electrons
c. Accepts protons
d. Donates protons

597. On the basis of Bronsted-Lowry concept, base is one which
a. Donates protons
b. Donates hydrogen
c. Accepts protons
d. Accepts hydrogen

598. On the basis of Arheneous concept, base is one which
a. Accepts electrons
b. Donates electrons
c. Accepts protons
d. Donates protons

599. What is the pH range of extremely acid soils ?
a. < 4.5 b. 4.6 – 5.0
c. 5.1 – 5.5 d. 5.6 – 6.0

600. What is the pH range of slightly acid soils?
a. 6.1 – 6.5 b. 4.6 – 5.0
c. 5.1 – 5.5 d. 5.6 – 6.0

601. What is the pH range of strongly acid soils ?
a. 6.1 – 6.5 b. 4.6 – 5.0
c. 5.1 – 5.5 d. 5.6 – 6.0

602. What is the pH range of very strongly acid soils ?
a. < 4.5 b. 4.6 – 5.0
c. 5.1 – 5.5 d. 5.6 – 6.0

Answers						
	587. c	590. a	593. a	596. a	599. a	602. b
	588. d	591. b	594. b	597. c	600. a	
	589. a	592. d	595. a	598. b	601. c	

603. Surface charge density (ψ) =
- a. RT/nF ln Unprotonated sp./Protonated sp.
- b. RT/nF ln Protonated sp./Unprotonated sp.
- c. RT/nF $Z\psi^{o}$ ln Unprotonated sp./ Protonated sp.
- d. RT/nF $Z\psi^{o}$ ln Protonated sp./ Unprotonated sp.

604. Hendersen-Hassabelich equation is
- a. pH = pKa – log $[A^-]/[HA]$
- b. pH = pKa – log $[HA]/[A^-]$
- c. pH = pKa – ln $[A^-]/[HA]$
- d. pH = pKa – ln $[HA]/[A^-]$

605. What is the hydrated ionic radius of K^+ ion ?
- a. 0.337 nm
- b. 0.7 nm
- c. 0.0337 nm
- d. 0.337 Å

606. What is the hydration energy of K^+ ion ?
- a. 1577 J/mol
- b. 1577 cal/mol
- c. 314 J/mol
- d. 314 cal/mol

607. What is the hydration energy of Ca^{2+} ion ?
- a. 1577 J/mol
- b. 1577 cal/mol
- c. 314 J/mol
- d. 314 cal/mol

608. What is the hydrated radius of Ca^{2+} ion ?
- a. 0.412 nm
- b. 0.428 nm
- c. 0.412 Å
- d. 0.428 Å

609. What is the hydrated radius of Mg^{2+} ion ?
- a. 0.412 nm
- b. 0.428 nm
- c. 0.412 Å
- d. 0.428 Å

610. What is the shape of the secondary clay mineral, montmorillonite ?
- a. Hexagonal
- b. Elongated tubules
- c. Irregular flakes
- d. Amorphous

611. What is the shape of the secondary clay mineral, kaolinite ?
- a. Hexagonal
- b. Elongated tubules
- c. Irregular flakes
- d. Amorphous

612. What is the shape of the secondary clay mineral, halloysite ?
- a. Hexagonal
- b. Elongated tubules
- c. Irregular flakes
- d. Amorphous

613. What is the shape of the secondary clay mineral, mica ?
- a. Hexagonal
- b. Elongated tubules
- c. Irregular flakes
- d. Amorphous

614. What is the size of montmorillonite ?
- a. 0.01 – 1 M
- b. 0.1 – 2 M
- c. 0.1° – 5 M
- d. 0.1 – 5 M

615. What is the size of kaolinite ?
- a. 0.01 – 1 M
- b. 0.1 – 2 M
- c. 0.1° – 5 M
- d. 0.1 – 5 M

616. What is the size of mica ?
- a. 0.01 – 1 M
- b. 0.1 – 2 M
- c. 0.1° – 5 M
- d. 0.1 – 5 M

617. What is the percentage of isomorphous substitution is tetrahedral layer of illite ?
- a. 10 %
- b. 15 %
- c. 20 %
- d. 25 %

618. Numbers of oxygen and hydroxyl ions in dioctahedral layer are
- a. $4\ O^{2-}$, $2(OH)^-$
- b. $4\ (OH)^-$, $2\ O^{2-}$
- c. $3\ O^{2-}$, $3\ (OH)^{3-}$
- d. $5\ O^{2-}$, $1\ (OH)^-$
- e. $5\ (OH)^-$, $1\ O^{2-}$

Answers						
	603. b	606. c	609. b	612. b	615. d	618. a
	604. a	607. a	610. c	613. c	616. b	
	605. a	608. a	611. a	614. a	617. b	

619. Numbers of oxygen and hydroxyl ions in dioctahedral layer are
- a. $4\ O^{2-}$, $2(OH)^-$
- b. $4\ (OH)^-$, $2\ O^{2-}$
- c. $3\ O^{2-}$, $3\ (OH)^{3-}$
- d. $5\ O^{2-}$, $1\ (OH)^-$
- e. $5\ (OH)^-$, $1\ O^{2-}$

620. What is the CEC/AEC ratio of kaolinite ?
- a. 2.3
- b. 0.5
- c. 5.8
- d. 6.7

621. What is the CEC/AEC ratio of montmorillonite ?
- a. 2.3
- b. 0.5
- c. 5.8
- d. 6.7

622. What is the CEC/AEC ratio of illite ?
- a. 2.3
- b. 0.5
- c. 5.8
- d. 6.7

623. AEC of montmorillonite at pH 4.7 is
- a. < 5 meq/100g
- b. <25 meq/100g
- c. < 35 meq/100g
- d. < 45 meq/100g

624. Which of the following adsorption equation is used for the prediction of alkali hazard in irrigation water ?
- a. Longmuir's equation
- b. Freundlich's equation
- c. Vanselow's equation
- d. Gapon's equation

625. The potential difference between the fixed layer and the freely mobile portion of diffused double layer (DDL) in soil is called as
- a. Electric potential
- b. Zeta potential
- c. Phosphate potential
- d. None

626. By the addition higher valent cations the zeta potential of soil will be
- a. Increased
- b. Decreased
- c. Not changed
- d. Unity

627. By the addition higher valent cations simple salts, the zeta potential in soil will be
- a. Increased
- b. Decreased
- c. Not changed
- d. Unity

628. By lowering the pH, the zeta potential of soil will be
- a. Increased
- b. Decreased
- c. Not changed
- d. Unity

629. In mono-divalent ion system, dilutions will _____ the adsorption of _____ cations.
- a. Increase, monovalent
- b. Decrease, monovalent
- c. Increase, divalent
- c. Decrease, divalent

630. In mono-divalent ion system, increases in concentration of solution will _____ the adsorption of _____ cations.
- a. Increase, monovalent
- b. Decrease, monovalent
- c. Increase, divalent
- c. Decrease, divalent

631. "Exchangeability in soil depends upon the amount of ions present in relation to other ions" is called as
- a. Ratio law
- b. Jarusov's Rule
- c. Stoke's law
- d. Pauling's rule

Answers						
	619. b	622. a	625. b	628. b	631. b	
	620. b	623. a	626. b	629. c		
	621. d	624. d	627. b	630. a		

632. Hydrolysis of Al^{3+} ion occurs in the pH range of
a. Less than 4.7 b. 4.7-6.5
c. 6.5-8.0 d. 8.0-11.0

633. Hydrolysis of Al $(OH)_3^o$ ion occurs in the pH range of
a. Less than 4.7 b. 4.7-6.5
c. 6.5-8.0 — d. 8.0-11.0

634. What is the zero point charge of montmorillonite ?
a. 2.0 b. 2.5
c. 4.5 d. 5.0

635. What is the zero point charge of kaolinite?
a. 2.0 b. 2.5
c. 4.5 d. 5.0

636. Hydrolysis of Al $(OH)^{2+}$ ion occurs in the pH range of
a. Less than 4.7 b. 4.7-6.5
c. 6.5-8.0 d. 8.0-11.0

637. What is the calcium carbonate equivalent (CCE) of dolomite ?
a. 86 b. 109
c. 136 d. 179

638. What is the calcium carbonate equivalent (CCE) of CaO ?
a. 86 b. 109
c. 136 d. 179

639. What is the calcium carbonate equivalent (CCE) of basic slag ?
a. 86 b. 106
c. 136 d. 148

640. What is the calcium carbonate equivalent (CCE) of $Ca(OH)_2$?
a. 86 b. 106
c. 136 d. 148

641. Neutralizing index = Calcium Carbonate Equivalent (CCE) × _____
a. pH b. Basicity
c. Acidity d. Fineness

642. What is the value of liming factor ?
a. 0.0 – 0.5 b. 0.5 – 1.0
c. 1.0 – 1.5 d. 1.5 – 2.0

643. What is the value of gypsum factor ?
a. 0.50 b. 0.75
c. 1.0 d. 1.25

644. Alkali soils are also called as
a. Solod and Soloth
b. Degraded alkali and Black alkali
c. Non-saline alkali
d. Sodic soil and solonetz
e. All the above

645. What is the solubility of gypsum ?
a. 0.0241 g/100 ml b. 0.241 g/100 ml
c. 2.41 g/100 ml d. 20.41 g/100 ml

646. Osmotic pressure = EC × _____
a. 0.26 b. 0.36
c. 0.46 d. 0.56

647. ESP = 0.0673 + 0.035 (_____).
a. SAR b. pH
c. EC d. RSC

648. Arrange the clay minerals based on their power to fix phosphorous in soil in decreasing order.
a. Montmorillonite > Kaolinite > Vermiculite > Muscovite
b. Kaolinite > Muscovite > Vermiculite > Montmorillonite
c. Kaolinite > Montmorillonite > Vermiculite > Muscovite
d. Montmorillonite > Vermiculite > Kaolinite > Muscovite

Answers						
632. a	635. c	638. d	641. d	644. e	647. a	
633. d	636. b	639. a	642. d	645. b	648. d	
634. b	637. b	640. c	643. d	646. b		

649. What is the zero point charge of silicon oxides ?
a. 2.0 b. 2.5
c. 4.5 d. 5.0

650. What is the zero point charge of aluminium oxides ?
a. 7.3 b. 9.1
c. 6 – 8 d. 5.0

651. What is the zero point charge of iron oxides ?
a. 7.3 b. 9.1
c. 6 – 8 d. 5.0

652. K^+/NH_4^+ fixation is more in
a. Montmorillonite b. Illite
c. Vermiculite d. Muscovite

653. Examples for lattice expanding cations are
a. Ca^{2+}, Mg^{2+}
b. Ca^{2+}, Mg^{2+}, Na^+
c. Na and H^+
d. All

654. Examples for lattice contracting cations are
a. NH_4^+, K^+
b. Rb^+, Cs^+
c. Fe^{3+} and Al^{3+}
d. Both and b
e. All the above

655. What is the potassium content of mica ?
a. 4.8% b. 10%
c. < 1% d. 6.8%

656. What is the potassium content of vermiculite ?
a. 4.8% b. 10%
c. < 1% d. 6.8%

657. Fixed potassium is majorly released by
a. Ca^{2+} b. Mg^{2+}
c. H_3O^+ d. Na^+

658. Arrange the cations based on their power to fix potassium in increasing order.
a. $Na^+ > Ca^{++} > Mg^{2+} > NH_4^+ > H^+$
b. $Na^+ > Mg^{2+} > Ca^{2+} > NH_4^+ > H^+$
c. $H^+ > NH_4^+ > Ca^{2+} > Mg^{2+} > Na^+$
d. $NH_4^+ > Ca^{2+} > Mg^{2+} > Na^+$

659. Arrange the cations based on their power to fix potassium in releasing power.
a. $Na^+ > Ca^{++} > Mg^{2+} > NH_4^+ > H^+$
b. $Na^+ > Mg^{2+} > Ca^{2+} > NH_4^+ > H^+$
c. $H^+ > NH_4^+ > Ca^{2+} > Mg^{2+} > Na^+$
d. $NH_4^+ > Ca^{2+} > Mg^{2+} > Na^+$

660. What is the coordination Al^{3+} ion ?
a. Two-fold coordination
b. Three-fold coordination
c. Four-fold coordination
d. Six-fold coordination
e. Both c and d

661. Retention of $SO_4^=$ is more in 1 : 1 types of clay than 2 : 1 type of clays. (True/False)

662. The process of clay decomposition and transformation under the influence of periodic reduction of Fe-oxides to Fe^{2+} form is called is
a. Ferrolysis b. Ferralitis
c. Gleization d. Argillization

663. Formation of hard pan in subsoil is due to the precipitation of
a. Fe and Mn b. Fe, Mn and Si
c. Fe, Mn and Al d. All

Answers					
649. a	652. c	655. b	658. b	661. T	
650. b	653. d	656. c	659. d	662. a	
651. c	654. d	657. c	660. e	663. b	

664. In the submerged soil, the first compound that undergoes reduction is
a. Mn^{4+} b. SO_4^{2-}
c. CO_2 d. NO_3^-

665. Submergence increases the specific conductance of soil (T/F)

666. Due to submergence
a. The pH of acid soil is increased
b. The pH of alkali soil decreased
c. The pH of alkali soil increased
d. The pH of acid soil decreased
e. Both a and b

667. Redox potential of oxidized zone in submerged soil is
a. > + 400 mv b. > + 350 mv
c. > + 300 mv d. > + 250 mv

668. In submerged soil, H_2S toxicity occurs in
a. Highly oxidized state
b. Healthy reduced state
c. Highly reduced toxic state
d. Both b and c

669. In submerged soil, Fe^{2+} toxicity occurs in
a. Highly oxidized state
b. Healthy reduced state
c. Highly reduced toxic state
d. Both b and c

670. Submergence of soil increases the availability of
a. N, P, and Mo
b. N, P, Si and Fe
c. N, P, Mn and Mo
d. All

671. Submergence of soil decreases the availability of
a. Ca, Mg and S b. S, Cu, Zn
c. Ca, Cu, Zn d. All

672. Critical limits of redox potential for Fe^{3+} reduction to Fe^{2+} is
a. + 280 to + 220 mv
b. + 180 to + 150 mv
c. – 120 to – 180 mv
d. – 200 to – 280 mv
e. + 380 to + 320 mv

673. Critical limits of redox potential for NO_3 → N_2 and Mn^{4+} to Mn^{2+}
a. + 280 to + 220 mv
b. + 180 to + 150 mv
c. – 120 to – 180 mv
d. – 200 to – 280 mv
e. + 380 to + 320 mv

674. Critical limits of redox potential for $SO_4^=$ to S^{2-}
a. + 280 to + 220 mv
b. + 180 to + 150 mv
c. – 120 to – 180 mv
d. – 200 to – 280 mv
e. + 380 to + 320 mv

675. What is the relationship between pE, and redox potential ?
a. pE = Redox potential / 0.0493
b. pE = Redox potential / 0.0563
c. pE = Redox potential / 0.189
d. pE = Redox potential / 0.0591

676. Due to submergence, the specific conductance of soil will be
a. Decreased b. Increased
c. Zero
d. Increased first and then decreased

677. Submergence of soil causes
a. NH_4 accumulation
b. NH_3 volatilization
c. Denitrification
d. All

Answers									
	664.	d	667.	a	670.	d	673.	a	676.	d
	665.	T	668.	c	671.	b	674.	c	677.	d
	666.	e	669.	c	672.	b	675.	d		

678. The increased availability of native as well as applied phosphorus in submerged soil is due to
a. Minerals of organic residues
b. Increased solubility of strengite and variscite
c. Increased solubility of Ca-PO_4
d. Reduction of Fe-PO_4
e. All the above

679. After submergence, the concentration of boron will
a. Remain more or less constant
b. Be increased
c. Be Decreased
d. None of the above

680. In olivine, silicon tetrahedra are held together by forming bonds with easily hydrolysable
a. Mg/Fe b. Mg/Mn
c. Mn/Fe d. Fe/Al

681. What is the percentage of Si^{4+} ions replacement by Al^{3+} ions in tetrahedra sites of anorthite ?
a. 15 b. 20
c. 25 d. 50

682. What is the percentage of Si^{4+} ions replacement by Al^{3+} ions in potassic feldspar ?
a. 15 b. 20
c. 25 d. 50

683. Formation of organo – mineral/clay – humus or free sesquioxides is
a. Neo-synthesis
b. Re-organization phenomenon
c. Both a and b
d. None

684. Release of iron from primary minerals and their disposal as coatings on soil particles or as complexes with organic matter/clay or as discrete aggregates is called as
a. Braunification
b. Rubification
c. Feruuginisation
d. All

685. The flocculating power of the monovalent cations decreases slightly in the order
a. $Rb^+ > Cs^+ > NH_4^+ > Na^+ > K^+ > Li^+$
b. $Rb^+ > Cs^+ > NH_4^+ > K^+ > Na^+ Li^+$
c. $Cs^+ > Rb^+ > NH_4^+ > K^+ > Na^+ Li^+$
d. $Cs^+ > Rb^+ > K^+ > NH_4^+ > Na^+ > Li^+$

686. What is the potassium content of illite ?
a. 4.8% b. 10%
c. < 1% d. 6.8%

687. What is the coordination Si^{4+} ion ?
a. Eight-fold coordination
b. Three-fold coordination
c. Four-fold coordination
d. Six-fold coordination
e. Both c and d

688. What is the coordination K^+ ion ?
a. Eight-fold coordination
b. Three-fold coordination
c. Four-fold coordination
d. Six-fold coordination
e. Both c and d

689. What is the coordination Fe^{3+}, Fe^{2+}, Ca^{2+}, Mg^{2+}, Mn^{3+}, Mn^{2+}, Zn^{2+} ions?
a. Two-fold coordination
b. Three-fold coordination
c. Four-fold coordination
d. Six-fold coordination
e. Both c and d

Answers									
	678.	e	681.	d	684.	d	687.	c	
	679.	a	682.	c	685.	c	688.	a	
	680.	a	683.	a	686.	d	689.	d	

690. Which soil material does not contribute to the cation exchange properties of the soil?
a. Silt
b. Clay
c. Oxides of iron and aluminum
d. Colloids

691. Positively charged atoms or molecules are called as
a. Cations
b. Anions
c. Ions
d. Atom

692. Negatively charged atoms or molecules are called as
a. Cations b. Anions
c. Ions d. Atom

693. Which ion would be readily attracted and adsorbed by soil colloids ?
a. NO_3^- b. Ca^{2+}
c. SO_4^{2-} d. Cl^-

694. Which ion is not adsorbed by soil colloids and leaches readily from the soil ?
a. NO_3^- b. K^+
c. Al^{3+} d. Ca^{2+}

695. Adding organic matter to a soil would
a. Increase the CEC
b. Increase the water holding capacity
c. Both of the above
d. None of the above

696. The cation exchange capacity is affected by the
a. The type of clay present
b. The amount of clay
c. The amount of organic matter
d. All

697. Which of the following is/are the examples of naturally occurring chelates ?
a. Fulvic acid and Oxalic acid
b. Citric acid
c. Acetic acid and Ascorbic acid
d. All

698. _____ may have from 1/4 to 1/2 of all Si replaced by Al in its tetrahedral sheet.
a. Montmorillonite
b. Vermiculite
c. Illite
d. Mica

699. Which type of clay has the greatest water holding capacity ?
a. Kaolinite
b. Montmorillonite
c. Illite
d. Halloysite

700. Which clay has the greatest capacity to shrink and swell ?
a. Kaolinite
b. Montmorillonite
c. Vermiculite
d. Illite

701. Which clay would be stickier after adding water ?
a. Kaolinite
b. Montmorillonite
c. Vermiculite
d. Illite

702. Which clay is sometimes used for medicinal purposes ?
a. Kaolinite
b. Montmorillonite
c. Vermiculite
d. Illite

Answers					
	690. a	693. b	696. d	699. b	702. a
	691. a	694. a	697. d	700. b	
	692. b	695. c	698. d	701. b	

703. If one site has a soil; that is 50% kaolinite, and another site has a soil that is 50% montmorillonite, which would be more favorable for ease of tillage, constructing a golf course or installing a septic system
a. The site with kaolinite
b. The site with montmorillonite
c. There is no difference in the sites as far as management and land use
d. None of the above

704. Which clay listed below has the greatest CEC ?
a. Kaolinite b. Illite
c. Halloysite d. Both a and c

705. The charge resulting from isomorphous substitution in the structure of 2.1 clays is
a. Permanent charge
b. Variable charge that is pH dependent
c. Both a and b
d. None of the above

706. The charge resulting from broken chemical bonds on the edges of 1.1 clays is
a. Permanent charge
b. Variable charge that is pH dependent
c. Both a and b
d. None of the above

707. In soils that contain kaolinite and humus, increasing soil pH by liming
a. Increases the CEC
b. Decreases the CEC
c. Has no effect on CEC
d. None

708. A soil test indicated 6 meq/100 g of exchangeable acidity. How many milliequivalent of $CaCO_3$ per 100 g of soil would be necessary to neutralize the acid?
a. 12 b. 6
c. 3 d. 0

709. How many grams of $CaCO_3$ per 100 grams of soil would be required to neutralize 6 meq. of acid ? (M.W. of $CaCO_3$ = 100, valency is 2)
a. 30 b. 0.3
c. 3.0 d. 0.03

710. What is the weight in grams of 6 meq. of Al^{3+} (Atomic weight of Al is 27, Valency is 3)
a. 0.054 b. 54
c. 108 d. 0.54

Use the following information to answer questions 711 - 713.

Cations extracted from 100 g of soil.

Cations	Meq./100 g
Al^{3+}	5
H^+	1
Ca^{2+}	4
Mg^{2+}	1
K^+	1
Na^+	0.5

711. What is the CEC of the soil ?
a. 6 b. 6.5
c. 12.5 d. 8.5

712. What is the percent base saturation of the soil ?
a. 52% b. 48%
c. 56% d. 44%

713. What is the percent exchangeable acidity ?
a. 48% b. 32%
c. 38% d. 42%

Answers					
	703. a	706. b	709. b	712. a	
	704. b	707. a	710. a	713. a	
	705. a	708. b	711. c		

714. Soil pH is a measure of the
a. Hydrogen ion concentration
b. Aluminum ion concentration
c. The percent base saturation
d. Both a and b

715. When soil pH is measured in water, it is a measure of the
a. Active acidity b. Potential acidity
c. Exchange acidity
d. Active and potential acidity

716. Aluminum ions are the major part of the _____ in soils.
a. Active acidity b. Potential acidity
c. Exchange acidity d. Both a and b

717. An effect of soil acidity that is detrimental to plant growth is
a. Aluminum toxicity
b. Hydroxide toxicity
c. Both a and b
d. None

718. Buffer capacity of soils refers to
a. The clay minerals in soils used in medicines
b. Resistance to change in pH
c. The amount of water held by soils
d. All

719. Which soils has the greatest buffer capacity ?
a. Sandy loam
b. Clay loam (montmorillonite clay)
c. Clay loam (kaolinite clay)
d. Sandy clay loam

720. Aluminum ions in soils cause a lower pH (more acid) because
a. The Al^{3+} reacts with water to produce H^+ ions
b. The Al^{3+} reacts with water to produce OH^- ions
c. The Al^{3+} reacts with water to produce both H^+ and OH^- ions
d. None of the above

721. The amount of lime that must be applied to increase the soil pH from 4.5 to 5.8 would be greatest for a
a. Clay loam b. Sand
c. Sandy loam d. Silty loam

722. To maintain the pH around 5.8 lime would have to be applied more often on the
a. Clay loam b. Sand
c. Sandy loam d. Silty loam

723. A liming material neutralizes acidity by producing
a. H^+ ions b. OH^- ions
c. Al^{3+} ions d. Both a and b

724. Decomposition of organic matter
a. Increases soil pH (makes it less acid)
b. Decreases soil pH (makes it more acid)
c. Brings the pH to neutral
d. Has no affect on soil acidity

725. Applying ammonium fertilizers to soil causes the soil
a. To eventually become more acid
b. To eventually become less acid
c. To eventually become neutral
d. Applying fertilizer does not affect pH

726. Which of the following is not a liming material ?
a. Calcium carbonate
b. Calcium hydroxide
c. Calcium oxide
d. Calcium sulfate

Answers					
	714. a	717. a	720. a	723. b	726. d
	715. a	718. b	721. a	724. b	
	716. b	719. b	722. b	725. a	

727. What is the molecular weight of $Ca(OH)_2$? (Atomic weights Ca=40, 0=16, H=1)
a. 74 b. 26
c. 52 d. 48

728. What is the neutralizing value (calcium carbonate equivalent) of $Ca(OH)_2$?
a. 119% b. 74%
c. 135% d. 98%

729. Which liming material is a source of magnesium ?
a. Calcitic limestone
b. Dolomitic limestone
c. Calcium hydroxide
d. Calcium Oxide

730. Which liming material should be used if a quick pH adjustment is needed ?
a. Calcitic limestone
b. Dolomitic limestone
c. Calcium hydroxide
d. Both a and c

731. The quality and effectiveness of a liming material is affected by its
a. Purity
b. Fineness&calciumcarbonate equivalent
c. Both a and b d. None

732. The most effective method of lime application before turf is planted is
a. Thorough mixing with the soil
b. Surface application
c. Subsurface application
d. Row application

733. In a lab test, a moist soil sample was divided into two equal parts. One gram of calcium oxide was applied to one portion and one gram of dolomitic limestone was added to the other. After 1 week the pH would be higher
a. In the sample with dolomitic limestone
b. In the sample with calcium oxide
c. The pH would be the same
d. The pH would be neutral

734. Which soil amendment could be applied to make soil more acid ?
a. Dolomitic limestone
b. Elemental sulfur
c. Calcium hydroxide
d. Calcium oxide

735. Cation exchange capacity affects
a. The amount of plant nutrients soil can hold
b. How often lime must be applied
c. Both of the above
d. None of the above

736. The main effect of high soil salinity on plant growth is that
a. It is more difficult for plants to take up water from saline soils
b. Plants take up excess amounts of water from saline soils
c. Soil salinity does not affect plant growth
d. Both a and b
e. All of the above

737. Fixed ammonium ions in clay minerals can be replaced by
a. Ca and Mg b. Hydrogen
c. Sodium d. All

738. Revised definition of law of mass action was given by
a. Guldberg and Waage b. von't Hoff
c. Stevenson d. None

739. What is the activity of pure salt ?
a. Unity b. -1
c. Zero d. None

Answers					
	727. a	730. c	733. b	736. a	739. a
	728. c	731. c	734. b	737. d	
	729. b	732. a	735. c	738. b	

6

Soil Fertility & Plant Nutrition

Questions :

1. The capability of soil to produce a plant or plant parts is called as
   a. Soil fertility b. Soil quality
   c. Soil productivity d. All

2. The inherent capacity of soil to provide nutrients is called as
   a. Soil fertility b. Soil quality
   c. Soil productivity d. All

3. The total number of essential nutrient elements required for plant growth is
   a. 16 b. 17
   c 20 d. 21

4. The 'Functional or metabolism nutrients' was given by
   a. Arnon and Stout
   b. Nicholas
   c. Mayor and Brown
   d. Juston von Liebig

5. N, P and K are called as
   a. Macro nutrients
   b. Micronutrients
   c. Secondary nutrients
   d. Beneficial nutrients

6. Ca, Mg and S are called as
   a. Macro nutrients
   b. Micronutrients
   c. Secondary nutrients
   d. Beneficial nutrients

7. Iron, zinc, boron and molybdenum are called as
   a. Macro nutrients
   b. Micronutrients
   c. Secondary nutrients
   d. Beneficial nutrients

8. Na, Ve, Ni, Si, Co, Se and I are the examples of
   a. Macro nutrients b. Micronutrients
   c. Secondary nutrients
   d. Beneficial nutrients

9. The form(s) of phosphorous absorbed by plants is/are
   a. HPO_4^{3-} b. $H_2PO_4^-$
   c. HPO_4^{2-} d. Both a and b
   e. All the above

10. The major portion of available boron is absorbed by plants as
    a. BO_3^{3-} b. $HB_4O_7^-$
    c. $H_2B_4O_7^-$ d. Both a and b

11. Of the following, which is the available form of molybdenum to plant?
    a. $HMoO_4^-$ b. MoO_4^-
    c. $HMoO_4^{2-}$ d. MoO_4^{2-}

12. Of the following, which nutrient element(s) is/are essential for protein synthesis?
    a. Nitrogen b. Phosphorous
    c. Potassium d. Ca and Mg

13. _____ is a constituent of sugar phosphates, viz. ADP, ATP?
    a. Nitrogen b. Phosphorous
    c. Sulphur d. Molybdenum

14. Which nutrient element is involved in energy transformation?
    a. Molybdenum b. Zinc
    c. Sulphate d. Phosphorous

15. The nutrient element(s) involved in stomatal regulation of cell is/are
    a. Ca and Mg b. Nitrogen
    c. Potassium d. Both a and c

Answers														
	1.	c	4.	b	7.	b	10.	b	13.	b
	2.	a	5.	a	8.	d	11.	a	14.	d
	3.	b	6.	c	9.	d	12.	a	15.	c

16. The nutrient element(s) essential for maintenance of the stability of cell wall is/ are
    a. Phosphorous b. Calcium
    c. Magnesium d. Potassium

17. Oil content in oil–bearing plants is increased by
    a. Sulphur b. Molybdenum
    c. Nitrogen d. Phosphorous

18. Of the following, which nutrient element(s) is/are responsible for the translocation of sugars across the membrane?
    a. Boron
    b. Phosphorus and Zinc
    c. Molybdenum and Iron
    d. All

19. Nutrient element(s) essential for photosynthesis is/are
    a. Manganese
    b. Copper and Zinc
    c. Phosphorus
    d. All

20. Nutrient element(s) essential for the functioning of sulphydryl compounds such as cysteine is/are
    a. Sulphur b. Zinc
    c. Phosphorous d. Both a and b

21. Which nutrient is a constituent of nitrate reductase and nitrogenase enzymes?
    a. Molybdenum b. Zinc
    c. Copper d. Phosphorous

22. Nutrients that are relatively immobile in the soil, move from soil particles to the root surface by the process of
    a. Diffusion
    b. Contact exchange
    c. Mass flow
    d. Bi-modal reciprocal transpiration inversion flow

23 Nutrient elements whose soil requirement is directly related to yield goal, yield potential, or growth rate include
    a. N, P and K
    b. N, S, B and Cl
    c. Ca, Mg, K and P
    d. Fe, Mn, Zn and Cu

24. Which nutrient is a constituent of chlorophyll and chromosomes?
    a. Magnesium b. Iron
    c. Phosphorous d. Both a and b

25. Movement of nutrient ions form soil to plant roots by
    a. Diffusion b. Mass flow
    c. Contact exchange d. All

26. Movement of nutrient ions along with irrigation water or rainwater is called as
    a. Diffusion b. Mass flow
    c. Contact exchange d. All

27. Movement of nutrient ions through irrigation water or rainwater is called as
    a. Diffusion b. Mass flow
    c. Contact exchange d. All

28. What is the mineralization rate of organic nitrogen per year in Indian soils?
    a. 1.5 % b. 2.0 %
    c. 2.5 % d. 1.0 %

29. Alkaline permanganate method is used for the estimation of
    a. Total nitrogen
    b. Available nitrogen
    c. Nitrate nitrogen
    d. Ammonical nitrogen

Answers									
	16.	b	19.	a	22.	b	25.	d	28.	c
	17.	a	20.	b	23.	a	26.	b	29.	b
	18.	a	21.	a	24.	a	27.	a		

30. The analytical method most suitable for the estimation of available phosphorous in acid soils is
    a. Olsen's method
    b. Mehlich's method
    c. Bray and Kurtz's method
    d. All

31. The analytical method most suitable for the estimation of available phosphorous in all the soils except acid soils is
    a. Olsen's method
    b. Bray and Kurtz's I method
    c. Bray and Kurtz's II method
    d. Both b and c

32. What is the composition of Bray and Kurtz's No. 1 solution used for the estimation of available phosphorous?
    a. 0.03 N Na_4F + 0.025 N HCl
    b. 0.03 N NH_4F + 0.025 N HCl
    c. 0.03 N Na_4F + 0.25 N HCl
    d. 0.03 N NH_4F + 0.25 N HCl

33. Which extractant used in Olsen's method for the estimation of available phosphorous in neutral and alkaline soils?
    a. 1 % K_2CO_3
    b. 1.0 % citric acid
    c. 0.5 M NH_4HCO_3
    d. 0.5 M $NaHCO_3$

34. The extractant commonly used in the estimation of phosphate potential of soils is
    a. 1 % K_2CO_3 b. 1.0% citric acid
    c. 0.01M $CaCl_2$ d. 0.1M $CaCl_2$

35. Available sulphur in soils can be extracted by
    a. 1% NaCl b. $Ca(H_2PO_4)_2$
    c. 0.15% $CaCl_2$ d. All

36. Diethylene triamine penta acetic acid (DTPA) is used for the estimation of available
    a. N, P and K b. Ca, Mg and S
    c. Fe, Mn, Zn and Cu
    d. Cu, Mn, Fe, Zn, B, Mo and Cl

37. Available molybdenum in soils is extracted by
    a. Citric acid
    b. Ammonium acetate
    c. Hot water d. $CaCl_2$

38. The pH of the solution (0.5M $NaHCO_3$) used in Olsen's method of available phosphorous estimation should be adjusted to
    a. 8.5 b. 8.0
    c. 8.3 d. 7.0

39. What is the optimum pH for the availability of most of the plant nutrients?
    a. 5.0 – 6.0 b. 6.0 – 7.0
    c. 6.5 – 7.5 d. 6.0 – 8.0

40. In soil, ammonifiers and nitrifiers are active at the pH of
    a. 5.0 – 6.0 b. 6.0 – 7.0
    c. 6.5 – 7.5 d. 6.0 – 8.0

41. In soil, the availability of phosphate ions to plants is considered to follow the order of
    a. $PO_4^{3-} > HPO_4^{2-} > H_2PO_4^-$
    b. $H_2PO_4^- > HPO_4^{2-} > PO_4^{3-}$
    c. $H_2PO_4^- > HPO_4^{2-} > H_3PO_4$
    d. $HPO_4^{2-} > H_2PO_4 > PO_4^{3-}$

42. Precipitation of phosphate ions in solution by hydrated iron takes place in the pH range of
    a. 3.0 – 7.0 b. 2.0 – 6.0
    c. 3.5 – 9.0 d. 3.0 – 8.0

Answers										
	30.	c	33.	d	36.	c	39.	c	42.	a
	31.	a	34.	c	37.	b	40.	d		
	32.	b	35.	d	38.	a	41.	b		

43. Precipitation of phosphate ions in solution by hydrated aluminium takes place in the pH range of
a. 3.0 – 7.0 b. 2.0 – 6.0
c. 3.5 – 9.0 d. 3.0 – 8.0

44. Increase in soil water content and soil temperature, increases the availability of
a. Nitrogen b. Phosphorous
c. Potassium d. All

45. The availability of calcium and magnesium in soil is low above the pH of
a. 7.5 b. 8.5
c. 9.5 d. 8.0

46. The availability of boron in soil is more in the pH range of
a. 5.0 – 7.0 and > 8.5
b. 5.0 – 8.5
c. 6.5 – 7.0 and > 8.5
d. 6.5 – 7.0 and > 9.0

47. The availability of molybdenum in soil is more in the pH of
a. > 6.5 b. > 7.5
c. > 8.5 d. > 8.0

48. The Law of Diminishing Return was given by
a. Juston von Liebig b. Spillman
c. Mitcherlich d. Schofield

49. The Law of Restitution was given by
a. Juston von Liebig b. Spillman
c. Mitcherlich d. Thomas Way

50. The Law of Minimum was given by
a. Juston von Liebig b. Spillman
c. Mitcherlich d. Thomas Way

51. The equation, $\log (A - y) = \log A - Cx$ is called as
a. Spillman's equation
b. Mitcherlich's equation
c. Liebig equation
d. Gapon's equation

52. The equation, $y = M (1-R^x)$ is called as
a. Mitcherlich's equation
b. Liebig equation
c. Spillman's equation
d. Gapon's equation

53. Nutrient mobility concept was given by
a. Cate and Nelson b. Arnon & Stout
c. Larsen d. Bray

54. Example(s) for Bray's relatively immobile nutrients is/are
a. Phosphorous b. Potassium
c. Calcium d. All

55 Example(s) for Bray's mobile nutrients is/are
a. Phosphorous b. NO_3 – nitrogen
c. Potassium d. Calcium

56. Bray's mobile nutrients follow the
a. Law of minimum or Law of limiting nutrients
b. Baule and Mitcherlich concepts
c. Law of minimum and Mitcherlich concepts
d. Law of minimum and Baule concepts

57. Bray's relatively immobile nutrients follow the
a. Law of minimum or Law of limiting nutrients
b. Baule and Mitcherlich concepts
c. Law of minimum and Mitcherlich concepts
d. Law of minimum and Baule concepts

Answers										
	43.	c	46.	a	49.	a	52.	c	55.	c
	44.	b	47.	a	50.	a	53.	d	56.	a
	45.	b	48.	c	51.	b	54.	d	57.	b

58. Example(s) of direct biological methods used for the diagnosis of soil nutrient status is/are
a. Field trial
b. Pot culture
c. Neubauer seedling method
d. All

59. Nutrient diagnosis in soil by pot culture methods were first initiated by
a. Bousingault b. Mitcherlich
c. Neubauer d. Mehlich

60. Nutrient diagnosis in soil by *Aspergillus niger* methods were first used by
a. Bousingault b. Mitcherlich
c. Neubauer d. Mehlich

61. Nutrient diagnosis in soil by soil plaque method was first used by
a. Bousingault
b. Mitcherlich
c. Sackett and Stewart
d. Mehlich

62. The range of concentration at which growth of plants is restricted in comparison with that of plant at higher nutrient level is called as
a. Hidden hunger
b. Critical nutrient level
c. Limiting factor
d. All

63. In A – value [A/B = (1– y)/y], B denotes
a. Available phosphorous
b. Fertilizer phosphorous
c. Phosphorous derived from soil
d. Both b and c

64. Bray and Kurtz's method of phosphorous determination is used for the soils having pH of
a. 5.5 and below b. 6.0 and below
c. 6.5 and below d. 5.0 and below

65. What is the concentration of DTPA used for the extraction of micronutrients in soil?
a. 0.5 M b. 0.05 M
c. 0.005 M d. 0.025 M

66. In soil micronutrient extraction, the pH of 0.005M DTPA is adjusted to
a. 7.5 b. 8.3
c. 8.5 d. 7.3

67. Common method(s) used for the determination of gypsum requirement of sodic soils
a. Schofield's method
b. Schoonoyer's method
c. Sokonov's method
d. All

68. Critical soil test level approach was given by
a. Cate and Nelson
b. Arnon and Stout
c. Larsen
d. Bray

69. Total number of classes in nutrient index is
a. Three b. Four
c. Five d. Six

70. What is the value of low nutrient index (NI)?
a. < 0.5 b. < 1.0
c. < 1.5 d. < 2.0

71. What is the value of high nutrient index (NI)?
a. > 4.5 b. > 3.5
c. > 2.5 d. > 3.0

Answers										
	58.	a	61.	c	64.	a	67.	b	70.	c
	59.	b	62.	b	65.	c	68.	a	71.	c
	60.	d	63.	b	66.	d	69.	a		

72. First permanent manurial experiment in India was started at
a. Coimbatore b. Kanpur
c. Pusa (Bihar) d. All

73. Manures with decreasing order of agriculture importance
a. Green manures> Crop wastes> Poultry litter> Cattle shed waste
b. Poultry litter> Cattle shed waste> Crop wastes> Green manures
c. Cattle shed waste> Poultry litter> Green manures> Crop wastes
d. Cattle shed waste> Poultry litter> Crop wastes> Green manures

74. What is the percentage of nitrogen in cattle dung?
a. 0.1 b. 0.2
c. 0.3 d. 0.5

75. What is the percentage of organic matter content in cattle waste?
a. 12.5 % b. 14 %
c. 15.2 % d. 31.1 %

76. What is the N, P_2O_5 and K_2O content (%) in FYM?
a. 1.0 : 0.5 : 1.5 b. 0.5 : 0.3 : 0.5
c. 0.5 : 0.5 : 1.0 d. 1.5 : 0.5 : 0.5

77. What is the N, P_2O_5 and K_2O content (%) in cow dung?
a. 1.0 : 0.5 : 1.5 b. 0.5 : 0.3 : 0.5
c. 0.5 : 0.5 : 1.0 d. 1.5 : 0.5 : 0.5

78. What is the N, P_2O_5 and K_2O content (%) in cow dung slurry from biogas plant?
a. 2.5 : 1.5 : 1.5 b. 1.8 : 1.0 : 1.0
c. 5.0 : 3.0 : 2.0 d. 0.5 : 0.5 : 1.0

79. What is the percentage of nitrogen content in green manures?
a. 0.7 b. 0.5
c. 1.2 d. 1.5

80. Which of the following is an example for edible oil cake?
a. Caster cake b. Karanji cake
c. Mahua cake d. Mustard cake

81. Which of the following is an example for non-edible oil cake?
a. Groundnut oil cake b. Niger cake
c. Neem cake d. Sesame cake

82. What is the percentage of P_2O_5 in bone meal?
a. 10 b. 20
c. 15 d. 5

83. Fish meal contains more _____.
a. Nitrogen b. Phosphorous
c. Potassium d. Ca and Mg

84. Which fertilizer is added to prevent nitrogen losses during the decomposition of organic matter?
a. Rock phosphate
b. Single super phosphate
c. Muriate of potash
d. Lime

85. What is the percentage of methane produced from biogas plant?
a. 50 – 60 b. 40 – 50
c. 60 – 70 d. 30 – 40

86. Which organism is responsible for the production of methane from the biogas plant?
a. *Bacillus*
b. *Pseudomonas*
c. *Arthrobacter*
d. *Methanobacteria*

Answers												
	72.	b	75.	c	78.	b	81.	c	84.	b
	73.	d	76.	b	79.	a	82.	b	85.	a
	74.	c	77.	d	80.	d	83.	a	86.	d

87. Microbes belonging to the family methanobacteria are
a. Aerobes
b. Anaerobes
c. Facultative aerobes
d. Facultative anaerobes

88. Which fertilizers enhance the manuring properties of legumes?
a. Nitrogenous fertilizers
b. Phosphatic fertilizers
c. Potassic fertilizers
d. All

89. Of the following, which one is concentrated organic manures?
a. FYM b. Compost
c. Bone meal d. Poultry litters

90. Of the following, which one is bulky organic manure?
a. Composts b. Oil cakes
c. Bone meals d. Fishmeals

91. When a fertilizer contains and is used for supplying single nutrient, it is called as
a. Straight fertilizers
b. Mixed fertilizers
c. Complex fertilizers
d. Compound fertilizers

92. The presence of two or more nutrients in one compound or mixture is called as
a. Complex fertilizers
b. Compound fertilizers
c. Mixed fertilizers
d. Both a and b

93. The physical mixture of two or more straight fertilizers or compound fertilizers is called as
a. Straight fertilizers
b. Complex fertilizers
c. Mixed fertilizers
d. Compound fertilizers

94. What is the percentage of nitrogen in urea?
a. 48 b. 46
c. 25 d. 42

95. What is the percentage of nitrogen in ammonium sulphate?
a. 20.6 b. 26.0
c. 25.0 d. 46.0

96. What is the percentage of nitrogen in ammonium chloride?
a. 20.6 b. 26.0
c. 25.0 d. 46.0

97. What is the percentage of P_2O_5 in single super phosphate?
a. 16.0 b. 46.0
c. 34.0 d. 28.0

98. What is the percentage of P_2O_5 in diammonium phosphate (DAP)?
a. 16.0 b. 48.0
c. 34.0 d. 46.0

99. The percentage of K_2O in muriate of potash (MOP) is
a. 58.0 b. 48.0
c. 23.0 d. 15.0

100. The percentage of K_2O in sulphate of potash (MOP) is
a. 58.0 b. 48.0
c. 23.0 d. 15.0

101. Muriate of potash is a
a. Straight fertilizer
b. Compound fertilizer
c. Mixed fertilizer
d. Complex fertilizer

Answers												
	87.	b	90.	a	93.	c	96.	c	99.	a
	88.	b	91.	a	94.	b	97.	a	100.	b
	89.	c	92.	d	95.	a	98.	d	101.	a

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102. Diammonium phosphate (DAP) is a
a. Compound or complex fertilizer
b. Mixed fertilizer
c. Straight fertilizer
d. Complete complex fertilizer

103. Which form of nitrogen is present in urea?
a. Nitrate form
b. Ammonical form
c. Amide form
d. Both a and b

104. The most deficient nutrient in Indian soils is
a. Nitrogen b. Zinc
c. Copper d. Boron

105. The second most deficient nutrient in Indian soils after nitrogen is
a. Nitrogen b. Zinc
c. Copper d. Boron

106. What is the temperature maintained in ammonia production by Claude–Haber–Bosch synthesis process?
a. 400–500 °C b. 500–600 °C
c. 550–600 °C d. 600–650 °C

107. By-product of coal distillation
a. Ammonium chloride
b. Ammonium nitrate
c. Ammonium sulphate
d. CAN

108. Fertilizer that supplies both nitrogen and sulphur is
a. Urea
b. Ammonium sulphate
c. Ammonium chloride
d. CAN

109. Equivalent acidity of ammonium sulphate is
a. 80 b. 60
c. 100 d. 110

110 Equivalent acidity of calcium ammonium nitrate (CAN) is
a. 80 b. 60
c. 100 d. 110

111. Equivalent acidity of urea is
a. 80 b. 60
c. 100 d. 110

112. Highly hygroscopic fertilizer is
a. Ammonium chloride
b. Ammonium sulphate
c. Urea
d. CAN

113. Urea is hydrolyzed by which of the following enzymes?
a. Nitrogenase b. Urease
c. Hydrogenase d. Both a and c

114. The first unstable compound produced by the hydrolysis of urea is
a. Ammonium carbamate
b. Ammonium carbonate
c. Ammonium
d. Nitrate

115. The ideal nitrogenous fertilizer suitable for foliar application is
a. Ammonium nitrate
b. Ammonium chloride
c. Ammonium sulphate
d. Urea

116. _____ is also called as Nitro–lime or Nitro–chalk.
a. Ammonium nitrate
b. Calcium ammoinium nitrate
c. Ammonium sulphate
d. Ammonium chloride

Answers					
	102. a	105. b	108. b	111. a	114. a
	103. c	106. a	109. d	112. b	115. d
	104. a	107. c	110. b	113. b	116. b

117. Nitrogen percentage in calcium ammonium nitrate (CAN) is _____.
a. 20.6 b. 46.0
c. 25.0 d. 26.0

118. Fertilizer that supplies nitrogen in both ammonical and nitrate forms is _____.
a. Calcium ammonium nitrate (CAN)
b. Urea
c. Ammonium sulphate
d. Ammonium chloride

119. _____ is an example for explosive fertilizer.
a. Ammonium chloride
b. Ammonium sulphate
c. Ammonium nitrate
d. CAN

120. Fertilizer that is a by–product of soda ash manufacture is _____.
a. Ammonium chloride
b. Ammonium sulphate
c. Ammonium nitrate
d. CAN

121. What is the formula of dicalcium phosphate?
a. $Ca(H_2PO_4)_2$ b. $CaHPO_4$
c. Ca_2HPO_4 d. $Ca_3(PO_4)_2$

122. Example for straight, water soluble phosphatic fertilizer is
a. Monocalcium phosphate
b. Dicalcium phosphate
c. Tricalcium phosphate
d. Diammonium phosphate

123 Example(s) for citrate soluble phosphatic fertilizers is/are
a. Basic slag and pelophos
b. Bone meal
c. Dicalcium phosphate
d. All

124. Phosphatic fertilizer that supplies both phosphorous and sulphur is
a. Dicalcium phosphate
b. Single super phosphate
c. Tricalcium phosphate
d. Diammonium phosphate

125. Most popular phosphatic fertilizer in India is
a. Single super phosphate
b. Double super phosphate
c. Rock phosphate
d. Diammonium phosphate

126. The impurities present in single super phosphate or rock phosphate are
a. Cu and Zn b. Mn and Cu
c. Mn and Fe d. Cu and Fe

127. The phosphatic fertilizer most suitable for all the crops on neutral and alkaline soils is
a. Rock phosphate
b. Single super phosphate
c. Double super phosphate
d. Diammonium phosphate

128. Phosphatic fertilizer(s) suitable for acid soils is/are
a. Rock phosphate
b. Dicalcium phosphate
c. Basic slag d. All

129. Phosphatic fertilizer obtained from steel industry as a by–product is
a. Dicalcium phosphate
b. Schoenite
c. Basic slag
d. Pelophos

Answers					
	117. c	120. a	123. d	126. c	129. c
	118. a	121. b	124. b	127. b	
	119. c	122. a	125. a	128. d	

130. Which phosphatic fertilizer is the double silicate and phosphate of lime?
a. Pelophos
b. Basic slag
c. Schoenite
d. Rock phosphate

131. What is the percentage of P_2O_5 in Indian basic slag?
a. 3 – 8 % b. 20 – 25 %
c. 10 – 12 % d. 12 – 18 %

132. The phosphatic fertilizer most suitable for plantation and perennial crops is
a. Single super phosphate
b. Dicalcium phosphate
c. Diammonium phosphate
d. Rock phosphate

133. Potassic fertilizer(s) most suitable for potato and tobacco is/are
a. Muriate of potash
b. Sulphate of potash
c. Schoenite
d. All

134. Filler material(s) used in the preparation of mixed fertilizers is/are
a. Sand b. Soil
c. Coal d. All

135. With increase in light intensity and day length, the fertilizer requirement of crops is
a. Increased b. Decreased
c. Unaltered d. None

136. What is the nitrogen use efficiency for rice crop?
a. 40 – 60% b. 28 – 34%
c. 35 – 43% d. 42– 50%

137. What is the nitrogen use efficiency for crops other than rice?
a. 28 – 34 % b. 35 – 43 %
c. 40 – 60 % d. 42– 50 %

138. What is the ratio of urea and soil in pellets made by mixing urea with soil?
a. 1 : 4 b. 1 : 6
c. 1 : 8 d. 1 : 5

139. Which is a slow release nitrogenous fertilizer?
a. Oxamide b. N-serve
c. AM d. ST

140. Which of the following is a nitrification inhibitor?
a. U-form b. IBDU
c. SCU d. ST

141. Which of the following is/are slow release nitrogenous fertilizers?
a. Urea-form
b. Isobutyledene diurea
c. Sulphur coated urea
d. All

142. Which of the following is/are nitrification inhibitors?
a. N-serve b. AM
c. ST d. All

143. Plant product used for the preparation of slow release fertilizer and also as nitrification inhibitors is
a. Neem and karanji cake
b. Neem and sal cake
c. Karanji and sal cake
d. Neem

144. N-serve is also called as
a. Sulphonylamide b. Nitrapyrin
c. U-formaldehyde d. Both a and b

Answers					
	130. b	133. b	136. b	139. a	142. d
	131. a	134. d	137. c	140. d	143. d
	132. d	135. a	138. b	141. d	144. b

145. Net mineralization will take place when the phosphorous concentration in organic matter is
a. Less than 0.2 %
b. Less than 0.5 %
c. Greater than 0.2 %
d. Greater than 0.5 %

146. Net immobilization will take place when the phosphorous concentration in organic matter is
a. Less than 0.2 %
b. Less than 0.5 %
c. Greater than 0.2 %
d. Greater than 0.5 %

147. Sources of hydrogen ions in soils are
a. Carbonic acids
b. Acids from biological metabolism
c. Accumulation of organic matter
d. All

148. Sources of hydrogen ions in soils are
a. Oxidation of N
b. Oxidation from S
c. Plant residues d. All

149. Sources of hydrogen ions in soils are
a. Acids in precipitation
b. Plant uptake of cation
c. Both d. None

150. Uptake of nitrate by plants will lead to more
a. Production of hydrogen ions
b. Consumption of hydrogen ions
c. Both d. None

151. Weathering of basic cations from minerals will lead to more
a. Production of hydrogen ions
b. Consumption of hydrogen ions
c. Both d. None

152. Principal of soil acidity includes
a. Active acidity b. Residual acidity
c. Exchangeable acidity
d. All

153. Percent base saturation is also known as
a. Acidity b. acid saturation
c. Non acid saturation
d. None

154. What is the total nitrogen percentage in plant?
a. 6.0 % b. 1.5 %
c. 1.0 % d. 0.5 %

155. What is the total sulphur percentage in plant?
a. 1.0 % b. 0.5 %
c. 0.2 % d. 0.1 %

156. Match the following

Nutrient element	Concentration in plants (%)
1. N	i. 1.0
2. P or Mg	ii. 0.5
3. K	iii. 1.5
4. Ca	iv. 0.1
5. S	v. 0.2

a. i, ii, iii, iv, v b. i, iii, ii, iv, v
c. iii, v, i, ii, iv d. ii, i, iii, v, iv

157. Match the following

Nutrient element	Concentration in plants (ppm)
1. Fe or Cl	i. 0.1
2. Mn	ii. 50
3. Zn or B	iii. 100
4. Cu	iv. 20
5. Mo	v. 6

a. i, ii, iii, iv, v b. ii, iii, i, iv, v
c. ii, i, iii, v, iv d. iii, v, iv, i, ii

Answers					
	145. c	148. d	151. b	154. b	157. a
	146. a	149. c	152. d	155. d	
	147. d	150. b	153. c	156. c	

158. Highly resistant organic compound is
a. Inositol phosphate b. Nucleic acid
c. Phytin d. Phospho–lipids

159. Which is/are the most frequently deficient nutrient(s) in soil?
a. Nitrogen b. Zinc
c. Boron d. Copper
e. All the above

160. Which is/are the most frequently deficient nutrient(s) in soil next to nitrogen?
a. Nitrogen b. Zinc
c. Boron d. Copper
e. All the above

161. Which are the deficient nutrients in Indian soil?
a. Nitrogen and Zinc
b. Nitrogen and Copper
c. Boron and Copper
d. All

162. Nitrate to nitrite formation (nitrate reduction) takes place in
a. Cell wall b. Chloroplast
c. Cytoplasm d. Mitochondria

163. Nitrite to ammonia formation (nitrite reduction) takes place in
a. Cell wall b. Chloroplast
c. Cytoplasm d. Mitochondria

164. When ATP and ADP breakdown, the amount of energy released is
a. 10 kcal/mol b. 12 kcal/mol
c. 78 kcal/mol d. 786 kcal/mol

165. What is the percentage of magnesium in plant chlorophyll?
a. 5 – 10 b. 10 – 15
c. 15 – 20 d. 20 – 25

166. The ratio of protein to non–protein nitrogen is decreased by
a. P deficiency b. S deficiency
c. Fe deficiency d. Mg deficiency
e. Both a and b

167. Which of the following nutrient element is essential for the formation of vitamin–B1 (Thiamine)?
a. N b. P
c. Mg d. S

168. Blossom end rot in tomato is caused by the deficiency of
a. Ca b. Mg
c. Mo d. B

169. Bitter pit in apple is caused by the deficiency of
a. Ca b. Mg
c. Mo d. B

170. The nutrient element that plays an important role in structural stability of proteins is
a. P b. S
c. Fe d. Mn

171. Which of the following is a precursor of photorespiration in plant?
a. Phosphoglycolate
b. Acetyl co–enzyme A
c. Citric acid d. Glycolate

172. What is the percentage of nitrogen use efficiency for rice crop?
a. 20 – 28 % b. 28 – 34 %
c. 35 – 45 % d. 40 – 60 %

173. What is the percentage of nitrogen use efficiency for other crops?
a. 20 – 28 % b. 28 – 34 %
c. 35 – 45 % d. 40 – 60 %

Answers						
158. c	161. c	164. b	167. d	170. b	173. d	
159. a	162. c	165. c	168. a	171. a		
160. b	163. b	166. e	169. a	172. b		

174. What is the percentage of phosphorus use efficiency in soil?
a. 10 – 30 % b. 20 – 30 %
c. 25 – 45 % d. 20 – 25 %

175. Lime requirement is calculated by
a. Shoemaker *et al.* b. Schoonover
c. Chepil and Woodruff
d. White and Beckett

176. Latice hole theory was given by
a. White and Beckett
b. Thomas Way
c. Page and Barer (1940)
d. Mitcherlich

177. The law of minimum was given by Liebig in the year
a. 1909 b. 1862
c. 1961 d. 1940

178. Essentiality of chlorine for plants was given by
a. Nicholas (1961)
b. Arnon and Stout
c. Cate and Nelson
d. Broyer *et al.* (1954)

179. The Ca: Mg ratio of soil should be
a. < 7 : 1 b. < 5 : 1
c. < 7 : 1 d. < 5 : 1

180. For field crops, K: Mg ratio should be
a. < 2 : 1 b. < 5 : 1
c. < 3 : 1 d. < 4 : 1

181. For vegetables, K: Mg ratio should be
a. < 2 : 1 b. < 5 : 1
c. < 3 : 1 d. < 4 : 1

182. For fruits, K: Mg ratio should be
a. < 2 : 1 b. < 5 : 1
c. < 3 : 1 d. < 4 : 1

183. What is the ideal pH range for rice crop?
a. 5.5–7.0 b. 5.0–6.5
c. 6.5–8.0 d. 4–6.5

184. What is the ideal pH range for Maize, Cowpea and Groundnut?
a. 5.5–7.0 b. 5.0–6.5
c. 6.5–8.0 d. 4–6.5

185. Hydrolysis of $Al(OH)^+$ ion occurs in the pH range of
a. Less than 4.7 b. 4.7–6.5
c. 6.5–8.0 d. 8.0–11.0

186. At the pH range of 2–5, phosphorous is mainly fixed by
a. Fe and Al b. Clay
c. Ca and Mg d. Organic matter
e. All the above

187. What is the ideal pH range for soybean and peas?
a. 5.5–7.0 b. 5.0–6.5
c. 6.5–8.0 d. 4–6.5

188. What is the ideal pH range for wheat, barley, sugarcane, sunflower and sorghum?
a. 6 – 7.5 b. 5.0 – 5.5
c. 4 – 6.5 d. 6.5 – 8.0

189. What is the ideal pH range for sugar beet?
a. 6 – 7.5 b. 5.0 – 5.5
c. 4 – 6.5 d. 6.5 – 8.0

190. What is the ideal pH range for cotton and potato?
a. 6 – 7.5 b. 5.0 – 5.5
c. 4 – 6.5 d. 6.5 – 8.0

191. Who was the first scientist to quantify the relationship between plant growth and addition of a growth factor?
a. Liebig b. Spillman
c. Bray d. Mitcherlich

Answers						
174. a	177. b	180. b	183. d	186. a	189. d	
175. a	178. d	181. c	184. b	187. a	190. b	
176. c	179. a	182. a	185. c	188. a	191. d	

192. Y = M (1 – R^x) is called as
a. Liebig b. Spillman
c. Bray d. Mitcherlich

193. In Mitcherlich equation, log (A–Y) = log A – Cx, the efficiency factor 'C' for nitrogen is
a. 0.122 b. 1.22
c. 0.831 d. 0.642

194. In Mitcherlich equation, log (A–Y) = log A – Cx, the efficiency factor 'C' for phosphorus is
a. 0.40 b. 0.60
c. 0.80 d. 1.00

195. In Mitcherlich equation, log (A–Y) = log A – Cx, the efficiency factor 'C' for potassium is
a. 0.40 b. 0.60
c. 0.80 d. 1.00

196. One Baule unit for nitrogen is
a. 250 lbs b. 241 lbs
c. 148 lbs d. 223 lbs

197. One Baule unit for phosphorus is
a. 35 lbs b. 45 lbs
c. 48 lbs d. 38 lbs

198. One Baule unit for potassium is
a. 66 lbs b. 76 lbs
c. 86 lbs d. 93 lbs

199. Which are the nutrients involved in the electron transport in plant system?
a. Na, Cl, Mn, K b. P, B, Si, Ca
c. Cu, Fe, Zn, Mo d. All

200. In active transport of nutrient in plant system, the carrier for cation is
a. Protein b. Nucleic acid
c. Cell mitochondria d. All

201. In active transport of nutrient in plant system, the carrier for anions is
a. Protein b. Nucleic acid
c. Cell mitochondria d. All

202. In submerged rice soil, increase in zinc concentration will_____.
a. Increase the availability of Fe and decrease the availability of Mn
b. Increase the availability of both Fe and Mn
c. Decrease the availability of both Fe and Mn
d. Decrease the availability of Fe and Increase the availability of Mn

203. In wheat cultivation, increases in concentration of Zn will _____
a. Increase the availability of Cu
b. Decrease the availability of Cu
c. Not change the availability of Cu
d. None of the above

204. With regard to chelation, the metals that are essential but not bound in co-ordinate linkage with chelates are
a. Cu, Zn, Mn, Co and Mo
b. Cd, Pb, Hg
c. Monovalent cations and Ca^{2+}, Mg^{2+}
d. Cr, Au, Ve
e. Cl, Pb, Hg, Cr, Au, Ve

205. With regard to chelation, the metals that are essential and form co-ordinate linkage with organic legends are
a. Cu, Zn, Mn, Co and Mo
b. Cd, Pb, Hg
c. Monovalent cations and Ca^{2+}, Mg^{2+}
d. Cr, Au, Ve
e. Cl, Pb, Hg, Cr, Au, Ve

Answers					
	192. b	195. a	198. b	201. a	204. c
	193. a	196. d	199. c	202. d	205. a
	194. b	197. b	200. b	203. b	

206. Arrange the metals based on their stability of metal chelatic complex.
a. $Cu^{2+} > Ni^{2+} > Co^{2+} > Zn^{2+} > Fe^{2+} > Mn^{2+}$
b. $Mn^{2+} > Fe^{2+} > Zn^{2+} > Co^{2+} > Ni^{2+} > Cu^{2+}$
c. $Cu^{2+} > Mn^{2+} > Co^{2+} > Ni^{2+} > Fe^{2+} > Zn^{2+}$
d. $Zn^{2+} > Fe^{2+} > Ni^{2+} > Co^{2+} > Mn^{2+} > Cu^{2+}$

207. Examples of natural chelates are
a. Citric acid and oxalic
b. EDTA and DTPA
c. Citric acid and oxalic and HEDTA
d. EDTA, DTPA and HEDTA

208. Examples of artificial chelates are
a. Citric acid and oxalic
b. EDTA and DTPA
c. Citric acid and oxalic and HEDTA
d. EDTA, DTPA and HEDTA

209. How many number of ATP molecules are required for the reduction of one mole of NO_3 to NH_3?
a. 12 b. 15
c. 18 d. 21

210. How many number of ATP molecules are required for assimilation of one mole NH_3?
a. 5 b. 10
c. 15 d. 18

211. Calicoles plants prefer
a. NO_3–N b. NH_4 – N
c. Both a and b d. None

212. Crude protein =
Total N × _____
a. 5.5 – 6.25 b. 5.0 – 6.25
c. 5.7 – 6.25 d. 5.9 – 6.25

213. What is the percentage of phospholipids in total organic phosphorous?
a. 35 b. 2.5
c. 1 – 5 d. 18 – 20

214. The pH at which the concentration of both $H_2PO_4^-$ and HPO_4^{2-} becomes equal is
a. 7.2 b. 7.0
c. 6.5 d. 7.5

215. Nutrient element mainly involved in the stomatal regulation is/are
a. Ca b. Mg
c. Na d. K
e. Both a and b

216. Nutrient element mainly involved in the photosynthesis and translocation of photosynthates is/are
a. Ca b. Mg
c. Na d. K
e. Both a and b

217. Nutrient element mainly involved in the phloem loading and unloading is/are
a. Ca and Mg b. Na
c. K d. All

218. Larger amount of K^+ is replaced by Na^+ in
a. Sugar beet, Turnip and Grasses
b. Wheat, Pea, Cotton, Cabbage and Radish
c. Oat, Barley, Rice, Tomato and Potato
d. Maize, Dye, Soybean and Beans

219. Small amount of K^+ is replaced by Na^+ in
a. Sugar beet, Turnip and Grasses
b. Wheat, Pea, Cotton, Cabbage and Radish
c. Oat, Barley, Rice, Tomato and Potato
d. Maize, Dye, Soybean and Beans

Answers					
	206. a	209. b	212. c	215. d	218. a
	207. a	210. a	213. c	216. d	219. d
	208. d	211. a	214. a	217. c	

220. Synthetic Mg–chelates contain ____ % of Mg.
a. 8 – 9 b. 2 – 4
c. 4 – 9 d. 16 – 19

221. Natural Mg–chelates contain ____ % of Mg.
a. 8 – 9 b. 2 – 4
c. 4 – 9 d. 16 – 19

222. Sulphate has positive interaction with nitrogen and phosphorous (True/False).

223. Sulphate has positive interaction with Mo, B, and Se (True/False).

224. The method used to measure a nutrient concentration in soil at equilibrium with the same in soil solution is
a. E-value b. A-value
c. L-value d. All

225. In biological methods of soil fertility evaluation, the *Aspergillus Niger* (Mulder) method is used to measure the availability of
a. Available K_2O b. Available P_2O_5
c. Cu and Mg d. N, P and K

226. In biological methods of soil fertility evaluation, the pot culture (Mitcherlich) method is used to measure the availability of
a. N, P and K
b. P, K, Ca and Micronutrients
c. Available P_2O_5
d. P and K

227. In biological methods of soil fertility evaluation, the soil plaque method is used to measure the availability of
a. N, P, K, S and lime
b. P, K, Ca and Micronutrients
c. Available P_2O_5
d. P and K

228. The biological method developed by Cunninghamella – Mehlich is used to measure the availability of
a. N, P and K
b. P, K, Ca and Micronutrients
c. Available P_2O_5
d. P and K

229. In biological methods of soil fertility evaluation, the pot culture (Jenny) method is used to measure the availability of
a. N, P and K
b. N, P K, S and lime
c. Available P_2O_5
d. P and K

230. In biological methods of soil fertility evaluation, the *Aspergillus niger* (Mehlich) method is used to measure the availability of
a. N, P and K b. P, K and Mg
c. Available P_2O_5 d. P and K

231. In biological methods of soil fertility evaluation, the Neubauer seedling technique method is used to measure the availability of
a. P, K, Ca and micronutrients
b. N, P, and K
c. N, P, K, S, and lime
d. P, K and Mg

232. Classification of nutrients based on their relative requirements was given by
a. Cate and Nelson b. Arnon
c. Nicholas d. Engelbert

Answers					
	220. b	223. F	226. d	229. b	232. b
	221. c	224. a	227. a	230. b	
	222. T	225. c	228. c	231. a	

233. Classification of nutrients based on their biochemical behaviour and physiological function was given by
a. Cate and Nelson
b. Emil Troug and Engel Bert
c Nicholas
d. Mengel and Kirk by

234. Classification of nutrients based on their functions and content in plant tissues was given by
a. Cate and Nelson
b. Emil Troug and Engel Bert
c. Nicholas
d. Mengel and Kirk by

235. In India decline in soil organic matter was confirmed through
a. LTFE experiments
b. Pot experiments
c. Field experiments
d. Fertilizer resource

236. Organic wastes used for composting are generally
a. Poor in NPK b. High in NPK
c. Moderate in NPK d. None

237. Generally farmers in India use
a. 2/3rd of FYM for fertilizing purpose
b. 2/3rd of FYM for fuel purpose
c. 2/3rd of FYM for agricultural purpose
d. None of the above

238. Which of the following holds a good promise of innovation in nutrient recycling?
a. Utilization of organic residues
b. FUE increase
c. Radiotracer studies
d. All the above

239. Soils of India are generally
a. High in fertility
b. Poor in fertility
c. Moderate in fertility
d. None of the above

240. Nutrients in soil can come from
a. Inorganic b. Organic
c. Biomass d. All

241. Losses of nutrients in soils can occur due to
a. Erosion
b. Leaching
c. Nutrient removal by crops
d. All

242. Inorganic source of nutrients include
a. Original rocks b. Minerals
c. Dissolved ions d. All

243. What is/are the reasons for declining soil fertility?
a. Nutrient losses
b. Declining soil organic matter stocks
c. Crop intensification
d. Imbalance fertilization
e. All the above

244 Which country is topmost in fertilizer consumption?
a. India b. China
c. USA d. All

245. Fertilizer consumption in India is higher in
a. Irrigated areas b. Rainfed areas
c. Both a and b d. None

246. Which of the following states has nutrient use of ≤ 50 kg/ha?
a. Madhya Pradesh b. Karnataka
c. West Bengal d. Uttar Pradesh

Answers					
	233. d	236. a	239. a	242. d	245. a
	234. b	237. b	240. d	243. e	246. a
	235. a	238. d	241. d	244. b	

247. Which of the following states has nutrient use of 50 – 100 kg/ha?
a. Madhya Pradesh b. Karnataka
c. West Bengal d. Uttar Pradesh

248. Which of the following states has nutrient use of 100 – 150 kg/ha?
a. Madhya Pradesh b. Karnataka
c. West Bengal d. Uttar Pradesh

249. Which of the following states has nutrient use of > 150 kg/ha?
a. Madhya Pradesh b. Karnataka
c. West Bengal d. Uttar Pradesh

250. Which country of the following has highest fertilizer use?
a. South Korea b. Japan
c. China d. India

251. What is the nutrient use efficiency of N, generally, under field conditions?
a. < 10 % b. < 20 %
c. < 30 % d. < 40 %

252. What is the nutrient use efficiency of P, generally, under field conditions?
a. < 10 % b. < 20 %
c. < 30 % d. < 40 %

253. What is the nutrient use efficiency of K, generally, under field conditions?
a. < 10 % b. < 20 %
c. < 30 % d. < 40 %

254. What is the nutrient use efficiency of micronutrients, generally, under field conditions?
a. 2 – 3 % b. 3 – 5 %
c. 5 – 10 % d. 10 – 15 %

255. Low content of soil organic matter is due to
a. Continuous cropping
b. Erosion
c. Both
d. None

256. Most important source(s) of organic matter is/are
a. FYM
b. Compost
c. Urban and industrial area
d. All

257. If the extractable Fe in soil is 0.01 to 0.3 ppm what will be the severity of Fe chlorosis in plants?
a. Moderate to severe
b. Slight to moderate
c. Nil Fe chlorosis
d. None

258. If the extractable Fe in soil is 0.3 to 2.00 ppm what will be the severity of Fe chlorosis in plants?
a. Moderate to severe
b. Slight to moderate
c. Nil Fe chlorosis
d. None

259. If the extractable Fe in soil is 2.0 to 32.0 ppm what will be the severity of Fe chlorosis in plants?
a. Moderate to severe
b. Slight to moderate
c. Nil Fe chlorosis
d. None

260. Fe chlorosis in plants is caused mainly due to
a. High Mn/Fe ratio b. High pH
c. Excess phosphate d. All the above
e. None of the above

Answers					
	247. b	250. a	253. d	256. d	259. c
	248. c	251. d	254. b	257. a	260. d
	249. d	252. b	255. c	258. b	

261. Fe chlorosis in plants is caused mainly due to
a. Excess carbonate
b. Presence of free lime
c. High moisture
d. All the above
e. None of the above

262. Generally in soils which is the order of concentration obtained for Mn?
a. Water soluble < Exchangeable Mn < Reducible Mn
b. Exchangeable Mn < Water soluble < Reducible Mn
c. Reducible Mn < Water soluble < Exchangeable Mn
d. None of the above

263. High boron requiring crops is/are
a. Apples and Sunflower
b. Alfalfa and Clovers
c. Beets and Cabbage
d. All the above
e. None of the above

264. High boron requiring crops is/are
a. Cauliflower b. Radish
c. Beet root d. All

265. Medium boron requiring crops are
a. Tobacco and Tomatoes
b. Lettuce and Cotton
c. Peach and Cherry
d. All

266. Medium boron requiring crops is/are
a. Peanut b. Carrot
c. Onions d. All

267. Low boron requiring crops are
a. Wheat and Oats
b. Corn and Barley
c. Peas and Beans
d. All

268. Low boron requiring crops are
a. Citrus b. Strawberry
c. Soybean d. All

269. Which of the following scientists have reported differential uptake of boron in soils?
a. Wears and Patterson
b. Martins
c. Cox and Reed d. All

270. Acid soils formed under moderate to high rainfall are
a. High in boron status
b. Low in boron status
c. Both d. All

271. Boron tends to accumulate in soils of
a. Low rainfall regions
b. High rainfall region
c. Moderate rainfall regions
d. All

272. Molybdenum disorders are also induced by excess of which of the following nutrient?
a. Mn b. Cu
c. SO_4 d. All

273. Soils high in free Fe_2O_3 are often
a. Deficient in available Mo
b. Sufficient in available Mo
c Having no effect
d. None

274. Which of the following scientist has given an index of N response of crops?
a. Bould
b. Lepodevin and Robinson
c. Watson
d. All

Answers					
	261. d	264. d	267. d	270. b	273. a
	262. a	265. d	268. d	271. a	274. d
	263. d	266. d	269. d	272. d	

275. Soils formed under tropical conditions are high in
a. Sesquioxides b. SiO_2
c. Both a and b d. None

276. Total phosphorus reserve in soils consists of
a. Organic phosphorus
b. Soluble phosphorus
c. Adsorbed phosphorus
d. Insoluble phosphorus
e. All the above

277. The per cent basic cations availability to plants can increase with the
a. Decrease in % Base Saturation
b. Increase in % Base Saturation
c. No change in % Base Saturation
d. All the above

278. A higher percent K saturation is desirable in which type of clay minerals?
a. 1 : 1 b. 2 : 1
c. 2 : 2 d. All

279. Mostly soils have the basic cations in which of the following exchangeable form?
a. Ca > Mg > K > Na
b. K > Ca > Mg > Na
c. Mg > Ca > K > Na
d. K > Na > Ca > Mg

280. Plant absorbs basic cations in which of the following order?
a. Ca > Mg > K > Na
b. K > Ca > Mg > Na
c. Mg > Ca > K > Na
d. K > Na > Ca > Mg

281. Acid soluble phosphatic fertilizer is/are
a. Monocalcium phosphate
b. Dicalcium phosphate
c. Tricalcium phosphate
d. Bone meal and basic slag

282. How many pounds of 5–10–10 fertilizer would be needed to supply 150 lbs of N?
a. 3000 b. 300
c. 150 d. 900

283. If you applied 200 lbs of 10–20–20 fertilizer, how many pounds of nitrogen would be supplied?
a. 500 b. 20
c. 100 d. 250

284. A soil test report recommended 1 lb of N per 1000 sq. ft. How many pounds 10–20–20 fertilizer should be applied to each 1000 sq. ft.?
a. 10 b. 5
c. 20 d. 15

285. The idea of decreasing excess carbon dioxide in the atmosphere by promoting practices that increase organic matter accumulation in the soil is more likely to succeed
a. In well drained soils
b. In frequently plowed agricultural fields
c. In soils that are saturated most of the year
d. All the above

286. The form of nitrogen that may volatilize from hog waste lagoons is
a. Ammonia b. Nitrate
c. Organic N d. Nitrite

287. The relatively stable colloidal fraction of soil organic matter that contributes to the CEC of soil is called as
a. Plant residue b. Humus
c. Animal waste d. All

Answers					
	275. a	278. a	281. c	284. a	287. b
	276. e	279. a	282. a	285. c	
	277. b	280. c	283. b	286. a	

288. A table spoon of fertile topsoil from a garden
a. Is composed of only non–living material
b. Contains millions of living organisms
c. Contains only a few hundred living organisms
d. None of the above

289. Mineralization of organic matter is dependent on
a. Soil organisms
b. Soil texture
c. Neither of the above
d. Both a and b

290. The rate of decomposition of organic residue depends on
a. Environmental conditions
b. The C.N ratio of the material
c. Neither of the above
d. Both a and b

291. Which organic residue has the greatest C.N ratio?
a. Pine straw b. Cow manure
c. Red clover d. Rice straw

292. Which plant residue would decompose more rapidly and release plant available N if incorporated into the soil?
a. Pine straw b. Cow manure
c. Red clover d. Rice straw

293. Which plant nutrient could be added to accelerate composting of a pile of grain straw?
a. Adding nutrients would have no effect
b. N
c. P
d. K

294. An example of important soil macrofauna is
a. Bacteria b. Fungi
c. Earthworms d. None

295. Examples of important soil microorganisms are
a. Fungi b. Bacteria
c. Actinomycetes d. All

296. When plant residues with a high C.N residue (e.g. wheat straw) are incorporated into soil and decomposition begins
a. Plant available N is temporarily increased
b. Plant available N is temporarily decreased
c. There is no effect on plant available N
d. None of the above

297. Incorporating low C.N ratio residues like red clover into the soil results in
a. Mineralization of N
b. Immobilization of N
c. Decrease of organic matter
d. Increase in proteineous N compounds

298. Advantages of applying organic wastes to soils are
a. Recycling nutrients
b. Disposal of waste material
c. Reducing the need for synthetic fertilizers
d. All of the above
e. None of the above

299. Fixation of N by organisms that live in the nodules on the roots of legumes is
a. Non–symbiotic nitrogen fixation
b. Symbiotic nitrogen fixation
c. Anaerobic nitrogen fixation
d. None

Answers					
	288. b	291. a	294. c	297. a	
	289. a	292. c	295. d	298. d	
	290. d	293. b	296. b	299. b	

300. Symbiotic nitrogen fixation can produce as much as
a. 100–200 lbs/ac/yr
b. 10–20 lbs/ac/yr
c. 1–2 lbs/ac/yr
d. 50–100lbs/ac/yr

301. The rate of decomposition of organic matter in soils is more rapid when the soil is
a. Saturated
b. Well drained
c. Excessively drained
d. Submerged

302. Denitrification occurs only if
a. Ammonium is present
b. Nitrate is present
c. Ammonium nitrate is present
d. None

303. Denitrification occurs only when soil conditions are
a. Saturated
b. Well drained
c. Aeration does not affect denitrification
d. Submerged

304. Conversion of ammonium to nitrate (Nitrification)
a. Requires aerobic soil conditions
b. Results in more acid soil conditions
c. Both of the above
d. Requires submerged conditions

305. Nitrification requires
a. The presence of oxygen
b. The oxygen supply has no effect
c. The absence of oxygen
d. The presence of nitrate

306. The main sources of the plant nutrients C, H. and O is
a. Slow release fertilizers
b. Air and water
c. Phosphate fertilizers
d. Organic matter

307. The form of most of the nitrogen taken up by plants growing on well drained soil is
a. N_2
b. NO_3^-
c. NH_4^+
d. All of the above

308. The form(s) of potassium taken up by plants is
a. K^+ b. K_2O
c. Potash d. Both a and b

309. The form(s) of nitrogen in soil that is most susceptible to leaching is/are the
a. Organic form b. NH_4^+ form
c. NO_3^- form d. Both b and c

310. Most of the nitrogen in soils is in the
a. Organic form b. Mineral form
c. Both a and b d. None

311. Nitrogen fixation refers to
a. Reaction with Fe to form insoluble compounds
b. Conversion of NH_4^+ to NO_3^-
c. Conversion of N_2 to forms that plants can utilize
d. Conversion of NO_3^- to NH_4^+

312. Soil phosphorus is more available for plant uptake at pH
a. 4.5 b. 5.5 – 6.5
c. Above 6.5 d. below 4.5

313. The secondary nutrient that strengthens plant cell walls is
a. P b. Ca
c. K d. S

Answers									
	300.	a	303.	a	306.	b	309.	c	312.	b
	301.	b	304.	c	307.	b	310.	a	313.	b
	302.	b	305.	a	308.	a	311.	c		

314. The source of nitrogen for manufacturing fertilizer and fixation by rhizobia is
a. Air b. Water
c. CO_2 d. All

315. Sources of calcium for plants are
a. Dolomitic limestone
b. Gypsum
c. Calcitic limestone
d. All

316. Source(s) of magnesium for plants is/are
a. Dolomitic limestone
b. Gypsum
c. Calcitic limestone
d. All

317. Leaching loss from soils in the Piedmont is more of a problem with
a. Nitrate b. Ammonium
c. Phosphorus d. Calcium

318. If a plant bed is fumigated to kill soil microorganisms, Nitrification would
a. Not be affected
b. Increase
c. Decrease
d. First increase and then decrease

319. Phosphorus fixation is more of a problem on
a. Soils high in Fe and Al
b. Organic soils
c. Soils with more SO_4^{2-} ions
d. Both a and b

320. Plant available phosphorus
a. Accumulates in mineral soils when fertilizers containing P are applied regularly over a number of years.
b. Cannot be maintained because it leaches out of the root zone
c. Will not be fixed in soils with high Al and Fe
d. Decreases with increase in organic matter

321. Plant available nitrogen
a. Accumulates in the soil when ammonium fertilizers are applied regularly over a number of years
b. Cannot be maintained because of leaching and other losses
c. Decreases with increase in organic matter
d. All of the above

322. Which plant nutrient moves readily with the soil water when it is in the inorganic form?
a. N b. P
c. K d. Ca

323. If a soil has a pH of 5, liming will
a. Increase the availability of all micronutrients except Mo
b. Decrease the availability of all micronutrients except Mo
c. Have no effect on availability of micronutrients
d. Decrease the availability of calcium

324. Phosphorus is taken up by plants as an
a. Anion
b. Cation
c. In the organic form
d. All

325. Sulfur is taken up by plants as
a. Elemental sulfur b. SO_4^{2-}
c. SO_3 d. S^{2-}

Answers									
	314.	a	317.	a	320.	a	323.	b	
	315.	d	318.	c	321.	b	324.	a	
	316.	a	319.	a	322.	a	325.	b	

326. Nitrogen fixation by legumes is often increased by inoculating the seed with
a. Mychorrizae b. Nematodes
c. Rhizobia d. All

327. Atmospheric pollutants contribute a significant amount of this nutrient for plant uptake.
a. Ca b. Mg
c. S d. P

328. Potassium fixation refers to
a. Atmospheric deposition of K^+
b. Trapping of K^+ ions in the interlayer space of illite
c. Reaction with iron
d. Fixed by the microorganisms

329. The amount of plant available nitrogen in the soil could be decreased by
a. Ammonification
b. Nitrification
c. Denitrification
d. Mineralization

330. Most soil phosphorus is in the
a. Organic form
b. Inorganic mineral form
c. Both a and b
d. None

331. How many pounds of NH_4NO_3 (34% N) would be required to supply 150 lbs of N?
a. 150 b. 44
c. 441 d. 241

332. Nutrient elements found in plants at concentrations greater than 0.1 per cent are
a. N, P, Ca and K
b. Fe, Mn, Zn and Cu
c. N, S, B and Cl
d. Ca, Mg, S, Cl and Mo

333. Nutrient elements found in plants at concentrations less than 0.1 per cent are
a. N, P, Ca and K
b. Fe, Mn, Zn and Cu
c. N, S, B and Cl
d. Ca, Mg, S, Cl and Mo

Answers			
326. c	329. c	332. a	
327. c	330. b	333. b	
328. b	331. c		

7

Soil Microbiology

Questions :

1. The mesofauna in soil has the size range of
   a. > 2 mm
   b. 2 – 0.2 mm
   c. < 0.2 mm
   d. None of the above

2. Soil organisms depending on dead tissue of both plants and animals as food source is called as
   a. Herbivores
   b. Carnivores
   c. Detritivores
   d. None of the above

3. For their carbon and energy needs, heterotrophs rely on
   a. Organic compounds
   b. Inorganic compounds
   c. Photosynthesis
   d. None of the above

4. In soil, action of the microflora is mostly
   a. Physical
   b. Both physical and chemical
   c. Chemical
   d. None of the above

5. Which of the followings is used as food source by microphytic feeders ?
   a. Microfauna b. Macrofauna
   c. Microflora d. Macrflora

6. Which of the following groups of soil organisms are termed as 'ultimate decomposers' ?
   a. Microflora b. Macroflora
   c. Microfauna d. Mesofauna

7. As energy source, photoautotrophs depend on
   a. Organic compounds
   b. Inorganic compounds
   c. Solar energy
   d. None of the above

8. Chemoautotrophs dose not derive energy from
   a. CO_2 b. N_2
   c. S d. Fe

9. The size range of soil inhabiting protozoa is
   a. 0.1 – 0.5 µm b. 1 – 2 µm
   c. 5 – 100 µm d. 1000–5000 µm

10. The rhizosphere zone extends from root surface within
    a. 1 – 2 mm b. 5 – 10 mm
    c. 15 – 20 mm d. 50 – 100 mm

11. Which of the following groups of soil algae are prokaryotes ?
    a. Green algae
    b. Blue-Green algae
    c. Yellow green algae
    d. Diatomes

12. Fungi are
    a. Photoautotrophs
    b. Chemoautotrophs
    c. Heterotrophs
    d. None of the above

13. Which of the following groups represent single celled fungi ?
    a. Molds
    b. Mushrooms
    c. Yeasts
    d. None of the above

14. Individual fungal filaments are called
    a. Hyphae b. Mycellium
    c. Pseudopodia d. Flagella

Answers										
	1. b	4. c	7. c	10. a	13. c
	2. c	5. c	8. a	11. b	14. a
	3. a	6. a	9. c	12. d	

15. Penicillum, Mucor, Fusarium and aspergillus are genera of
    a. Yeasts
    b. Molds
    c. Mushrom fungi
    d. None of the above

16. Mycorrhizae is a symbiotic association between
    a. Bacteria and plant roots
    b. Fungi and bacteria
    c. Two species of fungi
    d. Fungi and roots of higher plants

17. Mycotoxin is produced by
    a. Bacteria
    b. Protozoa
    c. Fungi
    d. Nematodes

18. Aflatoxin is a mycotoxin produced by
    a. *Bacillus polymyxa*
    b. *Aspergillus awamorii*
    c. *Pseudomonas striata*
    d. *Aspergillus flavus*

19. Which of the following statement is not true regarding arbuscules of VAM fungi?
    a. Transfer mineral nutrients from the fungi to host plant
    b. Transfer sugar from host plant to the fungi
    c. Work as storage organ for the fungi
    d. A highly branched structure

20. Which of the followings acts as storage organ for VAM fungi ?
    a. Hypha b. Arbuscule
    c. Mycellium d. Vesicle

21. Which of the following groups of plants does not form mycorrhizae ?
    a. Solanaceae b. Poaceae
    c. Leguminosae d. Cruciferae

22. Which of the following products are not originated from actinomycetes ?
    a. Actinomycin b. Penicillum
    c. Neomycin d. Streptomycin

23. Most commonly, the bacterial cell falls in the size range of
    a. 0.5 - 5 µm b. 10 - 15 µm
    c. 15 - 20 µm d. 20 - 25 µm

24. Which of the followings get oxidized during the first step of nitrification ?
    a. Nitrate
    b. Nitrite
    c. Ammonium
    d. None of the above

25. The nitrogen fixing organism living inside the leaves of the aquatic fern azolla is a
    a. Fungi
    b. Cyanobacteria
    c. Actinomycetes
    d. None of the above

26. Siderophores show strongest affinity to bind
    a. Iron b. Nitrogen
    c. Aluminium d. Phosphorus

27. Who for the first time showed that legumes can obtain nitrogen from air ?
    a. M.W. Beijerinck
    b. J.B. Boussingault
    c. Robert Koch
    d. Louis Pasteur

28. Bacteria from root nodules of legume was isolated for the first time by
    a. J.B. Boussingault
    b. M.W. Beijerinck
    c. Robert Koch
    d. Louis Pasteur

Answers										
	15. b	18. d	21. d	24. c	27. b
	16. d	19. c	22. b	25. b	28. b
	17. c	20. d	23. a	26. a	

29. Authentic drawings of microorganisms were made for the first time by
a. Louis Pasteur
b. Robert Koch
c. John Needham
d. Antony Van Leeuwenhoek

30. Who for the first time obtained pure culture of bacteria by serial dilution in liquid media?
a. Louis Pasteur
b. John Needham
c. Joseph Lister
d. M.W. Beijerinck

31. Who is credited with the discoveries of autotrophism in bacteria and microbiological transformation of nitrogen and sulphur ?
a. S.N. Winogradsky
b. Joseph Lister
c. M.W. Beijerinck
d. Robert Koch

32. Cellulose degradation by anaerobic bacteria was first discovered by
a. S.N. Winogradsky
b. Omeliansky
c. J.B. Boussingault
d. Joseph Lister

33. Study on ammonification of organic nitrogen substances by soil micro organisms was initiated by
a. Omeliansky
b. M.W. Beijerinck
c. Lipman and Brown
d. Hiltner

34. Study of rhizosphere was initiated by
a. Hiltner
b. Omeliansky
c. Lipman and Brown
d. S.N. Winogradsky

35. Importance of protozoa in controlling bacterial population and activity in soil was first suggested by
a. M.W. Beijerinck
b. Hiltner
c. Russel and Hutchinson
d. Joseph Lister

36. Contact slide technique for study of soil microorganisms was initiated by
a. Lipman and Brown
b. Russel and Hutchinson
c. Omeliansky
d. Rossi and Cholodny

37. Intensive study on mycorrhiza was initiated by
a. Beijerinck
b. S.N. Winogradsky
c. Rayner and Melin
d. Joseph Lister

38. Penicillin was discovered by
a. Robert Koch
b. Alexander Fleming
c. Waksman
d. Winogradsky

39. Streptomycin was discovered by
a. Robert Koch
b. Winogradsky
c. Alexander Fleming
d. Waksman

40. Glomus and Acaulospora are examples of
a. Ectomycorrhiza b. Actinomycetes
c. Endomycorrhiza d. None of these

41. The study of phyllosphere was initiated by
a. Rossi and Cholodny
b. Ruinen
c. Omeliansky
d. None of the above

Answers									
	29. d	32. b	35. c	38. b	41. b
	30. c	33. c	36. d	39. d	
	31. a	34. a	37. c	40. c	

42. Essentiality of molybdenum for accelerating nitrogen fixation by legume was demonstrated by
a. Bortels b. Winogradsky
c. Ruinen d. Beijerinck

43. Essentiality of the red pigment in legume root nodule for nitrogen fixation was first proposed by
a. Ruinen b. Bortels
c. Omeliansky d. Kubo

44. Isotope method to quantify the amount of nitrogen fixed was given by
a. Bortels
b. McCoy
c. Kubo
d. Burris and Wilson

45. The biochemistry of nitrogen fixation in legume root nodules was elaborated by
a. Bergersen b. Winogradsky
c. Joseph Lister d. Omeliansky

46. The hereditary mechanisms behind nodulation in legumes was first elaborated by
a. Bergersen b. Nutman
c. Winogradsky d. Hiltner

47. The theory of micro invagination of root hairs as explanation for the origin of infection threads in root hairs of clover was proposed by
a. Nutman b. Bergersen
c. Winogradsky d. Hiltner

48. The actinimycetes endophyte Frankia was first isolated by
a. Bergersen
b. Hiltner
c. Callahan, Del Tredici and Torrey
d. None of the above

49. Rhizobium from root nodules of a non legume was first isolated by
a. Quipsel b. Nutman
c. Bond d. Trinick

50. Azotobacterin and Phosphobacterin were first used in
a. USA b. U.K
c. Australia d. Russia

51. Acetylene Reduction Assay (ARA) was first proposed by
a. Vincent
b. Gibson
c. Hardy *et al*
d. None of the above

52. Nitrogen fixation by *azotobacter* was first demonstrated by
a. Burton b. Gibson
c. Trinick d. Dobereiner

53. The concepts of 'associative symbiosis' and 'diazotrophic biocoenocis' was proposed by
a. Vincent
b. Dobereiner
c. Gibson
d. None of the above

54. Nitrogen fixation by stem nodules of *Sesbania rostrata* was discovered by
a. Dobereiner
b. Gibson
c. Dommergues *et al*
d. Burton

55. Soil microorganisms were classified as autochthanous and Zymogenous by
a. Winogradsky
b. Dobereiner
c. Beijerinck
d. None of the above

Answers									
	42. a	45. a	48. c	51. c	54. c
	43. d	46. b	49. d	52. d	55. a
	44. d	47. a	50. d	53. b	

56. Bacteria thriving well within a temperature range of 15 - 45°C are called
a. Thermophillic
b. Psychrophillic
c. Mesophillic
d. None of the above

57. The bacteria *Nitrosomonas*, *Nitrobacter*, *Thiobacillus* and *Ferrobacillus* fall under
a. Heterotrophs
b. Photoautotrophs
c. Obligate chemoautotrophs
d. None of the above

58. The bacteria *thiobacillus* converts
a. Ammonia to nitrite
b. Inorganic sulphur to sulphate
c. Ferrous iron to Ferric iron
d. None of the above

59. The most common genera of actinomycetes in soil is
a. *Nocardia*
b. *Micromonospora*
c. *Actinomyces*
d. *Streptomyces*

60. The thermophillic actinomycetes genera most commonly occurring in compost heaps are
a. *Actinomyces* and *Nocardia*
b. *Actinoplanes* and *Micromonospora*
c. *Thermoactinomyces* and *Streptomyces*
d. None of the above

61. Which of the following is an example of ectotrophic mycorrhizal fungi ?
a. Glomus b. Scutellospora
c. Acaulospora d. Boletus

62. Chlorophyceae and Cyanophyceae are families of soil
a. Algae b. Fungi
c. Actinomycetes d. Myxomycetes

63. Phycocyanin is a pigment found in soil
a. Fungi b. Algae
c. Myxomycetes d. Actinomycetes

64. The primary function of heterocysts in blue green algae is
a. Multiplication
b. Cell protection
c. Nitrogen fixation
d. None of the above

65. Allantion, Bodo, Cercobodo, Cercomonas, Entosiphon, Monas, Oikomonas, Spiromonas, Tetramitus etc. are genera of soil
a. Algae b. Actinomycetes
c. Ectomycorrhizae d. Protozoa

66. The specialized structures produced by soil protozoa for survival at inhospitable conditions are called
a. Cysts
b. Sheaths
c. Spores
d. None of the above

67. The smallest inhabitants of soil is
a. Protozoa
b. Bacteria
c. Actinomycetes
d. Bacteriophages

68. Mycovirus attacks
a. Bacteria b. Algae
c. Protozoa d. Fungi

69. Cyanophages attack
a. Algae b. Bacteria
c. Fungi d. Protozoa

Answers									
	56.	c	59.	d	62.	a	65.	d	68.	d
	57.	c	60.	c	63.	b	66.	a	69.	a
	58.	b	61.	d	64.	c	67.	d		

70. Whiskers, Collar, Sheath, Plate and Pin are structural components of which of the following soil organisms ?
a. Actinomycetes
b. Protozoa
c. Bacteriophages
d. None of the above

71. The resolution limit of un-aided human eye is approximately
a. 0.1 mm b. 0.01 mm
c. 1 mm d. 0.001 mm

72. Tyndallization method is used for
a. Sterilization of media
b. Growing microorganisms in media
c. Counting microbial population in media
d. None of the above

73. The technique of enriched culture was developed by
a. Lipman and Lister
b. Leeuwenhoek and Koch
c. Winogradsky and Beijerinck
d. None of the above

74. Direct microscopic count technique was developed by
a. Winogradsky b. Beijerinck
c. Lister d. Conn

75. Which of the following groups of bacteria has been studied extensively as PGPR ?
a. *Bacillus* sp.
b. *Pseudomonas* sp.
c. *Azotobacter* sp.
d. None of these

76. The antibiotic Agrocin-84 is produced by
a. *Azotobacter chroococcum*
b. *Agrobacterium tumefaciens*
c. *Agrobacterium radiobacter*
d. None of the above

77. B 10 inhibiting the growth of *Erwinia caratovora* (causal agent of soft rot in potato) is a strain of
a. *Bacillus subtilis*
b. *Agrobacterium radiobacter*
c. Fluorescent pseudomonads
d. None of the above

78. Which of the followings is not an example of obligate aerobic nitrogen fixing bacteria?
a. *Azotobacter* b. *Beijerinckia*
c. *Derxia* d. *Klebsiella*

79. Which of the followings does not represent anaerobic nitrogen fixing bacteria ?
a. *Achromobacter*
b. *Clostridium*
c. *Chlorobium*
d. *Chromatium*

80. Which of the followings fixes nitrogen in a photoautotrophic manner ?
a. *Arthrobacter*
b. *Rhodopseudomonas*
c. *Desulfovibrio*
d. Methanobacterium

81. Which of the followings fixes nitrogen while reducing sulphates ?
a. *Arthrobacter*
b. *Rhodopseudomonas*
c. *Desulfovibrio*
d. *Mrthanobacterium*

82. The other protein fraction in nitrogenase besides the Fe-protein fraction is
a. S - protein fraction
b. P - protein fraction
c. Mn - protein fraction
d. Mo - Fe protein fraction

Answers									
	70.	c	73.	c	76.	c	79.	a	82.	d
	71.	a	74.	d	77.	c	80.	b		
	72.	a	75.	b	78.	d	81.	c		

83. The Mo - Fe protein fraction of nitrogenase is also termed as
a. Mo -nitrogenase
b. Fe -nitrogenase
c. Dinitrogenase
d. None of the above

84. The Fe-protein fraction of nitrogenase is also termed as
a. Fe-nitrogenase
b. Dinitrogenase
c. Dinitrogen oxidase
d. Dinitrogen reductase

85. Which of the followings has been used for transferring the nitrogen fixing (nif) genes from organismto organism ?
a. Plasmids
b. Intra chromosomal DNA
c. RNA
d. None of the above

86. In nitrogenase reaction, which step is followed by substrate reduction?
a. Electron activation by a suitable donor or ADP
b. Gene transfer
c. Substrate oxidation
d. None of the above

87. *Collema*, *Sterocaulon*, *Leptogium*, *Lichina*, *Peltigera*, *Labaria*, *Massalongia*, *Nephroma*, *Pannaria*, *Parmeliella*, *Placopsis*, *Placynthium*, *Palychidium* etc. are genera of
a. Algae
b. Lichens
c. Mycorrhizae
d. None of the above

88. The fungal partner of the lichen is known as
a. Phycobiont
b. Mycobiont
c. Cyanobiont
d. None of the above

89. When the algal partner in lichen is a true alga, it is called
a. Phycobiont b. Cyanobiont
c. Mycobiont d. Photobiont

90. When the algal partner in lichen is a cyanobacteria, it is called
a. Mycobiont
b. Cyanobiont
c. Phycobiont
d. None of the above

91. Both phycobiont and cyanobiont are collectively known as
a. Mycobiont b. Lichen
c. Moss d. Photobiont

92. The nitrogen fixing bacteria rhizobium was previously known as
a. *Bacillus polymyxa*
b. *Bacillus subtilis*
c. *Bacillus radicicola*
d. None of the above

93. Which of the following groups represents flavonoids secreted from legume roots that induce transcription of nodulation (nod) genes ?
a. Genistein and Daidzein
b. Delphinidin and Petunidin
c. Neringenin and Liquirtigenin
d. All the above

94. Formation of a typical 'Shepherdd's Crook' takes place in which plant part marking the onset of rhizobial infection ?
a. Root tip b. Root hair
c. Collar region d. None

Answers							
	83. c	86. a	89. a	92. c			
	84. d	87. b	90. b	93. d			
	85. a	88. b	91. d	94. b			

95. Curling of root hair in response to rhizobial infection is attributed to the production of
a. IBA
b. NAA
c. IAA
d. None of the above

96. Which of the followings imparts pink colouration to the effective legume root nodules ?
a. Melanin
b. Cytokinin
c. Leghemoglobin
d. None of the above

97. Besides *Sesbania*, which of the followings represents another genus of stem nodulating legumes ?
a. *Vigna* b. *Phaseolus*
c. *Cajanus* d. *Aeschynomene*

98. Which of the following tests are carried out to distinguish *Rhizobium* from *Agrobacterium* ?
a. Growth in Congo red medium
b. Hofer's alkaline broth test
c. Lactose agar test
d. All the above

99. Acetylene Reduction Assay (ARA) is done to determine
a. Nitrogenase activity
b. Dehydrogenase activity
c. Phosphatase activity
d. None of the above

100. The ^{15}N technique for quantitative estimation of nitrogenase activity was developed by
a. Hiltner
b. Beijerinck
c. Burris and Wilson
d. None of the above

101. The Rhizobium isolates from the tree species are assigned to the genus
a. Rhizobium
b. Bradyrhizobium
c. Azorhizobium
d. None of the above

102. N_2 fixing actinomycetes Frankia was discovered by
a. Winogradsky b. Lister
c. Beijerinck d. Frank

103. In cellulose molecule, individual glucose units are bound together by
a. α-1-4 b. β-1-4
c. α-1-6 d. β-1-6

104. Cellulase enzyme decomposes cellulose into disaccharide
a. Cellobiose
b. Galactose
c. Arabinose
d. None of the above

105. Hemicelluloses represent various polymers of
a. Hexoses b. Pentoses
c. Uronic acid d. All the above

106. Pectin is an example of
a. Cellulose
b. Lignin
c. Hemicellulose
d. None of the above

107. Which of the followings represents genera of lignin degrading fungi ?
a. Mycena and Marasmius
b. Polyporus and pleurotus
c. Citocybe and Collybia
d. All the above

Answers					
	95. c	98. d	101. b	104. a	107. d
	96. c	99. a	102. d	105. d	
	97. d	100. c	103. b	106. c	

108. The lignin degrading fungi mostly belongs to which of the following groups ?
a. Ascomycetes
b. Basidiomycetes
c. Phycomycetes
d. None of the above

109. Which of the followings is the most persistent and oldest fraction of humus ?
a. Humin
b. Fulvic acid
c. Humin and Fulvic acid
d. Humic acid

110. Fulvic acid is
a. Acid soluble
b. Alkali soluble
c. Acid insoluble
d. Acid and alkali soluble

111. Humin is
a. Resistant to cold alkali
b. Soluble in cold alkali
c. Soluble in hot water
d. Soluble in cold water

112. Which of the followings is a well known synthetic chelator ?
a. EBT b. EDTA
c. TTC d. TPF

113. Which of the followings represents an anaerobic decomposer of organic matter ?
a. Clostridium
b. Bacillus
c. Pseudomonas
d. None of the above

114. Iron is an important component of enzymes
a. Nitrogenase
b. Nitrate reductase
c. Nitrite reductase
d. All the above

115. Which of the followings is microaerobic that fixes nitrogen freely or in association with grasses ?
a. *Azotobacter* b. *Azospirillum*
c. *Rhizobium* d. *Frankia*

116. Which of the following bacterial genera take part in nitrification ?
a. Nitrosomonas and Nitrobacter
b. Nitrosococcus and Nitrosospira
c. Nitrosocystis and Nitrosogloea
d. All the above

117. Another term for anaerobic conversion of nitrate into molecular nitrogen is
a. Nitrate oxidation
b. Nitrate conversion
c. Nitrate respiration
d. None of the above

118. Which of the following soil conditions is best suited for denitrification ?
a. Fallow soils with ponded water
b. Fallow but well drained soils
c. Continuously cropped soils with ponded water
d. Continuously cropped but well drained soils

119. Which of the following nitrification inhibitors is known as N-serve ?
a. 2 chloro - 6 - (trichloromethyl) - pyridine
b. 2 amino - 4 - chloro - 6 - methyl pyridine
c. 2 chloro - 4 - (trichloromethyl) - pyridine
d. None of the above

Answers				
	108. b	111. a	114. d	117. c
	109. d	112. b	115. b	118. a
	110. d	113. a	116. d	119. a

120. Which of the followings acts as nitrification inhibitor ?
a. Root extract of *Flemingia macrophylla*
b. Leaf extract of *Alnus nepalensis*
c. Seeds of *Azadirachta indica*
d. None of the above

121. The precursor of Indole Acetic Acid is
a. Allophane
b. Tryptophane
c. Ethylene
d. None of the above

122. Which of the following plant diseases does not represent hyperauxiny ?
a. Crown gall b. Smut
c. Bakanae d. All the above

123. Which of the following roles are attributed to gibberellins ?
a. Overcoming dormancy and dwarfism in plants
b. Induce flowering
c. Sex alteration of flowers
d. All the above

124. Which of the followings plays a role in ripening of fruits ?
a. Auxin
b. Cytokinin
c. Ethylene
d. None of the above

125. Which of the following antibiotics inhibits cell wall synthesis of bacteria ?
a. Penicillin
b. Tetracycline
c. Kasugamycin
d. None of the above

126. Which of the following antibiotics inhibits protein synthesis ?
a. Penicillin
b. Tetracycline
c. Kasugamycin
d. None of the above

127. Transposons are
a. Antibiotic resistant genes
b. Pieces of DNA carrying resistant genes
c. Plasmids
d. None of the above

128. Wild fire toxin is produced by
a. *Fusarium* sp.
b. *Penicillium notatum*
c. *Pseudomonas tabaci*
d. None of the above

129. Bacillus thuringiensis was developed by
a. Fleming b. Winogradsky
c. Beijerinck d. Ishiwata

130. Polyhedroses and granuloses are classes of
a. PGPR
b. Pathogenic fungi
c. Viral insecticides
d. None of the above

131. Nopaline and Octopine are types of strain of
a. *Agrobacterium tumefaciens*
b. *Agrobacterium radiobacter*
c. *Fusarium oxysporum*
d. *Fusarium solani*

132. Sulphur is organically bound in the protoplasm of microorganisms in the form of
a. Cystine
b. Methionine
c. B-vitamins d. All the above

Answers					
	120. c	123. d	126. b	129. d	132. d
	121. b	124. c	127. b	130. c	
	122. c	125. a	128. c	131. a	

133. Besides rock phosphate and sulphur 'Biosuper' contains
a. *Pseudomonas fluorescens*
b. *Thiobacillus thiooxidans*
c. *Bacillus polymyxa*
d. None of the above

134. Besides nucleic acids and phospholipids, organic phosphorus containing substances derived from microorganisms contain
a. Folic acid b. Oxalates
c. Phytin d. Phenols

135. The first phosphate solubilizing biofertilizer 'phosphobacterin' contained
a. *Bacillus subtilis*
b. *Bacillus megatherium*
c. *Bacillus polymyxa*
d. None of the above

136. In acidic soils, manganese is prevalent in the form
a. Mn^{++}
b. Mn^{+++}
c. Mn^{++++}
d. None of the above

137. Copper fixation mostly takes place in soil types
a. Saline soil
b. Alkali soil
c. Acidic peaty soil
d. None of the above

138. Copper fixation/ precipitation in soil is contributed by
a. *Desulfovibrio desulfuricans*
b. *Clostridium lentoputrescens*
c. *Proteus vulgaris*
d. All the above

139. Which of the following groups of microorganisms contribute in precipitation of iron ?
a. *Gallionella, Siderophacus, Siderocapsa*
b. *Siderophaera, Ferribacterium, Ochromium*
c. *Sideromonas, Sideronema, Ferrobacillus*
d. All the above

140. Which of the following microorganisms contribute in conversion of ferrous iron to ferric form ?
a. Cyanophyceae and Volvocales
b. Chlorococcales and Euglenineae
c. Conjugales and Ulotrichales
d. All the above

141. The bacterial genera Achromobacter, Aerobacter, Agrobacterium, Bacillus, Clostridium, Corynebacterium, Escherichia, Erwinia, Pseudomonas and Streptococcus etc. can convert DDT to DDE through enzyme
a. Dehydrochlorinase
b. Dehydrogenase
c. Phosphatase
d. None of the above

142. Which of the following groups of microorganisms brings about dehalogenation of the insecticide Lindane ?
a. *Bacillus* and *Pseudomonas*
b. *Erwinia* and *Agrobacterium*
c. *Clostridium* and *Escherichia*
d. None of the above

143. The insecticide Aldrin is converted to Dieldrin by
a. *Trichoderma* b. *Fusarium*
c. *Penicillium* d. All the above

Answers				
	133. b	136. a	139. d	142. c
	134. c	137. c	140. d	143. d
	135. b	138. d	141. a	

144. Malathion is degraded by
a. *Torulopsis* b. *Chlorella*
c. *Thiobacillus* d. All the above

145. The herbicide 2, 4- D is degraded by
a. Pseudomonas and Achromobacter
b. Flavobacterium and Cornebacterium
c. Arthrobacter and Sporocytophaga
d. All the above

146. The first organic fungicide is
a. Zineb
b. Thiram
c. Captan
d. None of the above

147. The mode of action of fungicide captan is
a. Cell wall lysis
b. Inhibition of amino compounds and enzyme synthesis
c. Interference in mitosis
d. None of the above

148. The mode of action of fungicide carboxin and oxycarboxin is
a. Affecting mitochondrial systems
b. Interference in mitosis
c. Cell wall lysis
d. Inhibition of amino compounds

149. The mode of action of benomyl is
a. Cell wall lysis
b. Damaging mitochondrial systems
c. Interference in mitosis
d. None of the above

150. The addition of biomass of enriched bacterial species for degrading a specific compound is termed
a. Bioaugmentation
b. Pseudosolubilization
c. Biodegradation
d. None of the above

151. 'Surgee 2' and 'Corexit' are examples of
a. Surfactans
b. Chemosterilants
c. Pheromones
d. None of the above

152. Application of 2, 4- D increases the incidence of
a. *Alternaria solani* on tomato
b. *Helminthosporium sativum* on barley
c. *Botrytis fabae* on broad bean
d. None of the above

153. Application of MH (Malic Hydrazide) increases the incidence of
a. *Alternaria solani* on tomato
b. *Helminthosporium sativum* on barley
c. *Botrytis fabae* on broad bean
d. None of the above

154. Application of Simazine increases the incidence of
a. *Alternaria solani* on tomato
b. *Helminthosporium sativum* on barley
c. *Botrytis fabae* on broad bean
d. *Pyricularia grisea* on paddy

155. The incidence of *Puccinia graminis* on oats and wheat is reduced by application of
a. 2, 4 - D
b. Malic Hydrazide
c. Atrazine
d. None of the above

156. The incidence of *Sclerotium rolfsii* on groundnut is reduced by application of
a. 2, 4 - D
b. Simazine
c. Atrazine
d. Dinoseb

Answers					
	144. d	147. b	150. a	153. b	156. b
	145. d	148. a	151. a	154. c	
	146. b	149. c	152. a	155. a	

157. Hartig net is developed by
a. Endomycorrhizae
b. Ectomycorrhizae
c. Nodulating bacteria
d. None of the above

158. The undefined constituents of root exudates required for growth/ culture of ectomycorrhizae are called
a. P-factor
b. G-factor
c. M-factor
d. None of the above

159. Which of the followings represents the liason tissue between the fungal sheath and the host cells ?
a. Cortex layer
b. Casparian strip
c. Hartig net
d. None of the above

160. Which of the following ectomycorrhiza causing fungus does not produce antibiotics ?
a. Lactarius b. Cortinarius
c. Hygrophorus d. Russula

161. Which of the following structures of VAMF connect the fungal ramifications inside roots with the mycelium of the fungus outside roots ?
a. Vesicles
b. Appressoria
c. Arbuscules
d. None of the above

162. The VAM fungi with spores bearing straight or angular stalks are grouped as
a. Glomus b. Gigaspora
c. Acaulospora d. Endogone

163. The VAM fungi with spores bearing bulbous stalks are grouped as
a. Glomus
b. Sclerocystis
c. Gigaspora
d. None of the above

164. The VAM fungi with sessile spores are grouped as
a. Sclerocystis b. Acaulospora
c. Gigaspora d. Glomus

165. The VAM fungi with spores regularly arranged on a central core are grouped as
a. Sclerocystis b. Acaulospora
c. Gigaspora d. Glomus

166. 'Aeroponic culture' system is used for culturing which of the following organism?
a. Nitrogen fixing bacteria
b. Phosphate solubilizing bacteria
c. VAM fungi
d. Celluloe decomposer

167. Which of the following groups has the simplest nutritional requirement ?
a. Chemoautotrophs
b. Chemoheterotrophs
c. Photoheterotrophs
d. None of the above

168. CO_2 is the sole carbonaceous nutrient for which of the following groups?
a. Chemoautotrophic and photoautotrophic
b. Chemoheterotrophic and photo-heterotrophic
c. Chemoautotrophic and photo-heterotrophic
d. Chemoheterotrophic and photo-autotrophic

Answers				
	157. b	160. d	163. c	166. c
	158. c	161. b	164. b	167. a
	159. c	162. a	165. a	168. a

169. The ratio of the amount of energy captured by the biological system to the amount released in the oxidation of the substrate is termed
a. Energy input
b. Free energy efficiency
c. Energy output
d. None of the above

170. The amount of energy actually used by an organism in a biochemical reaction is expressed as Energy yield X _____.
a. Energy input
b. Energy output
c. Free energy efficiency
d. None of the above

171. Decomposition of larger polysaccharides are carried out by
a. Intracellular enzymes
b. Extracellular enzymes
c. Both intracellular and extracellular enzymes
d. None of the above

172. Biological oxidation actually does not proceed by
a. Addition of oxygen
b. Removal of hydrogen
c. Removal of electron
d. All the above

173. The group of enzymes always produced in microbial cell irrespective of presence or absence of a substrate is called
a. Inducible enzyme
b. Intracellular enzyme
c. Extracellular enzyme
d. Constitutive enzyme

174. The enzyme amylase brings about
a. Cellulose breakdown
b. Lignin decomposition
c. Lipid breakdown
d. Hydrolysis of starch

175. The enzyme Lipase breaks down lipids into
a. Glycerol and alcohol
b. Alcohol and fatty acids
c. Glycerol and fatty acids
d. None of the above

176. The enzyme Invertase breaks down sucrose into
a. Glucose + Galactose
b. Glucose + Fructose
c. Glucose + Cellulose
d. None of the above

177. Which functions are served by organic matter decomposition ?
a. Yielding energy for growth
b. Supplying carbon for formation of new cell material
c. Both a and b
d. None of the above

178. The process of converting substrate carbon to protoplasmic carbon by microorganisms is termed as
a. Decomposition
b. Assimilation
c. Both a and b
d. None of the above

179. The term used to denote conversion of organic complexes of an element to inorganic state is
a. Mineralization
b. Immobilization
c. Assimilation
d. All the above

Answers				
	169. b	172. a	175. c	178. b
	170. c	173. d	176. b	179. a
	171. b	174. d	177. c	

180. The phenomenon of enhancement in native humus decomposition owing to external addition of organic matter is termed
a. Mineralization b. Assimilation
c. Immobilization d. Priming

181. Shrinkage of organic soils owing to biological decomposition is termed as
a. Gleying b. Erosion
c. Thawing d. Subsidence

182. Which of the following organic acids are formed due to decomposition of organic fraction in well drained soils ?
a. Formic acid
b. Acetic acid
c. Both a and b
d. None of the above

183. Alcohols produced by decomposition of organic fraction in well drained soils are
a. Ethanol and methanol
b. n-propyl alcohol and n- butyl alcohol
c. Both a and b
d. None of the above

184. In woody perennials, the bulk of the organic matter lost is derived from
a. Hemicelulose
b. Cellulose
c. Lignin
d. All the above

185. As the decomposition proceeds, the oxidation - reduction potential (E_h) of the soil
a. Shifts to a more reduced state
b. Shifts to a more oxidized state
c. Remains unchanged
d. Shows variable response

186. As the clay content of a soil increases, the decay rate
a. Increases
b. Decreases
c. Remains unchanged
d. Shows variable response

187. The microorganisms taking part in organic matter decomposition feeds on
a. The organic substrates added
b. Intermediates formed during decomposition
c. The protoplasm of microorganisms active in decomposition
d. All the above

188. Upon incorporation of succulent plant tissues, the population and activity of which of the following microorganisms are mostly stimulated ?
a. Bacteria and protozoa
b. Fungi
c. Actinomycetes
d. All the above

189. Upon incorporation of mature crop residue, the population and activity of which of the following microorganisms are mostly stimulated ?
a. Bacteria
b. Protozoa
c. Fungi and Actinomycetes
d. All the above

190. The most abundant organic compound in nature is
a. Hemicellulose
b. Celulose
c. Lignin
d. None of the above

Answers				
	180. d	183. c	186. b	189. c
	181. d	184. b	187. d	190. b
	182. c	185. a	188. a	

191. Cellulose is found in microbial cell wall as sub microscopic rod shaped units called
a. Cluster
b. Micelle
c. Microfibril
d. None of the above

192. The larger structures of cellulose composed of several units of micelles in microbial cell wall is called
a. Clusters
b. Aggregates
c. Microfibril
d. None of the above

193. Beyond which of the following ratios between inorganic N and cellulose, the cellulose decomposition does not respond to further addition of inorganic N
a. 1 : 10 b. 1 : 20
c. 1 : 30 d. 1 : 35

194. Which of the following chemicals are formed during anaerobic decomposition of cellulose ?
a. Ethanol
b. Acetic and Formic acid
c. Lactic and Butyric acid
d. All the above

195. Which of the following microbial groups are dominant in anaerobic decomposition of cellulose ?
a. Bacteria
b. Fungi
c. Actinomycetes
d. All the above

196. Which of the followings is the most common anaerobic cellulose fermenter in nature ?
a. *Bacillus*
b. *Clostridium*
c. *Cytophaga*
d. None the above

197. Aerobic bacteria generally convert cellulose into
a. CO_2 and cell substance
b. H_2 and ethanol
c. Acetic and Formic acid
d. Succinic and Butyric acid

198. The catalytic system required for cellulose breakdown includes
a. Enzyme C_1
b. β- (1,4) glucanase or C_x
c. β- glucosidase
d. All the above

199. During decomposition of cellulose, the enzyme C_1 cleave
a. Native cellulose
b. Cellobiose
c. Other partially degraded products
d. None of the above

200. During cellulose decomposition, the enzyme β- (1, 4) glucanase attacks
a. Native cellulose
b. Glucose
c. Partially degraded products
d. None of the above

201. In cellulose breakdown, when the C_x enzyme breaks the bond between the glucose units at random, the enzyme is called
a. Ecto enzyme
b. Endo enzyme
c. Exo enzyme
d. None of the above

Answers				
	191. b	194. d	197. a	200. c
	192. c	195. a	198. d	201. b
	193. d	196. b	199. a	

202. The C_x enzyme breaking the bonds between the glucose units from one end of the chain during cellulose decomposition is called
a. Ecto enzyme
b. Endo enzyme
c. Exo enzyme
d. None of the above

203. The regulatory mechanism by which certain products inhibits the synthesis of additional enzyme is called
a. Anabolic repression
b. Catabolic repression
c. Catabolic induction
d. None of the above

204. Hemicelluloses are polymers of
a. Simple sugars
b. Uronic acids
c. Both simple sugars and uronic acids
d. None of the above

205. The prefix 'glyc' in the term glycan refers to
a. Uronic acid
b. Unspecified simple sugar
c. Disaccharides
d. None of the above

206. Which of the followings represents homoglycans ?
a. Xylan b. Mannan
c. Galactan d. All the above

207. Which of the followings represents heteroglycans ?
a. Glucomannans b. Arabinoxylans
c. Arabinogalactans d. All the above

208. Which type of enzymes are chiefly responsible for initial breakdown of hemicelluloses ?
a. Exo enzyme
b. Glycosidases
c. Endo enzyme
d. None of the above

209. In the breakdown of xylan, the action of endo enzyme yields
a. Cellobiose
b. Xylobiose
c. Xylose
d. None of the above

210. In the breakdown of xylan, the action of exo enzyme yields
a. Cellobiose b. Xylobiose
c. Xylose d. Glucose

211. The effectiveness of a hemicellulose cleaving enzyme may be reduced due to
a. Adsorption of the enzyme on clay
b. Adsorption of the substrate on clay
c. Both a and b
d. None of the above

212. Which of the followings are responsible for inadequate knowledge on structure and decomposition of lignin ?
a. Chemical complexity of the lignin molecule
b. Difficulties in assaying for this molecule
c. Problems related to isolation of a purified lignin fraction suitable for use as a microbiological substrate
d. All the above

213. During decomposition of lignin, the number of which of the following groups in its structure increases ?
a. Methoxyl group
b. Hydroxyls and carboxyls
c. Both a and b
d. None of the above

Answers				
	202. c	205. b	208. c	211. c
	203. b	206. d	209. b	212. d
	204. c	207. d	210. c	213. b

214. Which of the following groups in the structure of lignin most readily metabolized?
a. Methoxyl group
b. Hydroxyl group
c. Carboxyl group
d. None of the above

215. The rate of breakdown of methoxyl group in the structure of lignin is highest under
a. Anaerobiosis
b. Water logged condition
c. Aerobic condition
d. None of the above

216. Which of the following intermediates are formed during lignin degradation ?
a. Vanillic acid and Vanillin
b. Ferulic and Syringic acid
c. Coniferyldehyde and Syringilaldehyde
d. All of the above

217. Which of the following enzymes have been postulated as responsible for lignin degradation ?
a. Phenol oxidases
b. Laccases
c. Peroxidases
d. All the above

218. In which of the following sequence guaiacylglycerol- β- coniferyl ether, guaiacyl glycerol+ coniferyl alcohol and vanillin are formed as intermediates during lignin decomposition ?
a. Guaiacyl glycerol- β- coniferyl ether followed by guaiacyl glycerol+ coniferyl alcohol followed by vanillin
b. Guaiacyl glycerol+ coniferyl alcohol followed by guaiacyl glycerol- β- coniferyl ether followed by vanillin
c. Vanillin followed by guaiacyl glycerol+ coniferyl alcohol followed by guaiacyl glycerol- β- coniferyl ether
d. None of the above

219. The components of the plant starches are
a. Amylose
b. Amylopectin
c. Both a and b
d. None of the above

220. In the structure of amylose, glucose units are bound together by
a. β 1 - 4 linkage
b. α - (1 - 4) glucosidic bonding
c. α - (1 - 6) linkage
d. β - (1 - 6) linkage

221. Which of the following bonds are found in the structure of amylopectin ?
a. α - (1 - 4) linkage
b. α - (1 - 6) linkage
c. Both a and b
d. None of the above

222. The anaerobic fermentation of starches yields
a. Lactic acid b. Acetic acid
c. Butyric acid d. All the above

223. The different enzymes catalyzing starch breakdown are
a. α - amylase
b. β - amylase
c. Glucoamylase
d. All the above

224. β - amylase and α - amylase are
a. Exo and endo enzyme respectively
b. Endo and exo enzyme respectively
c. Both exo enzymes
d. Both endo enzymes

Answers				
	214. a	217. d	220. b	223. d
	215. a	218. a	221. c	224. a
	216. d	219. c	222. d	

225. By attacking amylose, α - amylase yields
a. Maltose
b. Glucose
c. Trisaccharide named Maltotriose
d. All the above

226. Which of the following products accumulate due to inability of α - amylase to breakdown branch points of amylopectin ?
a. Maltotriose
b. Maltose
c. Dextrin
d. None of the above

227. The maltotriose, maltose and the low molecular oligosaccharide derived from amylopectin breakdown are finally converted to glucose by
a. α - amylase
b. α - glucosidase
c. Dextrase
d. None of the above

228. The main buiding block of pectin is
a. Galactan
b. Uronic acid
c. Galactouronic acid
d. None of the above

229. Pectic substances are of types
a. Protopectin and pectin
b. Pectinic acid and pectic acid
c. Both a and b
d. None of the above

230. Which of the following groups of bacterial genera represent pectin degraders ?
a. *Arthrobacter* and *Bacillus*
b. *Clostridium* and *Flavobacterium*
c. *Micrococcus* and *Pseudomonas*
d. All the above

231. The enzyme pectin esterases converts
a. Pectin to pectic acid
b. Pectinic acid to pectic acid
c. Both a and b
d. None of the above

232. Which of the following enzymes take part in pectin breakdown ?
a. Pectinesterases
b. Polymethylgalacturonase and poly-galacturonase
c. Pectin lyase and pectate lyase
d. All the above

233. The polysaccharide inulin is composed of
a. Glucose units
b. Fructose units
c. Galactose units
d. None of the above

234. The enzyme causing breakdown of inulin is called
a. Inulinase
b. Fruictase
c. Galactase
d. None of the above

235. The building block of chitin is
a. Glucose
b. N-acetylglucosamine
c. Fructose
d. None of the above

236. The enzymes responsible for breakdown of chitin are
a. Chitinase
b. Chitobiase
c. Both a and b
d. None of the above

Answers				
	225. d	228. c	231. c	234. a
	226. c	229. c	232. d	235. b
	227. b	230. d	233. b	236. c

237. Which of the followings does not inhibit bio synthesis of CH_4 ?
a. Nitrate b. Nitrite
c. Nitrous oxide d. Ammonium

238. Which of the followings represents rod shaped methane producing bacteria ?
a. Methanobacteria
b. Methanosarcina
c. Methanococcus
d. None of the above

239. Which of the following mechanisms/ pathways are proposed for methane production in soil ?
a. Reduction of CO_2 to CH_4
b. Conversion of methyl groups to methane
c. Both a and b
d. None of the above

240. Which of the following groups of microorganisms are methylotrophic ?
a. Methylomonas and methylococcus
b. Methylosinus and methylobacter
c. Methylocystis
d. All the above

241. The greatest source of biological leak in the otherwise closed nitrogen cycle is
a. Nitrification
b. Denitrification
c. Ammonia volatilization
d. None of the above

242. Mineralization of nitrogen represents which of the following microbiological processes?
a. Nitrification
b. Ammonification
c. Denitrification
d. Both a and b

243. The major end products of aerobic protein breakdown are
a. Carbon di Oxide and ammonium
b. Sulfate and water
c. Both a and b
d. None of the above

244. The anaerobic breakdown of protein rich materials is termed
a. Putrefaction
b. Denitrification
c. Depolymerization
d. None of the above

245. Which of the following groups represents final products of anaerobic protein breakdown ?
a. Ammonium, amines and CO_2
b. Organic acids, mercaptans and hydrogen sulphide
c. Both a and b
d. None of the above

246. Which of the following bacterial genera are dominant decomposers of protein ?
a. *Pseudomonas* and *Bacillus*
b. *Clostridium* and *Serratia*
c. *Micrococcus*
d. All the above

247. Which of the following fungal genera are protein decomposers ?
a. Alternaria and Aspergillus
b. Mucor and Penicillium
c. Rhizopus
d. All the above

248. Which of the following soil moisture conditions favour nitrogen mineralization the most ?
a. Continuous wetting
b. Alternate drying and wetting
c. Continuous drying
d. None of the above

Answers				
	237. d	240. d	243. c	246. d
	238. a	241. b	244. a	247. d
	239. c	242. d	245. c	248. b

249. Which of the followings represent the optimum temperature range for nitrogen mineralization ?
a. Below 20°C
b. Between 20 - 40°C
c. Between 40 - 60°C
d. Above 60°C

250. The rise in pH near the urea particles applied to soil is caused by production of
a. Ammonia
b. Nitrate
c. Nitrite
d. None of the above

251. Which of the followings is the intermediate product in hydrolysis of urea ?
a. Ammonium carbonate
b. Ammonium carbamate
c. CO_2
d. NH_3

252. Which of the following bacterial genera produce enzyme urease ?
a. *Bacillus* and *Micrococcus*
b. *Pseudomonas* and *Klebsiella*
c. *Cyanobacterium* and *Clostridium*
d. All the above

253. The group of true bacteria termed 'urea bacteria' bears the properties
a. Tolerance to high urea levels
b. High nutritional affinity for the compound (urea)
c. Develops well in alkaline conditions
d. All the above

254. Which of the following bacterial genera fall in the group 'urea bacteria' ?
a. *Bacillus pasteurii*
b. *Bacillus freudenreichii*
c. Both a and b
d. None of the above

255. Some microorganisms devoid of urease enzymebreaks down urea into
a. Allophanic acid b. Acetic acid
c. Butyric acid d. None

256. 'Nitrogen factor' defines
a. Number of units of inorganic nitrogen immobilized for each hundred units of material undergoing decomposition
b. The amount of nitrogen need to be added to prevent a net immobilization from the environment
c. Both a and b
d. None of the above

257. Which of the followings happens when organic substrates containing more than 1.8 percent nitrogen decompose in soil ?
a. The inorganic nitrogen level in soil is increased almost immediately
b. A temporary removal of the inorganic nitrogen follows application of the material
c. The inorganic nitrogen level is depleted within a week for upto several months
d. None of the above

258. Upon decomposition of added organic substrate containing upto 1.8 percent nitrogen
a. Inorganic nitrogen will deplete within a week and the deficiency will not be alleviated for several months
b. Temporary removal of nitrogen occurs at initial stages followed by a stage when mineralization will exceed immobilization
c. Both a and b
d. None of the above

Answers				
	249. c	252. d	255. a	258. b
	250. a	253. d	256. c	
	251. b	254. c	257. a	

259. Which of the following groups are formed due to protease action on protein molecules?
a. Amino group b. Carboxyl group
c. Methyl group d. Both a and b

260. The action of protease enzyme on protein molecules is termed
a. Hydrolysis
b. Hydration
c. Oxidation
d. None of the above

261. The common mechanisms for initial degradation of amino acids include
a. Deamination
b. Decarboxylation
c. Both a and b
d. Dehydrogenation

262. 2 - chloro - 6 (trichloromethyl) pyridine is an example of
a. Nitrification inhibitor
b. Ammonification inhibitor
c. Both a and b
d. None of the above

263. Which of the followings are the most dominant microorganisms in nitrification ?
a. *Nitrosomonas* b. *Nitrobacter*
c. Both a and b d. *Nitrosospira*

264. Which of the followings represents the most dominant microorganism in conversion of ammonia to nitrite ?
a. *Nitrosomonas winogradsky*
b. *Nitrosomonas europaea*
c. *Nitrobacter winogradsky*
d. None of the above

265. Which of the followings may prove toxic to *nitrobacter* in alkaline environments ?
a. Ammonia b. Nitrate
c. Nitrite d. None

266. The enrichment of water with nutrients causing profuse unwanted growth of algae or other rooted aquatic plant is termed as
a. Fortification
b. Eutrophication
c. Algalization
d. None of the above

267. Which of the followings represents approximately the minimum level of nitrate nitrogen capable of causing eutrophication?
a. 0.3 ppm b. 12 ppm
c. 37.5 ppm d. 39 ppm

268. Which of the followings represents the maximum permissible limit of nitrate nitrogen in drinking water ?
a. 25 ppm b. 10 ppm
c. 0.1 ppm d. None

269. Which of the following diseases is caused by nitrate pollution ?
a. Haemophilia
b. Methemoglobinemia
c. Itai - Itai
d. None of the above

270. In methemoglobinemia, the haemoglobin is converted to
a. Methemoglobin
b. Leghemoglobin
c. Phytin
d. None of the above

271. Which of the following forage crops are heavy accumulators of nitrate ?
a. Corn and sorghum
b. Sudan grass and oat
c. Both a and b
d. None of the above

Answers					
	259. d	262. a	265. a	268. b	271. c
	260. a	263. c	266. b	269. b	
	261. c	264. b	267. a	270. a	

272. Reduction of nitrate and nitrite during denitrification yields
a. Molecular nitrogen
b. Nitrous oxide
c. Nitric acid
d. Both a and b

273. The microbial reduction of nitrate as a nutrient source to ammonical form is termed
a. Nitrate assimilation
b. Nitrate respiration
c. Denitrification
d. All of these

274. Denitrification may also be termed as
a. Nitrate assimilation
b. Nitrate respiration
c. Denitrification
d. All the above

275. Which of the following mechanisms are responsible for nitrogen volatilization ?
a. Non biological losses of ammonia
b. Chemical decomposition of nitrite
c. Microbial denitrification liberating N_2, N_2O and NO
d. All the above

276. In soils with high pH, the accumulated nitrite decompose spontaneously forming
a. N_2 b. N_2O
c. NO_2 d. All the above

277. Application of ammonium to soils too acidic for nitrification results in
a. No volatilization
b. High volatilization
c. Moderate volatilization
d. None of the above

278. The bacterial genera active in denitrification include
a. *Pseudomonas* b. *Bacillus*
c. *Paracoccus* d. All the above

279. Upon addition of organic matter to a water logged soil containing low carbon, the rate of denitrification/ nitrogen volatilization
a. Increases
b. Decreases
c. Does not change
d. Either decreases or does not change

280. Upon addition of organic substances in well drained soils, nitrogen losses
a. Increase
b. Decrease
c. Either increase or decrease
d. Does not change

281. At soil pH above 6, which of the followings represents dominant end product of denitrification ?
a. N_2O b. N_2
c. NO_2 d. NO

282. Which of the followings represents dominant end product of denitrification in acidic soil condition ?
a. N_2O b. N_2
c. NO_2 d. NO

283. Which of the followings represents a dominant anaerobic N_2 fixer ?
a. *Azotobacter*
b. *Clostridium*
c. *Beizerinckia*
d. None of the above

284. *Aulosira, Anabaena, Anabaenopsis, Cylindrospermum, Nostoc* and *tolypothrix* are examples of
a. N_2- fixing bacteria
b. BGA
c. Denitrifier
d. None of the above

Answers					
	272. d	275. d	278. d	281. b	284. b
	273. a	276. d	279. a	282. a	
	274. b	277. a	280. b	283. b	

285. Which of the followings represents acid tolerant N_2 – fixing bacteria ?
a. *Beijerinckia* b. *Derxia*
c. Both a and b d. *Clostridium*

286. In filamentous BGA species like *Anabaena, Cylindrospermum* and *Mastigocladus* etc., site of active N2- fixation is
a. Heterocyst
b. Vegetative cells
c. Both a and b
d. None of the above

287. *Collema, Lichina, Peltigera* and *Sterocaulon* are examples of N_2- fixing
a. Alga b. Lichen
c. Fungus d. None

288. Which of the following groups represents photosynthetic N_2- fixing bacteria ?
a. Non sulfur purple bacteria
b. Purple sulfur bacteria
c. Green sulfur bacteria
d. All the above

289. In presence of ammonium or nitrate, the rate of biological N_2 – fixation is
a. Enhanced
b. Suppressed
c. Either enhanced or not affected
d. None of the above

290. Which of the following groups of elements are required for N_2 – fixation ?
a. Molybdenum and Iron
b. Calcium and Cobalt
c. Both a and b
d. None of the above

291. The approximate molecular weight of the Mo containing protein in nitrogenase enzyme is
a. 1,00,000 b. 2,00,000
c. 60,000 d. 5,00,000

292. The approximate molecular weight of the protein not containing Mo in nitrogenase enzyme is
a. 60,000 b. 2,00,000
c. 1,00,000 d. None

293. Which of the following elements is common in both the types of protein molecules in nitrogenase enzyme ?
a. Mo b. Co
c. Fe d. None

294. Which of the following traits are true for *Rhizobium* ?
a. Gram negative, non spore forming, aerobic, rods
b. Gram positive, non spore forming, aerobic rods
c. Gram negative, spore forming, aerobic rods
d. Gram negative, non spore forming, anaerobic rods

295. The bacteria *Rhizobium* has striking similarity with
a. *Agrobacterium radiobacter*
b. *Azotobacter chroococcum*
c. *Azospirillum lipoferum*
d. None of the above

296. The phenomenon of a bacteria infecting plants outside their cross inoculation groups is termed
a. Symbiotic association
b. Symbiotic promiscuity
c. Criss-cross infection
d. None of the above

Answers					
	285. c	288. d	291. b	294. a	
	286. a	289. b	292. a	295. a	
	287. b	290. c	293. c	296. b	

297. Which of the followings does not represent non leguminous N_2 – fixing tree ?
a. *Alnus* b. *Casuarina*
c. *Gmelina* d. *Myrica*

298. Which of the followings elements is found in the form of compounds containing vitamin B_{12} in legume root nodules ?
a. Co
b. Mo
c. Fe
d. None of the above

299. The bulk of the phosphorus in a bacterial cell is found in
a. Cell wall
b. RNA
c. DNA
d. None of the above

300. The H_2S liberating bacteria that converts ferric phosphate to ferrous sulfide facilitates
a. Fixation of P
b. Plant uptake of P
c. Solubilization of P
d. Both b and c

301. Mineralization of organic phosphorus is
a. Higher in virgin soils
b. Higher in cultivated soils
c. Equal in both virgin and cultivated soils
d. Either higher in virgin soils or equal with cultivated soils

302. The enzyme phytase liberates phosphates from
a. Phytic acid
b. Phytin
c. Both a and b
d. None of the above

303. Which of the following ranges of phosphorus holds true for fungal mycelium ?
a. 1-3%
b. 0.5-1%
c. 10-15%
d. None of the above

304. Which of the following ranges of phosphorus holds true for bacterial cell ?
a. 1-3%
b. 0.5-1%
c. 10-15%
d. None of the above

305. Which of the followings is the critical C : P ratio of crop residue, below which net mineralization of P is affected ?
a. 500 : 1
b. 300 : 1
c. 200 : 1
d. None of the above

306. Which of the followings represents the approximate N : P ratios for humus and microbial cells ?
a. 20 : 1
b. 10 : 1
c. 25 : 1
d. None of the above

307. Which of the following groups represents sulfur containing substrates for microorganisms ?
a. Cystine and Methionine
b. Thiamin and Biotin
c. Lipoic acid
d. All the above

308. The approximate S content in most of the microorganisms ranges from
a. 0.1-1%
b. 1-5%
c. 5-10%
d. None of the above

Answers				
	297. c	300. d	303. b	306. b
	298. a	301. a	304. a	307. d
	299. b	302. c	305. c	308. a

309. The critical C : S ratios of carbonaceous materials above which immobilization dominates mineralization ranges from
a. 200 : 1 to 400 : 1
b. 50 : 1 to 75 : 1
c. 100 : 1 to 150 : 1
d. None of the above

310. Which of the following elemental S oxidizing bacterial species can grow actively at pH 3 or below ?
a. *Thiobacillus denitrificans*
b. *Thiobacillus novellus*
c. *Thiobacillus thiooxidans*
d. None of the above

311. Which of the microorganisms have potential role in controlling potato scab disease ?
a. *Thiobacillus sp.*
b. *Streptomyces sp.*
c. *Pseudomonas sp.*
d. None of the above

312. In which of the following pH ranges, sulfur reduction takes place ?
a. 3.5 - 4 b. 4 - 5.5
c. Below 3.5 d. 6 and above

313. Which of the microorganisms is dominant in reduction of sulfur ?
a. Desulfovibrio desulfuricans
b. Thiobacillus novellus
c. Both a and b
d. None of the above

314. Which of the following microorganisms is responsible for contributing volatile sulfur compounds to the atmosphere ?
a. *Clostridium* and *Pseudomonas*
b. *Aspergillus* and *Schyzophyllum*
c. Both a and b
d. None of the above

315. Which of the followings have been as biological indicators of SO_2 pollution in atmosphere ?
a. PGPRs
b. Lichens
c. Both a and b
d. None of the above

316. Which of the following volatile sulfur compounds are known to inhibit nitrification ?
a. Methane thiol
b. Dimethyl sulfide
c. CH_2S
d. All the above

317. The microorganism dominant in bringing about release of iron from sulfide ore is
a. *Thiobacillus ferrooxidans*
b. *Thiobacillus thiooxidans*
c. *Thiobacillus novellus*
d. None of the above

318. The conversion of ferric iron to ferrous iron is brought about by
a. *Bacillus* and *Clostridium*
b. *Klebsiella* and *Pseudomonas*
c. Both a and b
d. None of the above

319. Gleying, an outcome of microbial metabolism of iron is marked by production of
a. Ferrous sulfate
b. Ferrous sulfide
c. Ferric sulfate
d. None of the above

Answers				
	309. a	312. d	315. b	318. c
	310. c	313. a	316. d	319. b
	311. a	314. c	317. a	

320. Which of the following groups of microorganisms are responsible for oxidation of Mn ?
a. *Arthrobacter* and *Bacillus*
b. *Corynebacterium* and *Klebsiella*
c. *Metallogenium* and *Pedomicrobium*
d. All the above

321. The microorganisms responsible for causing arsenic poisoning through production of volatile arsenic compounds are
a. *Aspergillus* and *Mucor*
b. *Scopulariopsis* and *Fusarium*
c. Both a and b
d. None of the above

322. The phenomenon representing association of mutual benefit to two species of interacting microorganisms where the cooperation is not obligatory for their existence or performance is termed
a. Symbiosis
b. Protocooperation
c. Commensalism
d. None of the above

323. The type of microbial interaction in which only one species derives benefit while the other remains unaffected is termed
a. Symbiosis
b. Proto cooperation
c. Commensalism
d. None of the above

324. The type of microbial interaction in which one organism is suppressed as the two species struggle for limiting quantities of common requirements is termed
a. Competition
b. Proto cooperation
c. Commensalism
d. None of the above

325. The type of microbial interaction in which one species is suppressed, while the other is not affected is termed
a. Predation b. Competition
c. Commensalism d. Ammensalism

326. The chemotherapeutic substances produced by actinomycetes are
a. Streptomycin and Chloramphenicol
b. Cyclohexamide and Chlortetracycline
c. Both a and b
d. None of the above

327. The most frequently encountered bacteria synthesizing pyocyanin are
a. *Bacillus* b. *Pseudomonas*
c. *Azotobacter* d. Both a and b

328. A fungistatic agent
a. Inhibits fungus
b. Kills fungus
c. Either inhibits or kills fungus
d. Does not affect fungus

329. The microorganism showing predation and parasitism of bacteria includes
a. Protozoa
b. Myxobacteria
c. Cellular slime molds
d. All the above

330. Bdellovibrio is a predator of
a. Protozoa b. Bacteria
c. Fungi d. Algae

331. Digestion of the walls of cells or filaments of susceptible species by means of extracellular enzymes excreted by lytic population is called
a. Autolysis
b. Heterolysis
c. Both a and b
d. None of the above

Answers				
	320. d	323. c	326. c	329. d
	321. c	324. a	327. d	330. b
	322. b	325. d	328. a	331. b

332. A self destruction by enzymes produced by the cell or hypha that is digested is called
a. Autilysis
b. Heterolysis
c. Selflysis
d. None of the above

333. The heterolysis of fungi may be brought about by
a. *Streptomyces* and *Nocardia*
b. *Bacillus* and *Pseudomonas*
c. Both a and b
d. None of the above

334. Which of the following compounds imparts resistance to lysis of microorganisms ?
a. Melanin
b. Peptidoglycan
c. Chitin
d. None of the above

335. The rhizosphere effect can be quantitatively represented by
a. C : N ratio
b. R : S ratio
c. C : P ratio
d. None of the above

336. The R : S ratio of actinomycetes, protozoa and algae generally fall within the range
a. 20 : 1 to 30 : 1
b. 10 : 1 to 15 : 1
c. 2 : 1 to 3 : 1
d. None of the above

337. Which of the following sequence is true in terms of their R: S ratios ?
a. Fungi > Bacteria > Protozoa
b. Fungi > Protozoa > Bacteria
c. Bacteria > Protozoa > Fungi
d. Bacteria > Fungi > Protozoa

338. The microbiological conversion of an inhibitory pesticide molecule into a non toxic product is called
a. Detoxication b. Activation
c. Conjugation d. Defusing

339. Which of the followings represents different types of conversion of pesticides by microorganisms ?
a. Detoxication and degradation
b. Conjugation and Complex formation
c. Activation and Defusing
d. All the above

340. The place occupied by an organism in a biotic community is called
a. Niche
b. Unit
c. Ecology
d. None of the above

341. The relationship of a microorganism of a community with the food web in a particular environment is called
a. Symbiosis
b. Trophic level
c. Niche
d. None of the above

342. The heterotrophic soil microorganisms can also be termed as
a. Lithotrophs
b. Chemoorganotrophs
c. Both a and b
d. None of the above

343. The total physical environment of any living organism including soil microorganisms is termed
a. Eclology b. Community
c. Niche d. Biosphere

Answers				
	332. a	335. b	338. a	341. b
	333. c	336. b	339. d	342. b
	334. a	337. d	340. a	343. d

344. The microbiological media of which, the chemical composition of some of the ingredients are not known are termed
a. Synthetic media
b. Non synthetic media
c. Organic media
d. Both b and c

345. Jenson's N-free medium is an example of
a. Synthetic medium
b. Non synthetic medium
c. Organic medium
d. None of the above

346. As media ingredients, yeast extract, beef extract, peptone, tryptone etc. serves as sources of
a. Proteins and amino acids
b. Vitamins and growth factors
c. Both a and b
d. Carbon

347. As media ingredients, glucose, sucrose and mannitol etc. serves as sources of
a. Proteins
b. Vitamins
c. Carbon
d. None of the above

348. As ingredients of common media, potassium nitrate, ammonium nitrate etc. serves as
a. Protein source
b. N-source
c. Carbon source
d. Growth factors

349. The common solidifying agent used in media is
a. Agar-agar
b. Beef extract
c. Gum acacia
d. None of the above

350. The media suitable for growth of most of the bacteria is
a. YEMA
b. Nutrient agar (NA)
c. Burk's medium
d. None of the above

351. The medium commonly used for culturing *rhizobium* is
a. Yeast extract mannitol agar (YEMA)
b. Tryptone agar
c. Soil extract agar
d. None of the above

352. The medium commonly used for culturing Azotobacter is
a. Tryptone agar
b. Pikovskaya's medium
c. Jenson's N-free medium
d. None of the above

353. The medium commonly used for growing phosphate solubilizing microorganism is
a. Pikovskaya's medium
b. Tryptone agar
c. Jenson's N-free medium
d. None of the above

354. Which of the following instruments is used for sterilization with steam under pressure?
a. Hot air oven
b. Laminar flow
c. Autoclave
d. None of the above

355. The pressure level used for moist heat sterilization in autoclave is
a. 5 P.S.I b. 10 P.S.I
c. 15 P.S.I d. 20 P.S.I

Answers				
	344. d	347. c	350. b	353. a
	345. a	348. b	351. a	354. c
	346. c	349. a	352. c	355. c

356. Seitz filters or milipore membrane filters are used for
a. Dry heat sterilization
b. Filtration sterilization
c. Filtering the undissolved media ingredients
d. None of the above

357. The temperature range used for dry heat sterilization of glassware is
a. 50-80°C b. 100-120°C
c. 120-140°C d. 160-180°C

358. Microbiological procedures are carried out under aseptic condition in
a. Laminar flow
b. BOD incubator
c. Autoclave
d. None of the above

359. The type of filter used for supplying germ free air in laminar flow is called
a. Seitz filter
b. HEPA filter
c. Bacterial filter
d. None of the above

360. Hockey stick is used for
a. Uniform spreading of inoculum in media plate
b. Stirring the media
c. Pouring the media
d. None of the above

361. Streaking of inoculum on media plate is done through
a. Hockey stick
b. Inoculation needle
c. Hypodermic syringe
d. None of the above

362. UV light in laminar flow chamber is used for
a. Faster growth of inoculum
b. Solidification of medium
c. Killing the contaminating microbes
d. None of the above

363. Which of the following chemicals is used for surface sterilization of hand, working bench etc. inside the laminar flow chamber?
a. Methanol b. Ethanol
c. Distilled water d. Acetone

364. B.O.D incubator is used for facilitating microbial growth by providing
a. Aseptic condition
b. Optimum temperature
c. Optimum pressure
d. All the above

365. The method/methods used for enumerating bacteria are
a. Direct microscopic count
b. Dilution plate counting
c. MPN technique
d. All the above

366. Helber counting chamber is used for counting bacteria through
a. Direct microscopic count
b. Dilution plate counting
c. MPN technique
d. None of the above

367. The common method used for counting soil fungi is
a. Direct microscopic count
b. Dilution plate counting
c. MPN technique
d. None of the above

Answers				
	356. c	359. b	362. c	365. d
	357. d	360. a	363. a	366. a
	358. a	361. b	364. b	367. b

368. The medium used for quantification of ammonifiers in soil is
a. Jenson's N-free medium
b. Remy's medium
c. YEMA broth
d. None of the above

369. The medium used for quantification of nitrifiers in soil is
a. Nutrient agar
b. Stephenson's Nitrosomonas medium
c. Stephenson's Nitrobacter medium
d. Both b and c

370. The medium used for quantification of S oxidizing bacteria *Thiobacillus thiooxidans* is
a. Starkey's medium
b. Nutrient agar
c. YEMA
d. None of the above

371. The medium used for isolation of Thiobacillus denitrificans is
a. Nutrient agar
b. Starkey's medium
c. Trautwein's medium
d. None of the above

372. The medium used for isolation of sulphate reducing bacteria is
a. Starkey's medium
b. Pikovskaya's medium
c. Burk's medium
d. Van Delden's agar medium

373. The medium used for isolation of iron precipitating bacteria is
a. Van Delden's agar medium
b. Ferric ammonium Citrate nitrate agar
c. Burk's medium
d. None of the above

374. Semi solid malate medium and Nitrogen free bromothymol blue medium are used for isolation of
a. *Rhizobium* b. *Azotobacter*
c. *Azospirillum* d. None of these

375. The most common medium used for culturing BGA is
a. NFB medium
b. Burk's medium
c. Jensen's medium
d. Fogg's nitrogen free medium

376. The principle of gram staining is based on differences in
a. Composition of bacterial cell wall
b. Size of bacteria
c. Shape of bacteria
d. Colour of bacteria

377. The gram reaction of a bacteria is mostly governed by the content of
a. Chitin
b. Nucleic acid
c. Peptidoglycan
d. None of the above

378. Peptidoglycan content (on dry weight basis) in the call wall of gram positive bacteria can be
a. Less than 5%
b. 5-10%
c. 50% or more
d. None of the above

379. In general, peptidoglycan content (on dry weight basis) in the cell wall of gram negative bacteria is
a. Less than 10%
b. More than 10%
c. 25-30%
d. More than 50%

Answers				
	368. b	371. c	374. c	377. c
	369. d	372. d	375. d	378. c
	370. a	373. b	376. a	379. a

380. Besides a basic dye, the other solution/ reagents required in gram staining includes
a. Mordent
b. Decolourizing agent
c. Counter stain
d. All the above

381. In gram staining, methylene blue, crystal violet and carbol fuchsin are used as
a. Basic dye
b. Mordent
c. Counter stain
d. Decolourizing agent

382. Carbol Fuchsin consists of
a. Basic dye b. Fuchsin
c. Phenol d. All the above

383. In gram staining procedure, acids, bases, metallic salts and iodine are used as
a. Basic dye
b. Mordent
c. Counter stain
d. None of the above

384. The function of mordent in gram staining procedure is to
a. Enhance the affinity between cell wall and dye
b. Reduce the affinity between cell wall and dye
c. Clean the slide
d. None of the above

385. In gram staining procedure, the decolourizing agent
a. Fixes the stain on cell wall
b. Removes the stain from cell wall
c. Does not affect the stain
d. None of the above

386. In gram staining procedure, the counter stain
a. Imparts colour to the stained cell wall
b. Enhances colour of the stained cell wall
c. Imparts colour to the decolourized cell wall
d. None of the above

387. In gramstaining procedure, safranin is used as
a. Counter stain
b. Basic dye
c. Mordent
d. None of the above

388. Hot Malachit green stain is used for
a. Endospore staining
b. Flagella staining
c. General staining for fungi
d. None of the above

389. After acid fast staining, the acid fast bacteria is coloured
a. Blue
b. Green
c. Red
d. None of the above

390. The stain used for fat staining is
a. Methylene blue
b. Carbol fuchsin
c. Safranin
d. Sudan Black B

391. After fat staining, the fat globules in the cell are coloured
a. Red b. Blue
c. Black d. Green

392. The most commonly used stain (s) for general staining of fungi is/ are
a. Carbol Fuchsin b. Methylene blue
c. Cotton blue d. Both b and c

Answers					
	380. d	383. b	386. c	389. c	392. d
	381. a	384. a	387. a	390. d	
	382. d	385. b	388. a	391. c	

393. Hydrolysis of starch leads to production of
a. Dextrin
b. Maltose
c. Glucose
d. All of the above

394. In qualitative test for starch, addition of iodine solution develops
a. Red colour
b. Blue colour
c. Green colour
d. Either b or c

395. The medium that can be used for isolation of starch hydrolyzing microorganisms is
a. Starch agar medium
b. Soil extract agar
c. Nutrient agar
d. None of the above

396. The medium used for isolation of protein hydrolyzing bacteria is
a. Soil extract agar
b. Starch agar medium
c. Skim - milk agar medium
d. None of the above

397. Gelatine hydrolysis test is an indicator of
a. Starch breakdown by microorganisms
b. Nitrifying activity of microorganisms
c. Proteolytic activity of microorganisms
d. None of the above

398. The medium used for estimation of anaerobic N_2 - fixation by bacteria is
a. NFB medium
b. N - free Winogradsky's medium
c. Burk's medium
d. None of the above

399. The medium used for enumeration of anaerobic N_2 – fixing bacteria is
a. YEMA
b. NFB medium
c. Glucose phosphate N_2 free medium
d. None of the above

400. The most common contaminant of rhizobium isolated from legume root nodule is
a. *Agrobacterium*
b. *Azotobacter*
c. *Azospirillum*
d. None of the above

401. Ketolactase test is used for distinguishing
a. *Rhizobium* from *Agrobacterium*
b. *Azotobacter* from *Azospirillum*
c. *Rhizobium* from *Azospirillum*
d. None of the above

402. The medium used for ketolactase test is
a. YEMA
b. Burk's medium
c. Lactose agar medium
d. Both b and c

403. Bacterial growth in Hoffer's alkaline broth indicates
a. Purity of *Rhizobium*
b. Contamination of *Rhizobium* with *Agrobacterium*
c. Presence of pure cultures of *Azotobacter*
d. None of the above

404. Blackening of lead acetate papers in H_2S production test implies
a. Presence of pure cultures of *Azospirillum*
b. Purity of *Rhizobium*
c. Contamination of *Rhizobium* with *Agrobacterium*
d. None of the above

Answers				
	393. d	396. c	399. c	402. c
	394. b	397. c	400. a	403. b
	395. a	398. b	401. a	404. c

405. Wet- sieving- decanting process is used for
a. Enumeration of Azotobacter
b. Recovering VAM propagules from soil
c. Isolation of Azospirillum
d. None of the above

406. 'Floatation bubbling process' followed by 'density gradient centrifugation process' is used for
a. Purification of VAM spores
b. Culturing of VAM spores
c. Killing of VAM spores
d. None of the above

407. 'Host - baiting technique' is used for
a. Purification of VAM spores
b. Killing of VAM spores
c. Culturing of VAM spores
d. Extracting all the VAM spores present in soil

408. During isolation of VAM propagules, 'Sodium hypochlorite' solution is used for
a. Purification of VAM spores
b. Killing of VAM spores
c. Surface sterilization of VAM spores
d. None of the above

409. Which of the following genera of microorganisms represent ectomycorrhizal fungi ?
a. *Alpova, Amanita, Astreus*
b. *Boletu, Cortinarius, Fuscobo lectinus*
c. *Hebebma, Hymenogaster, Hysterangium*
d. All the above

410. The earliest biofertilizer industry set up in 1895 sold legume inoculants on commercial basis under the trade name
a. Azospirillin
b. Nitragin
c. Bacterin
d. None of the above

411. Biofertilizer inoculation technique was started during
a. 1880 b. 1885
c. 1887 d. 1895

412. In India, commercial production of *rhizobiuim* was started during
a. 1930 b. 1934
c. 1940 d. 1964

413. The earliest biofertilizer industry was set up in USA by
a. Nobbe and Hiltner
b. Beijerinck
c. Winogradsky
d. None of the above

414. YEMA medium was introduced for *rhizobium* by
a. Hiltner b. Nobbe
c. Fred d. Joseph Lister

415. BGA was discovered as a nitrogen fixer in paddy field by
a. P.K. Dey b. Beijerinck
c. Fred d. None of these

416. Peat was recognized as a carrier for bacterial culture during
a. 1930 b. 1948
c. 1950 d. 1964

417. The first isolation of non symbiotic N2-fixing organism done by P.K. Dey and R. Bhattacharya was
a. *Derxia gummosa*
b. *Azotobacter*
c. *Azospirillum*
d. None of the above

Answers					
	405. b	408. c	411. c	414. c	417. a
	406. a	409. d	412. d	415. a	
	407. d	410. b	413. a	416. b	

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418. In India, first study of legume- *rhizobium* symbiosis was carried out during 1920 by
a. P.K. Dey
b. N.V. Joshi
c. R. Bhattacharya
d. None of the above

419. Earliest production of *rhizobium* inoculant in India was done by
a. P.K. Dey
b. N.V. Joshi
c. M.R. Madhok
d. B.N. Uppal

420. Indian peat as a carrier in biofertilizer was at first reported by
a. N.V. Joshi
b. M.R. Madhok
c. B.N. Uppal
d. V. Iswaran

421. Charcoal, lignite and FYM as alternative to peat as carriers in biofertilizer was first reported in India by
a. V. Iswaran
b. P.K. Dey
c. N.V. Joshi
d. None of the above

422. ISI mark was assigned to *rhizobium* inoculant during
a. 1964 b. 1970
c. 1977 d. 1982

423. ISI standards for *Azotobacter* inoculant was published for the first time during
a. 1979 b. 1985
c. 1988 d. 1992

424. All India Coordinated Research Project on Biological Nitrogen Fixation was initiated in
a. 1975
b. 1979
c. 1983
d. None of the above

425. National Project on Development and Use of Biofertilizers was set up during
a. 1979 b. 1980
c. 1981 d. 1983

426. National Research Centre for BGA was set up at IARI during
a. 1982
b. 1985
c. 1988
d. None of the above

427. National facility of *rhizobium* germplasm collection was set up at IARI during
a. 1982
b. 1991
c. 1997
d. None of the above

428. Publication of Biofertilizer Newsletter under National Biofertilizer project was started from
a. 1982 b. 1991
c. 1992 d. 1993

429. Which of the following genus under *rhizobium* contributes to stem nodulation?
a. *Azorhizobium*
b. *Bradyrhizobium*
c. *Rhizobium*
d. None of the above

430. Which of the following morphological traits does not apply for *rhizobium* ?
a. Gram –ve
b. Cell size more than 2μ wide.
c. Motile with peritrichous flagella
d. Accumulate poly β- hydroxy butyrate granules

Answers					
	418. b	421. a	424. b	427. b	430. b
	419. c	422. c	425. d	428. d	
	420. d	423. a	426. c	429. a	

431. NifTal – 1000, NC- 92, SB- 103, GMBS 1 etc. are important strains of
a. *Rhizobium*
b. *Azotobacter*
c. *Azospirillum*
d. None of the above

432. Which of the following morphological traits does not hold true for *Azotobacter* ?
a. Large ovoid cells
b. Polymorphic
c. Gram +ve
d. Accumulate poly β- hydroxy butyrate granules

433. Which of the following morphological traits does not hold true for *Azospirillum*?
a. Curved rods
b. Accumulate poly β- hydroxy butyric acid
c. Gram +ve
d. All the above

434. Development of white pellicle 2-4mm below the surface of the medium is a characteristic feature of
a. *Azotobacter*
b. *Azospirillum*
c. *Rhizobium*
d. None of the above

435. Which of the following pigments is present in BGA ?
a. Carotene b. Xanthophylls
c. Phycocyanine d. All the above

436. Clearing zone around the colonies indicate
a. Phosphate solubilizing microorganisms
b. Nitrogen fixing bacteria
c. Both a and b
d. None of the above

437. As per ISI specification, the carrier for biofertilizer should pass through
a. 100 - 110μ IS sieve
b. 120 - 150μ IS sieve
c. 150 - 212μ IS sieve
d. None of the above

438. Which of the following standards are to be met by *Rhizobium* biofertilizer ?
a. Viable cell count of minimum 10^7 cells/ g of carrier
b. pH range of 6-7.5
c. Moisture content 35-40%
d. All the above

439. The minimum shelf life of *Rzizobium* biofertilizer should be
a. 4 months
b. 6 months
c. 12 months
d. None of the above

440. Which of the following specifications should not be met by *Azotobacter* biofertilizer ?
a. Viable cell count of minimum 10^6 cells/ g of carrier
b. pH range of 6.5- 7.
c. Moisture content of 60-70%
d. Minimum 6 months of shelf life

441. In case of standard *Azotobacter* inoculant, minimum N- fixation should be
a. Not less than 20mg per g of sucrose utilized
b. Not less than 10mg per g of sucrose utilized
c. Not less than 25mg per g of sucrose utilized
d. Not less than 50mg per g of sucrose utilized

Answers				
	431. a	434. b	437. c	440. c
	432. c	435. d	438. d	441. b
	433. c	436. a	439. b	

442. Which of the following standards does not hold good for commercial *Azospirillum* inoculant ?
a. Viable cell count of minimum 10^7 cells/ g of carrier
b. pH range of 5-6
c. Moisture content of 35-40%
d. Minimum 6 months of shelf life

443. Which of the followings does not hold good for commercial PSB inoculant?
a. Viable cell count of minimum 10^6 cells/ g of carrier.
b. pH range of 6.5-7.5
c. Moisture content 35-40%
d. Minimum 6 months of shelf life

444. Which of the soil parameter ranges is not optimum for higher efficacy of biofertilizers ?
a. Soil temperature range of 28-30 °C
b. Soil moisture range of 30-40%
c. Soil organic matter range of 20-25%
d. Soil pH range of 6.5-7.5

445. In application through seed treatment, 200g of biofertilizer is sufficient for approximately
a. 40-50kg seeds b. 30-35kg seeds
c. 20-25kg seeds d. 10-12kg seeds

446. The dose of *Azospirillum* inoculant required for its application through seedling treatment in paddy is approximately
a. 2-3 kg/ha
b. 8-10 kg/ha
c. 14-15 kg/ha
d. None of the above

447. Which of the followings is/ are responsible for disappearance of *Rhizobia* from soil ?
a. Bacteriophages named Rhizophage
b. Nematode *Meloidogyne sp.*
c. Both a and b
d. None of the above

448. In biofertilizer application through seed treatment, gum acacia is used as
a. Killer of antagonistic organisms
b. Maintainer of inoculant viability
c. Sticker or adhesive
d. None of the above

449. Which of the following methods can be used for application of *azolla* to transplanted paddy ?
a. Incorporation of fresh *azolla* @ 3-4t/ ha after draining out water
b. Growing *azolla* as dual crop with paddy
c. Application of *azolla* compost
d. All the above

450. For dual cropping with rice, fresh *azolla* @3-4t/ ha is applied
a. At the time of transplanting of paddy
b. 1-2 weeks after transplanting of paddy
c. As the paddy reaches reproductive stage
d. None of the above

451. Which of the following elements are of utmost importance for getting maximum response from N- fixing biofertilizers?
a. Nitrogen b. Phosphorus
c. Molybdenum d. Both b and c

452. The threshold level of Mo for optimum growth and nitrogenase activity of *azotobacter* is
a. 0.1-1ppm
b. 2-5ppm
c. 8-10ppm
d. None of the above

Answers				
	442. b	445. d	448. c	451. d
	443. a	446. a	449. d	452. a
	444. c	447. c	450. b	

453. The threshold level of Mo for optimum growth and nitrogenase activity of azolla is
a. 0.1µg/ litre
b. 1µg/ litre
c. 10µg/litre
d. None of the above

454. The N fixing bacteria Acetobacter diazotrophicus may be characterized by
a. Highly specific to sugar rich crops
b. Tolerance to strongly acidic conditions
c. Tolerance to high nitrate levels
d. All the above

455. Acetoclastic bacteria can be characterized by
a. Methane production exclusively from acetic acid through anaerobic digestion
b. Very slow growth rate with doubling time of several days
c. Both a and b
d. None of the above

456. Acetylene reduction assay (ARA) is based on the activity of nitrogenase enzyme to
a. Reduce acetylene to ethylene
b. Convert ethylene to acetylene
c. Both a and b
d. None of the above

457. Actinomycetes differ from fungi by that
a. Actinomycetes are prokaryotic
b. Actinomycetes have bacterial type cell wall
c. Actinimycetes are inhibited by anti bacterial agents
d. All the above

458. Agar-agar, the solidifying agent in microbiological media is derived from
a. Petroleum products
b. Ceylon moss (*Gelidium corneum*)
c. Microbial byproducts
d. None of the above

459. The term 'algalisation' stands for
a. Inoculation of soils with algae
b. Production of algae from its dormant structures
c. Dominance of algae over other microorganisms
d. None of the above

460. Associative symbiotic bacteria can fix nitrogen
a. Inside the plant roots
b. In the soils surrounding the plant roots
c. Both a and b
d. None of the above

461. The term 'autocolony' stands for
a. Any microbial colony
b. Microbial colony formed in the cells of parent colony
c. Both a and b
d. None of the above

462. A pure culture of a bacterium may be called
a. Axenic culture
b. Auxotrophic culture
c. Anoxic culture
d. None of the above

463. The term 'azofication' stands for
a. Symbiotic N fixation by *rhizobium*
b. Associative symbiotic N- fixation by *azospirillum*
c. Non symbiotic N- fixation by *Azotobacter*
d. None of the above

Answers				
	453. b	456. a	459. a	462. a
	454. d	457. d	460. c	463. c
	455. c	458. b	461. b	

464. Which of the following microorganisms take active part in compost preparation ?
a. *Chaetomium* and *Trichoderma*
b. *Cellulomonas* and *Clostridium*
c. *Nocardia* and *Streptomyces*
d. All the above

465. Which of the followings is dominant in N-fixation in boggy acid soils ?
a. *Rhizobium meliloti*
b. *Azotobacter chroococcum*
c. *Clostridium pasteurianum*
d. None of the above

466. Congo red test is used to
a. Differentiate *rhizobia* from other contaminants
b. Differentiate *Azotobacter* from *azospirillum*
c. Quantify N- fixing potential of *rhizobia*
d. None of the above

467. In congo red test, *rhizobia* stand out as
a. Pinkish colonies
b. White, translucent, glistening colonies
c. Red, large colonies
d. None of the above

468. 'Hurting net' is produced by
a. N - fixing *rhizobium*
b. Ectotrophic mycorrhiza
c. Both a and b
d. None of the above

469. The acronym 'HEPA' filter stands for
a. High energy particulate air filter
b. Heavy electrical power air filter
c. High efficiency particulate air filter
d. None of the above

470. HEPA filter is capable of screening out particles
a. Smaller than 0.3μm
b. Larger than 0.3μm
c. Larger than 0.1μm
d. None of the above

471. The oldest and most persistent component of soil humus is
a. Humic acid
b. Fulvic acid
c. Humin
d. None of the above

472. Lyophilized culture is a preparation of microorganisms produced by
a. Intermittant heating
b. Freezing at 4°C
c. Freeze drying
d. None of the above

473. In case of sieves, mesh size refers to
a. Size of the sieve as a whole
b. Pore size of the sieve
c. Number of apertures per inch of the sieve
d. None of the above

474. 'Nif' gene is responsible for
a. Nitrification
b. Synthesis and regulation of nitrogenase
c. Denitrification
d. None of the above

475. 'NifTAL' stands for
a. A N- fixing gene
b. A N- fixing bacteria
c. A N- fixing site
d. (Centre for) Nitrogen fixation in Tropical Agricultural Legume

476. *Rhizobium japonicum* mostly causes nodulation in
a. Soybean b. Peas
c. Lentils d. All the above

Answers					
	464. b	467. b	470. b	473. c	476. a
	465. c	468. b	471. a	474. b	
	466. a	469. c	472. c	475. d	

477. *Rhizobium leguminoserum* mostly causes nodulation in
a. Peas b. Lentils
c. Broad beans d. All the above

478. *Rhizobium lupini* causes nodulation in
a. *Lupinous sp.*
b. *Ornithopus sp.*
c. Both a and b
d. None of the above

479. *Rhizobium meliloti* causes nodulation in
a. Sweat clover (melilotis)
b. Alfalfa (Medicago)
c. Fenugreek (Trigonella)
d. All the above

480. In biofertilizer production, the pure culture/ mixture of microorganisms used for starting the fermentation process is termed
a. Fermenter culture
b. Starter culture
c. Pure culture
d. All the above

481. Which of the followings represent stem nodulating legumes ?
a. Aeschynomene b. Sesbania
c. Naptunia d. All the above

482. The 'National Biofertilizer Development Centre' was established during
a. 1980
b. 1983
c. 1985
d. None of the above

483. The 'Solid State Fermentation (SSF)' and 'Submerged Liquid Fermentation (SLF)' procedures are used for
a. Compost making
b. Mass culture of microorganisms
c. Both a and b
d. None of the above

484. Which of the followings is not a characteristic feature of 'Solid State Fermentation process' ?
a. Higher product concentration
b. More virulent and robust spores
c. High cost of raw materials
d. Suitable for small scale industries

485. Which of the following procedures is widely used for producing microbial enzymes and biopesticides ?
a. Solid State Fermentation
b. Submerged Liquid Fermentation
c. Both a and b
d. None of the above

486. In soils with very low organic matter content, the poor performance of *azotobacter* inoculant is mostly attributed to
a. Lack of sufficient population
b. High availability of native soil nitrogen
c. Lack of sufficient energy source for the organism
d. None of the above

487. Who for the first time reported occurrence of nitrogen fixing bacterium *Spirillum lipoferum* in the roots of digit grass ?
a. J. Dobereiner and J.M. Dey
b. P.K. Dey
c. N.V. Joshi
d. M.R. Madhok

488. The preferred carbon sources for *azospirillum* are
a. Malic acid
b. Succinic acid
c. Both a and b
d. None of the above

Answers				
	477. d	480. b	483. b	486. c
	478. c	481. d	484. c	487. a
	479. d	482. b	485. a	488. c

489. Which of the followings is the highly salt tolerant species of *azospirillum* ?
a. *Azospirillum lipoferum*
b. *Azospirillum halopraeferens*
c. *Azospirillum amazonense*
d. *Azospirillum brasilense*

490. Which of the followings is not an advantage of *azospirillum* inoculation ?
a. Fixation of nitrogen
b. Production of Indole Acetic Acid
c. Production of Gibberelic Acid
d. Suppression of pathogenic fungi

491. In the total number of bacteria in rhizosphere, the share of *azospirilum* is
a. 1-10%
b. 20-30%
c. 40-50%
d. None of the above

492. In India, biofertilizer was introduced for the first time in
a. Pea
b. Soybean
c. French bean
d. None of the above

493. Who authored the book 'Introduction to Soil Microbiology' ?
a. A.C. Gaur
b. N.S. Subba Rao
c. Martin Alexander
d. None of the above

494. The book 'Soil Microorganisms and Plant Growth' was authored by
a. P.K. Dey
b. Martin Alexander
c. N.V. Joshi
d. N.S. Subba Rao

495. 'Biofertiliser Newsletter' is published by
a. Indian Agricultural Research Institute
b. NifTAL
c. National Biofertilizer Development Centre
d. None of the above

496. Inhibition of germination of conidia and spores of fungi by soil inhabiting substances is termed
a. Fungistasis
b. Competition
c. Fungicidal
d. Ammensalism

497. Which of the following tests are employed to asses the population or activity of soil microorganisms ?
a. Soil Microbial Biomass carbon (SMBC)
b. Dehydrogenase activity
c. Soil basal respiration
d. All the above

498. The principle of determining soil microbial biomass carbon is based on
a. Changes in weight of fumigated soil in comparison to non fumigated one
b. Differences in pattern of CO_2 release from fumigated and non fumigated soil
c. Differences in pattern and quantity of CO_2 release from fumigated and non fumigated soil
d. None of the above

499. Which of the followings is used as fumigant in determination of Soil Microbial Biomass Carbon ?
a. Alcohol rich chloroform
b. Alcohol free chloroform
c. Formalin
d. None of the above

Answers				
	489. b	492. b	495. c	498. c
	490. d	493. c	496. a	499. b
	491. a	494. d	497. d	

500. In determination of Soil Microbial Biomass Carbon, the $CO_{2=}$ evolved is trapped in
a. Sodium hydroxide
b. Potassium hydroxide
c. Sodium bicarbonate
d. None of the above

501. In determination of dehydrogenase activity, the soil is extracted with
a. 2,3,5- triphenyl tetrazolium chloride (TTC)
b. Triphenyl fermazan (TPF)
c. Methanol
d. None of the above

502. The estimation of soil dehydrogenase activity is based on varying solubility and colour development upon oxidation or reduction of
a. 2,3,5- triphenyl tetrazolium chloride (TTC)
b. Triphenyl fermazan (TPF)
c. Methanol
d. None of the above

503. In estimation of soil dehydrogenase activity, reduction of TTC leads to production of TPF as indicated by development of
a. Greyish colour b. Bluish colour
c. Dark green colour d. Red colour

504. That the enzyme nitrogenase can also reduce C_2H_2 to C_2H_4 was first discovered by
a. Keeney and Bremner
b. Dilworth, Schollhorn and Burris
c. Both a and b
d. None of the above

505. In Acetylene Reduction Assay (ARA), the C_2H_4 produced is detected by
a. N - detector
b. Acetylene detector
c. H - flame ionization detector
d. None of the above

506. In determination of nitrogenase activity by acetylene reduction assay, calcium carbide (CAC_2) is used to
a. Generate acetylene
b. Detect ethylene
c. Both a and b
d. None of the above

507. Which of the following is the first unicellular organism in the world ?
a. *Gunflintia* b. *Eubacterium*
c. *Bacillus* d. *Pseudomonas*

508. Which of the following is the first photosynthetic cell in the world ?
a. *Gunflintia*
b. *Eubacterium*
c. Blue green algae
d. Grass green algae

509. Green plants are also called as
a. Primary producers
b. Secondary producers
c. Consumers
d. Decomposers

510. Of the following, which is soil micro fauna?
a. Diatoms b. Earthworms
c. Moles d. Protozoa

511. Of the following, which is soil macro fauna?
a. Protozoa b. Nematodes
c. Earthworms d. Diatoms

512. Penicillium is an example of
a. Cellulose decomposer
b. Protein decomposer
c. Lignin decomposer
d. Humus former

Answers					
	500. a	503. d	506. a	509. a	512. a
	501. c	504. b	507. b	510. d	
	502. a	505. c	508. a	511. c	

513. Cellulose is mainly decomposed by
a. Penicillium b. Aspergillus
c. Mucar d. All

514. Gallionella is an example of
a. Sulphur oxidizer b. Iron oxidizer
c. Hydrogen oxidizer d. All

515. Of the following, which is/are soil macro fauna ?
a. Earthworms b. Moles
c. Ants d. All

516. *Hydrogenomonas* is an example of
a. Iron oxidizer
b. Sulphur oxidizer
c. Hydrogen oxidizer
d. Denitrifier

517. Iron is oxidized by
a. *Gallionella*
b. *Ferrobacillus*
c. *Hydrogenomonas*
d. All

518. Of the following, which is/are the example(s) for autotrophic organisms ?
a. *Gallionella* b. *Bacillus*
c. *Pseudomonas* d. All

519. Of the following, which is/are the example(s) heterotrophic organism(s) ?
a. *Bacillus* b. *Pseudomonas*
c. *Paracoccus* d. All

520. Arrange the following microorganisms based on their population in soil.
a. Fungi > Bacteria > Actinomycetes
b. Bacteria > Fungi > Actinomycetes
c. Bacteria > Actinomycetes > Fungi
d. Fungi > Actinomycetes > Bacteria

521. Who is the 'Father of field experiment'?
a. M.W. Beijerink
b. J. B . Bousingault
c. C. Theoder de Saucer
d. Arnon and Stout

522. What is the name of the Dutch scientist who isolated the bacteria from the root nodules of legumes ?
a. M. W. Beijerink
b. J.B . Bousingault
c. Theoder de Saucer
d. Arnon and Stout

523. The bacterial population per gram of rhizosphere of soil is
a. 6778×10^6 b. 918×10^3
c. 83×10^6 d. 68×10^6

524. Organisms which grow only when the presence of oxygen is called as
a. Heterotrophs b. Autotrophs
c. Aerobes d. Anaerobes

525. Organisms, which grow and develop in the presence of oxygen but can also adopt themselves to grow under an oxygen depleted conditions is called as
a. Facultative aerobes
b. Facultative anaerobes
c. Obligate aerobes
d. Obligate anaerobes

526. What is the temperature range of mesophiles ?
a. < 10 °C b. 10 – 20 °C
c. 20 – 40 °C d. > 40 °C

527. All the autotrophic organisms get carbon source from
a. Organic matter b. Carbon dioxide
c. Both a and b d. Minerals

Answers					
	513. d	516. a	519. d	522. a	525. b
	514. b	517. d	520. c	523. a	526. c
	515. d	518. a	521. b	524. c	527. b

528. All the heterotrophic organisms get carbon source from
a. Organic matter b. Carbon dioxide
c. Both a and b d. Minerals

529. All the heterotrophic organisms get energy source from
a. Carbon dioxide b. Minerals
c. Carbohydrates d. Organic matter

530. Phototrophic organisms derive their energy from
a. Carbon dioxide b. Organic matter
c. Sun light d. All

531. What is the optimum temperature for the mesophyllic organisms ?
a. 30 °C b. 37 °C
c. 27 °C d. 17 °C

532. _____ prefer near neutral to slightly alkaline reaction in soils.
a. Bacteria b. Fungi
c. Actinomycetes d. All

533. The ideal pH range for the growth of fungi in soil is
a. 6.5 and 8.0 b. 5.5 and 7.0
c. 6.0 and 7.0 d. 4.5 and 6.5

534. The ideal pH range for the growth of bacteria in soil is
a. 6.5 and 8.0 b. 5.5 and 7.0
c. 6.0 and 7.0 d. 4.5 and 6.5

535. Soil protozoa are the predators of
a. Fungi b. Bacteria
c. Actinomycetes d. All

536. What is the amount of energy released when one mol of glucose is oxidized ?
a. 474 kcal b. 574 kcal
c. 674 kcal d. 774 kcal

537. The enzymes produced as a response to the presence of a substrate is called as
a. Constitutive enzymes
b. Adaptive enzymes
c. Intracellular enzymes
d. Extracellular enzymes

538. The enzymes produced irrespective of presence of a substrate is called as
a. Constitutive enzymes
b. Adaptive enzymes
c. Intracellular enzymes
d. Extracellular enzymes

539. Which enzyme is responsible for the conversion of protein into aminoacids?
a. *Urease* b. *Phosphatase*
c. *Cellulase* d. *Proteinase*

540. Which reaction is responsible for the conversion of sulphate esters into sulphate ions by sulphatase enzymes ?
a. Oxidation b. Reduction
c. Hydrolysis d. Hydration

541. What is the size range of bacteria ?
a. 0.0 – 0.5 μ b. 0.5 – 1.0 μ
c. 1.0 – 1.5 μ d. 1.5 – 2.0 μ

542. Live weight of bacteria in the total soil mass is
a. 0.1 – 0.4 % b. 0.01 – 0.4%
c. 1.0 – 1.5 % d. 0.1 – 1.0 %

543. Among the bacteria, which has largest number of species in soil ?
a. *Bacillus* b. *Pseudomonas*
c. *Azotobacter* d. *Arthrobactor*

544. Arrange the following bacteria based on their population in soil in decreasing order.
a. *Azotobacter > Pseudomonas > Bacillus*
b. *Azotobacter > Bacillus > Pseudomonas*
c. *Bacillus > Azotobacter > Pseudomonas*
d. *Bacillus > Pseudomonas > Azotobacter*

Answers						
	528. a	531. b	534. a	537. b	540. c	543. a
	529. d	532. a	535. b	538. a	541. b	544. d
	530. c	533. d	536. c	539. d	542. b	

545. Which of the following bacteria is associated with biological nitrogen fixation ?
a. *Bacillus* b. *Pseudomonas*
c. *Rhizobium* d. *Paracoccus*

546. Which of the following bacteria is associated with symbiotic nitrogen fixation ?
a. *Rhizobium* b. *Azotobacter*
c. *Azospirillum* d. *Clostridium*

547. Of the following, which is/are free-living (non- symbiotic) nitrogen fixing organisms?
a. *Azotobacter* b. *Clostridium*
c. *Beijerinkia* d. All

548. Biological nitrogen fixing heterotrophic organisms is/are
a. *Rhizobium* b. *Azotobacter*
c. *Clostridium* d. All

549. Nodule formation and nitrogen fixation are influenced by
a. Nitrogen b. Phosphorous
c. pH d. All

550. Legumes fail to develop nodules in the soils having pH of
a. < 5.0 b. < 6.0
c. < 7.0 d. < 4.0

551. Nitrogen fixing power of legumes is enhanced by the application of
a. Potash b. Phosphates
c. Lime d. Both a and b

552. Which is the enzyme responsible for the biological nitrogen fixation ?
a. *Nitrate reductase*
b. *Nitrite reductase*
c. *Nitrogenase*
d. *Urease*

553. Biological nitrogen fixation by associated symbiosis is performed by
a. *Rhizobium* b. *Azotobacter*
c. *Clostridium* d. *Azospirillum*

554. Which of the following is heterotrophic, free-living and anaerobic nitrogen fixing organism ?
a. *Clostridium* b. *Rhizobium*
c. *Azotobacter* d. *Beijerinkia*

555. Which of the following is heterotrophic, free-living and aerobic nitrogen fixing organism ?
a. *Clostridium* b. *Azotobacter*
c. *Azospirillum* d. *Beijerinkia*

556. Of the following, which is an aerobic and also act as an anaerobic organism ?
a. *Azospirillum* b. *Clostridium*
c. *Azotobacter* d. All

557. Conversion of organic nitrogen into inorganic nitrogen by soil microorganisms is called as
a. Mineralization
b. Immobilization
c. Nitrification
d. Ammonification

558. Conversion of inorganic nitrogen into organic nitrogen by soil microorganisms is called as
a. Mineralization
b. Immobilization
c. Nitrification
d. Ammonification

559. Conversion of ammonical nitrogen to nitrite nitrogen by microorganisms is called as
a. Nitrification
b. Nitrate formation
c. Nitrite formation
d. Ammonification

Answers					
	545. c	548. d	551. b	554. a	557. a
	546. a	549. d	552. c	555. b	558. b
	547. d	550. a	553. d	556. c	559. c

560. _____ is an example for nitrate forming bacteria (NO_2 to NO_3).
a. *Nitrobacter*
b. *Nitrosomonas*
c. *Bacillus*
d. *Clostridium*

561. _____ is an example for nitrite forming bacteria (NH_4 to NO_2).
a. *Bacillus* b. *Pseudomonas*
c. *Nitrobacter* d. *Nitrosomonas*

562. Deamination and decarboxylation are the two important processes in
a. Nitrification
b. Mineralization
c. Immobilization
d. Ammonification

563. _____ and _____ are the examples for two important ammonifying bacteria.
a. *Bacillus* and *Pseudomonas*
b. *Bacillus* and *Clostridium*
c. *Bacillus* and *Paracoccus*
d. *Bacillus* and *Clostridium*

564. What is the optimum pH for nitrification ?
a. 5.5 – 6.5 b. 6.5 – 7.5
c. 7.5 – 8.5 d. 5.0 – 7.0

565. What is the optimum temperature for nitrification ?
a. 20 – 25°C b. 25 – 30°C
c. 30 – 35°C d. 35 – 40°C

566. Nitrification rate is slow and almost ceases below the pH of
a. 3.0 b. 4.0
c. 5.0 d. 6.0

567. Of the following, which is/are the denitrifying bacteria ?
a. *Bacillus* b. *Pseudomonas*
c. *Paracoccus* d. All

568. Of the following, which is/are the facultative anaerobic denitrifying bacteria?
a. *Bacillus* b. *Pseudomonas*
c. *Paracoccus* d. All

569. The process by which nitrates are reduced to oxides of nitrogen and to gaseous nitrogen is called as
a. Nitrification b. Denitrification
c. Immobilization d. Volatilization

570. Of the following, which is/are the cellulose decomposing bacteria ?
a. *Cytophaga*
b. *Sporocytophaga*
c. *Angiococcus*
d. All

571. Of the following, which is/are the anaerobic cellulose decomposing bacteria ?
a. *Cytophaga* b. *Clostridium*
c. *Polyangium* d. All

572. Lignin is mainly decomposed by
a. Fungi b. Bacteria
c. Actinomycetes d. All

573. Humus is primarily formed by
a. Fungi b. Bacteria
c. Actinomycetes d. Protozoa

574. Phytomycetes and fungi imperfecti are the predators of
a. Bacteria b. Actinomycetes
c. Protozoa d. Fungi

575. Of the following, which is/are the cellulose decomposing fungi ?
a. *Penicillium* b. *Trichoderma*
c. *Aspergillus* d. *Fusarium*

Answers						
	560. a	563. a	566. c	569. b	572. a	575. e
	561. d	564. b	567. d	570. d	573. a	
	562. d	565. c	568. d	571. b	574. c	

e. All the above

576. The major decomposing fungi in acid soils are
a. *Aspergillus* and *Mucar*
b. *Aspergillus* and *Penicillium*
c. *Penicillium* and *Trichoderma*
d. *Aspergillus* and *Fusarium*

577. The major cellulose decomposing fungi in all the soils except acid soils are
a. *Aspergillus* and *Mucar*
b. *Aspergillus* and *Penicillium*
c. *Penicillium* and *Trichoderma*
d. *Aspergillus* and *Fusarium*

578. Basidiomycetes are capable of decomposing _____.
a. Protein b. Cellulose
c. Hemicellulose d. Lignin

579. Of the following, which is/are the protein decomposing fungi (fungus) ?
a. *Penicillium* b. *Fusarium*
c. *Alternaria* d. All

580. *Aspergillus*, *Mucar* and *Citromycetes* are the examples of
a. Humus forming fungi
b. Cellulose decomposers
c. Protein decomposers
d. Lignin decomposers

581. *Alternaria* and *Aspergillus* are
a. Protein decomposers
b. Humus formers
c. Cellulose decomposers
d. Lignin decomposers

582. Ectotrophic mycorrhiza which helps in increasing the availability of less mobile nutrient elements is
a. *Amenita* b. *Phoma*
c. *Rhizoctonia* d. All

583. Endotrophic mycorrhiza which helps in increasing the availability of less mobile nutrient elements is
a. *Amenita* b. *Boletus*
c. *Rhizoctonia* d. All

584. Mycorrhizae help in increasing the availability of less mobile nutrients mainly
a. Nitrogen
b. Phosphorus
c. Potassium
d. Calcium and Magnesium

585. VAM fungi are
a. Obligate symbiont
b. Facultative symbiont
c. Free-living
d. Both a and b

586. Actinomycetes are more abundant in
a. Wet soils b. Dry soils
c. Sandy soils d. Both a and b

587. Actinomycetes are more abundant in
a. Grass land
b. Pasture soils
c. Cultivated soils
d. Both a and b

588. Actinomycetes are
a. Autotrophic and aerobic
b. Autotrophic anaerobic
c. Heterotrophic aerobic
d. Heterotrophic anaerobic

589. Organic residues added to soils are first attacked by
a. Bacteria b. Fungi
c. Actinomycetes d. Protozoa

Answers					
	576. c	579. b	582. a	585. a	588. c
	577. d	580. c	583. c	586. b	589. a
	578. d	581. b	584. b	587. d	

590. Organic substances such as celluloses, polysaccharides, proteins, fats, acids, etc. are degraded by
a. Bacteria b. Fungi
c. Actinomycetes d. Both a and b

591. Which of the following is chlorophyta ?
a. Blue-green algae
b. Grass-green algae
c. Yellow-green algae
d. Golden-brown algae (Diatoms)

592. Which of the following is bacillariophyta ?
a. Blue-green algae
b. Grass-green algae
c. Yellow-green algae
d. Golden-brown algae (Diatoms)

593. Blue-green algae belong to
a. Cyanophyta b. Chlorophyta
c. Xanthophyta d. Diatoms

594. Which algae are dominant in tropical soils?
a. Blue-green algae
b. Grass-green algae
c. Yellow-green algae
d. Golden-brown algae (Diatoms)

595. Which algae are dominant in temperate soils ?
a. Blue-green algae
b. Grass-green algae
c. Yellow-green algae
d. Golden-brown algae (Diatoms)

596. The algae which are most abundant in all the soils are
a. Blue-green algae and Yellow-green algae
b. Blue-green algae and Diatoms
c. Blue-green algae and Grass-green algae
d. Yellow-green algae and Grass-green algae

597. Nitrogen fixing capacity of BGA can be increased by the application of
a. Nitrogen and Phosphorous
b. Nitrogen and Potash
c. N, P and K
d. Phosphorous and Molybdate

598. Organisms which fix atmospheric nitrogen and also supply oxygen to the crops are
a. Bacteria b. Fungi
c. Actinimycetes d. Algae

599. What is the quantity of nitrogen fixed by algae in soil ?
a. 10-20 kg/ha
b. 20-30 kg/ha
c. 30-40 kg/ha
d. More than 40 kg/ha

600. Which of the following is an aquatic fern?
a. *Azolla* b. *Anabaena*
c. BGA d. Both a and b

601. _____ is associated with Azolla, an aquatic fern, in symbiotic nitrogen fixation.
a. *Diatoms* b. *Azospirillum*
c. *Anabaena* d. All

602. Earthworm casts are rich in nutrients and _____.
a. Bacteria b. Fungi
c. Viruses d. All

603. Earthworms are more abundant in
a. Coarse textured soils
b. Fine textured soils
c. Medium textured soils
d. Both a and b

Answers					
	590. c	593. a	596. c	599. b	602. a
	591. b	594. a	597. d	600. a	603. b
	592. d	595. b	598. d	601. c	

604. What is the optimum pH for earthworms in soils ?
a. Acidic b. Basic
c. Neutral d. Slightly alkaline

605. Earthworms thrive well in neutral soils with high reserves of
a. Nitrogen b. Phosphorous
c. Potassium d. Calcium

606. _____ tolerate adverse climatic conditions than any other organisms in soil.
a. Bacteria b. Fungi
c. Actinomycetes d. Protozoa

607. Protozoa feed on
a. Bacteria b. Actinomycetes
c. Fungi d. Both a and b
e. All the above

608. Soil viruses are
a. Obligate parasites
b. Facultative parasites
c. Saprophytes
d. Both a and b

609. The conversion of NO_3 to NH_3 by soil microorganisms is called as
a. Immobilization
b. Nitrate reduction
c. Ammonification
d. Both a and b
e. All the above

610. The conversion of NH_3 to NO_3 by soil microorganisms is called as
a. Nitrate reduction
b. Nitrification
c. Mineralization
d. Ammonification

611. The conversion of NO_3 to N_2 by soil microorganisms is called as
a. Nitrification b. Denitrification
c. Volatilization d. Mineralization

612. What is the percentage of lignin in plant tissues ?
a. 10 – 30 % b. 20 – 30 %
c. 1 – 15 % d. 1 – 8 %

613. What is the percentage of cellulose content in plant tissues ?
a. 10 – 30 % b. 20 – 30 %
c. 1 – 15 % d. 1 – 8 %

614. Nutrient(s) essential for protoplasmic synthesis of microbes that takes part in carbon mineralization is/are
a. Nitrogen
b. Phosphorous
c. Potassium
d. Calcium and magnesium

615. What is the amount of energy released during the nitrification of one molecule of ammonium ?
a. 64 kcal b. 74 kcal
c. 84 kcal d. 94 kcal

616. Nitrification fails when the pH of soil is below
a. 3.5 b. 4.5
c. 5.5 d. 6.5

617. N-serve and AM are the examples of
a. Urease inhibitors
b. Denitrification inhibitors
c. Phosphate solublizers
d. Nitrification inhibitors

618. 2-chloro-6 trichloro-methyl pyridine is the chemical name of
a. N-serve b. AM
c. U-form d. CDU

Answers					
	604. c	607. d	610. b	613. b	616. c
	605. d	608. a	611. b	614. a	617. d
	606. d	609. d	612. a	615. c	618. a

619. 2-amino-4 chloro-6 methyl pyrimidine is the chemical name of
a. N-serve b. AM
c. U-form d. CDU

620. Example(s) for nitrification inhibitor(s) derived from plant
a. Neem b. Karanji
c. Caster d. Both a and b

621. Thiobacillus denitrificants is a
a. Nitrate reducing bacteria
b. Sulpahte reducing bacteria
c. Iron oxidizing bacteria
d. Both a and b

622. Main factor which influences the decomposition of organic matter is
a. Temperature
b. pH
c. C/N ratio
d. Biodegradability of compounds

623. During the initial stage of organic matter decomposition, immobilization of nitrogen will occur when the C/N ratio of organic matter is
a. < 20 : 1 b. 20–30 : 1
c. > 30 : 1 d. None

624. What is the optimum C/N ratio for organic matter decomposition ?
a. < 20 : 1 b. 20 – 30 : 1
c. > 30 : 1 d. None

625. Net mineralization will occur when organic matter has the C/N ratio of
a. < 20 : 1 b. 20–30 : 1
c. > 30 : 1 d. None

626. Which of the following algae is also called as cyanobacteria ?
a. Blue-green algae
b. Grass-green algae
c. Yellow-green algae
d. Golden-brown algae (Diatoms)

627. Of the following algae which one is more abundant in calcareous soils ?
a. Blue-green algae
b. Grass-green algae
c. Yellow-green algae
d. Golden-brown algae (Diatoms)

628. Of the following algae which one is more abundant in acidic soils ?
a. Blue-green algae
b. Grass-green algae
c. Yellow-green algae
d. Golden-brown algae (Diatoms)

629. Phytin is a type of organic _____.
a. Nitrogen
b. Phosphorous
c. Sulphur
d. Molybdenum

630. Temperature regime favourable for higher activity of phosphate mineralizing organisms
a. Frigid b. Cryic
c. Mesic d. Thermal

631. What is the optimum C : N : P ratio for phosphorous mineralization ?
a. 100 : 50 : 1 b. 114 : 10 : 1
c. 100 : 10 : 1 d. 110 : 10 : 1

632. Of the following which one is an autotrophic sulphur oxidizing bacterium ?
a. *Desulfovibrio*
b. *Desulfatomaculam*
c. *Desulfuromonas*
d. *Thiobacillus*

Answers					
	619. b	622. c	625. a	628. b	631. c
	620. d	623. c	626. a	629. b	632. d
	621. a	624. b	627. d	630. d	

633. Of the following which is/are the heterotrophic sulphur reducing bacteria/ bacterium ?
a. *Desulfovibrio*
b. *Desulfatomaculam*
c. *Desulfuromonas*
d. All

634. What is the optimum C: S ratio for sulphur mineralization ?
a. 40 : 1 b. 50 : 1
c. 60 : 1 d. 100 : 1

635. Clearing zone or plaque is formed by which of the following microorganisms ?
a. Bacteria b. Actinomycetes
c. Fungi d. Viruses

636. What is the quantity of nitrogen fixed by biological nitrogen fixation process per year ?
a. 82 - 120 × 10^6 t/ha
b. 92 - 170 × 10^6 t/ha
c. 152 - 250 × 10^6 t/ha
d. 132 - 320 × 10^6 t/ha

637. Which is/are the tree species that fix (es) atmospheric nitrogen by symbiosis with certain microorganisms ?
a. Casuarina
b. Gunnera
c. Pangola gran (Degetaria)
d. All

638. Which is/are the tree species that fix (es) atmospheric nitrogen without symbiosis ?
a. Alder b. Gunnera
c. Degetaria d. All

639. Microorganism that has symbiotic association with casuarinas in atmospheric nitrogen fixation is
a. *Rhizobium* b. *Alnus*
c. *Frankia* d. *Azospirillum*

640. Of the following, which is/are the phosphate solubilizing bacterium/bacteria ?
a. *Bacillus* b. *Pseudomonas*
c. *Paracoccus* d. Both a and b
e. All the above

641. Of the following, which is the phosphate solubilizing fungus ?
a. *Penicillium* b. *Rhizopus*
c. *Alternaria* d. *Mucar*

642. *Aspergillus* is an example of
a. Sulphur oxidizer
b. Phosphate solubilizers
c. Iron oxidizer
d. Iron reducer

643. Of the following, which is/are the gum producing bacterium/bacteria ?
a. *Azotobacter* b. *Beijerinkia*
c. *Rhizobium* d. All

644. Liming of acid soils increases the activity (ies) of
a. Bacteria
b. Actinomycetes
c. Fungi
d. Both a and b
e. All the above

645. Gypsum application to sodic or alkali soils increases the activity (ies) of
a. Bacteria b. Fungi
c. Actinomycetes d. All

646. *Azospirillum* is an example of
a. Aerobic bacterium
b. Anaerobic bacterium
c. Facultative anaerobic bacterium
d. Micro aerobic bacterium

Answers					
	633. d	636. b	639. c	642. b	645. a
	634. b	637. a	640. d	643. d	646. d
	635. d	638. d	641. a	644. d	

647. Which of the following are the examples of heterotrophic denitrifiers ?
a. *Bacillus*, *Pseudomonas* and *Paracoccus*
b. *Thiobacillus denitrificants* and *T. thioparus*
c. *Nitrosomonas* and *Nitrosobacter*
d. *Nitromonas* and *Nitrobacter*

648. *Agaricus bisporus* is the scientific name of
a. White buttom mushroom
b. Paddy straw mushroom
c. Oyster mushroom
d. None

649. Microorganism(s) most efficient in organic matter decomposition is/are
a. Bacteria b. Fungi
c. Actinomyates d. All

650. Mycorrhizae increase the availability of
a. PO_4 and Zn b. Cu and Mo
c. PO_4, Zn and Mo d. All

651. VAM is an endomycorrhizae (True/False).

652. Which of the following are the carbon and energy sources for photo autotrophs ?
a. CO_2 and Sunlight
b. CO_2, organic matter and sunlight
c. CO_2 and inorganic compounds
d. CO_2, organic matter and inorganic compound
e. Both from organic matter

653. Which of the following are the carbon and energy sources for chemoautotrophs ?
a. CO_2 and Sunlight
b. CO_2, organic matter and sunlight
c. CO_2 and inorganic compounds
d. CO_2, organic matter and inorganic compound
e. Both from organic matter

654. Which of the following are the carbon and energy sources for heterotrophs/ chemoheterotrophs ?
a. CO_2 and Sunlight
b. CO_2, organic matter and sunlight
c. CO_2 and inorganic compounds
d. CO_2, organic matter and inorganic compound
e. Both from organic matter

655. *Bacillus*, *Pseudomonas* and *Paracoccus* are _____ bacteria.
a. Aerobic
b. Anaerobic
c. Facultative anaerobic
d. Facultative aerobic

656. Organism(s) responsible for the conversion of $Fe^{2+} \rightarrow Fe^{3+}$ is/are
a. *Ferrobacillus*
b. *Gallionella*
c. *Hydrogenomonas*
d. Both a and b
e. All the above

657. Organism(s) responsible for the oxidation of H_2 is/are
a. *Hydrogenomonas*
b. *Desulforibria*
c. *Methonobacillus*
d. Both a and b
e. All the above

658. Organism(s) responsible for the conversion of $CO \rightarrow CO_2$ by
a. *Carboxydomonas*
b. *Hydrogenomonas*
c. *Klebsiella*
d. All

Answers				
	647. a	650. d	653. c	656. d
	648. a	651. T	654. e	657. e
	649. b	652. b	655. c	658. a

659. Which is the growth hormone secreted by rhizobium after the infection of root hairs?
a. Gibbrellin b. Auxin
c. Cytokinin d. Abscisic acid

660. All N-fixing organisms are
a. Symbiotic heterotrophic bacteria
b. Non-symbiotic heterotrophic bacteria
c. Non-symbiotic autotrophic bacteria
d. Symbiotic autotrophic bacteria

661. Both stem and root nodules are formed in
a. Sesbania b. Crotolaria
c. Groundnut d. Alder

662. Leaf nodules are formed by
a. *Digitaria* and *Klebsiella*
b. *Beijerinkia* and *Klebsiella*
c. *Digitaria* and *Beijerinkia*
d. All

663. _____ has the associative symbiosis with non-legumes.
a. *Digitaria* b. *Beijerinkia*
c. *Gunnera* d. *Klebsiella*

664. Of the following, which are the acid tolerant nitrogen fixers ?
a. *Digitaria* and *Gunnera*
b. *Beijerinkia* and *Klebsiella*
c. *Azotobacter* and *Beijerinkia*
d. Both a and c
e. All the above

665. *Frankia* has the symbiotic relationship with _____ in N-fixation.
a. Coffee berry
b. Alder
c. Flooded rice
d. Both a and b
e. All the above

666. Bacterium that has symbiotic relationship with bean group is
a. *Rhizobium japanicum*
b. *Rhizobium leguminosarum*
c. *Rhizobium phaseoli*
d. *Rhizobium meliloti*

667. Bacterium that has symbiotic relationship with soybean is
a. *Rhizobium japanicum*
b. *Rhizobium leguminosarum*
c. *Rhizobium phaseoli*
d. *Rhizobium meliloti*

668. Bacterium that has symbiotic relationship with alfalfa group is
a. *Rhizobium trifoli*
b. *Rhizobium lupini*
c. *Rhizobium meliloti*
d. *Rhizobium leguminosarum*

669. *Thiobacillus* group of organisms are more active in the pH range of
a. 4.0 – 6.5 b. 5.5 – 7.5
c. 6 – 8.0 d. < 4.0

670. What is the temperature range of pyschrophiles ?
a. < 0°C b. < 3°C
c. < 5°C d. < 10°C

671. What is the temperature range of mesophiles ?
a. 15 – 25°C b. 20 – 30°C
c. 25 – 37°C d. 25 – 40°C

672. What is the temperature range of thermophiles ?
a. 45 – 75°C b. 35 – 45°C
c. 35 – 55°C d. 35–65°C

673. What is the C : N ratio in bacteria ?
a. 10 : 1 b. 6 – 8 : 1
c. 4 – 5 : 1 d. 10 – 12 : 1

Answers					
	659. b	662. b	665. e	668. c	671. c
	660. b	663. d	666. c	669. d	672. a
	661. a	664. c	667. a	670. c	673. c

674. The processes of ammonification and nitrification are collectively called as
a. N– fixation
b. Mineralization
c. Immobilization
d. Demineralization

675. Organic matter decomposition progresses until the losses of
a. Carbon become equal to nitrogen
b. Carbon greater than nitrogen
c. Nitrogen greater than carbon
d. None

676. What is the percentage of humus in total organic carbon ?
a. 30 – 40 b. 40 – 50
c. 50 – 60 d. 60 – 70

677. What is the approximately C: N ratio of most of the Indian soil ?
a. 10 – 12 : 1 b. 20 : 1
c. 15 : 1 d. 25 : 1

678. Brown humic acid is
a. Soluble in Alkali
b. Insoluble in alkali
c. Soluble in acid
d. Insoluble in acid

679. Grey humic acid is
a. Soluble in Alkali
b. Insoluble in alkali
c. Soluble in acid
d. Insoluble in acid

680. What is the temperature favorable for ammonification ?
a. 20 – 30°C b. 30°C
c. 40 – 60°C d. 30 – 50°C

681. What is the temperature favorable for nitrification ?
a. 20 – 30°C b. 30°C
c. 40 – 60°C d. 30 – 50°C

682. Alternate welting and drying can increase mineralization rate than wetting or drying (True/False).

683. Amount of inorganic nitrogen required to prevent the net immobilization is called as
a. Mineralization factor
b. Nitrification factor
c. Immobilization factor
d. Nitrogen factor

684. What is the range of nitrogen factor in mineralization process ?
a. 0.1 – 0.5 b. 0.1 – 1.0
c. 0.1 – 1.3 d. 0.1 – 1.5

685. Example(s) for protobacteria is/are
a. *Rhizobium*
b. *Frankia*
c. *Nostoc and Anabaena*
d. All

686. Example(s) for thallobacteria is/are
a. *Rhizobium*
b. *Frankia*
c. *Nostoc and Anabaena*
d. All

687. What is the optimum C: N: S ratio in soil ?
a. 140 : 10 : 1.3 b. 100 : 10 : 1.5
c. 110 : 10 : 1.5 d. 140 : 10 : 1.5

688. What is the optimum C: N: P: S ratio in soil ?
a. 140 : 10 : 1.3 : 1.3
b. 140 : 10 : 1.5 : 1.5
c. 110 : 10 : 1.3 : 1.3
d. 110 : 10 : 1.5 : 1.5

Answers					
	674. b	677. b	680. c	683. d	686. b
	675. a	678. a	681. b	684. c	687. c
	676. d	679. b	682. T	685. c	688. a

689. What is the optimum N : S ratio in soil ?
a. 6 – 10 : 1 b. 8 – 10 : 1
c. 10 – 12 : 1 d. 6 – 8 : 1

690. Lyotrophic series of anions is
a. $H_2PO_4^- > SO_4^= = CH_3COO^- > NO_3^- = Cl^- > OH^-$
b. $OH^- > H_2PO_4^- > SO_4^= > CH_3COO^- > NO_3^- > Cl^-$
c. $OH^- > H_2PO_4^- > SO_4^= = CH_3COO^- > NO_3^- = Cl^-$
d. $NO_3^- = Cl^- = CH_3COO^- = SO_4^= > H_2PO_4^- > OH^-$

691. Dissimilatory $SO_4^=$ reduction is the conversion of
a. $SO_4^= \rightarrow S^{2-}$ and S^o
b. $S^o \rightarrow S^{2-}$
c. S^o, $SO_4^= \rightarrow$ organic S
d. Both a and b
e. All the above

692. Assimilatory $SO_4^=$- reduction is the conversion of
a. $SO_4^= \rightarrow S^{2-}$ and S^o
b. $S^o \rightarrow S^{2-}$
c. S^o, $SO_4^= \rightarrow$ organic S
d. Both a and b
e. All the above

693. Of the following, which are the examples for autotrophic dentrifiers ?
a. *Bacillus, Pseudomonas* and *Paracoccus*
b. *Thiobacillus dentrificants* and *T. thioparus*
c. *Nitrosomonas* and *Nitrosobacter*
d. *Nitromonas* and *Nitrobacter*

694. An ecosystem is
a. The total dry weight of all plant and animal organisms in an ecosystem
b. An organism which feeds primarily on plant matter
c. A community of living and nonliving organisms interacting with one another and the environment
d. Anything which is living or nonliving

695. Which of the following are the examples of herbivores ?
a. Humans, chickens, bears, and hogs
b. Horses, cattle, deer, and sheep
c. Coyotes, dogs, bobcats, and owls
d. Llamas, cats, dogs, and wolverines

696. Which of the following comes from the environment ?
a. Food
b. Clothing
c. Medicine
d. All of these come from the environment

697. If a person was studying the complex relationships among living things and their environmental he/she would be studying
a. Botany b. Zoology
c. Ecology d. World history

698. The process of bacteria changing dead organisms into ammonia, then to nitrites, and finally to nitrates useful to plants is called _____.
a. Photosynthesis
b. Electrolysis
c. Nitrification
d. Ammonification

699. Highly degraded soil organic matter is/are known as
a. Humus b. Soil beginnings
c. Microbial soil d. Pedogenisis

Answers				
	689. d	692. c	695. b	698. c
	690. c	693. b	696. d	699. a
	691. d	694. c	697. c	

700. Which of the following is a function of soil as a medium for plant growth ?
a. Serving as an aggregate for asphalt and concrete
b. Serving as a road bed
c. Supplying water to roots
d. Supplying material for land fills

701. As a physical substance soil is used for which of the followings ?
a. Furnishing mineral for plant nutrition
b. Supplying air and water to plant roots
c. Anchoring plant roots
d. As an aggregate for asphalt and concrete

702. The place that an organism occupies in a biotic community is called as
a. Niche
b. Biotic community
c. Ecology
d. Soil ecology

703. The relationship of a microbial community in a particular environment to the food web is termed as
a. Trophic level b. Niche
c. Food web d. None

704. Autotrophs are also called as
a. Lithotrophs b. Heterotrophs
c. Chemotrophs d. None

705. When the exact chemical composition of the medium is known, then it is an example of
a. Synthetic medium
b. Non - synthetic medium
c. Nutrient agar
d. All

706. Yeast extract, beef extract, peptone, tryptone serve as a source of
a. Protein b. Carbohydrate
c. Sugar d. Fats in a media

707. Sugars in a media serve as a source of
a. C b. N
c. S d. Fats

708. A medium without agar-agar solution is called as
a. Brine b. Broth
c. Both a and b d. None

709. Solidifying agent in a medium is called as
a. Agar-agar b. Starch
c. Fats d. Sugars

710. Nutrient agar is used as a growing media for
a. Bacteria b. Fungi
c. Actinomycetes d. None

711. Yeast extract mannitol agar is a best growing media for
a. Fungi
b. Rhizobium
c. Azotobacter
d. Azospirillium

712. Tryptone agar media is used for counting
a. Population of microbes in food samples
b. Population of microbes in water samples
c. Both a and b
d. None of the above

713. Jenson's free agar is best for the growth of
a. *Azotobacter* b. *Rhizobium*
c. *Azospirillium* d. All

714. Of the following, which is/are facultative anaerobe ?
a. *Bacillus* b. *Enterobacter*
c. *Klebsiella* d. All

Answers					
	700. c	703. a	706. a	709. a	712. a
	701. d	704. a	707. a	710. a	713. a
	702. a	705. a	708. b	711. b	714. d

715. *Derxia* is a
- a. Anaerobic bacteria
- b. Aerobic bacteria
- c. Both a and b
- d. None

716. *Spirillum* is an
- a. Anaerobic bacteria
- b. Aerobic bacteria
- c. Both a and b
- d. None

717. Which is an example of purple sulphur bacteria ?
- a. *Ectothiorhodospira*
- b. *Rhodopseudomonas*
- c. *Rhodomicrobium*
- d. *Chlorobium*

718. An example of photosynthetic bacteria
- a. *Ectothiorhodospira*
- b. *Rhodopseudomonas*
- c. *Rhodomicrobium*
- d. *Chlorobium*
- e. All the above

719. Which is an example of green sulphur bacteria ?
- a. *Chlorobium*
- b. *Rhodomicrobium*
- c. *Rhodosprillum*
- d. All

720. Example(s) for anaerobic bacteria is/are
- a. *Clostridium*
- b. *Desulfotomaculum*
- c. *Desulfovibrio*
- d. All

721. Which antibiotic almost suppresses the activity of number of bacteria ?
- a. *Aureomycin* b. *Streptomycin*
- c. Both a and b d. None

722. VAM is an example of
- a. Ectomycorrhizae
- b. Endomycorrhizae
- c. Both a and b
- d. None

723. Propagules of VAM fungi consist of
- a. Clamydospores
- b. Azygospores
- c. Soil-borne vesicle
- d. All

724. Which method is the best method for recovering VAM propagules ?
- a. Wet-sieving decanting process
- b. Dry-sieving decanting process
- c. Both a and b
- d. None

725. Ectomycorrhizal fungi can be isolated from
- a. *Sporocarp* tissue b. *Sclerotia*
- c. *Rhizomorphs* d. All

726. Example(s) for ectomycorrhizal fungi is/are
- a. *Alpora* b. *Amanita*
- c. *Astraeus* d. *Boletus*
- e. All the above

727. Which of the following pigment, located in cytoplasm, is responsible for the green colour of the algae ?
- a. Xanthophylls b. Carotenoids
- c. Chromatophores d. All

728. What is the percentage of cellulose percentage in plant dry matter ?
- a. 45% b. 18%
- c. 20% d. 8%

Answers					
	715. b	718. e	721. a	724. a	727. c
	716. b	719. a	722. b	725. d	728. a
	717. a	720. d	723. d	726. e	

729. What is the percentage of lignin percentage in plant dry matter ?
- a. 45% b. 18%
- c. 20% d. 8%

730. What is the percentage of hemicellulose percentage in plant dry matter ?
- a. 45% b. 18%
- c. 20% d. 8%

731. Example for rhizobial fertilizer is
- a. *Rhizobium*
- b. *Azotobacterin*
- c. *Nitrin*
- d. *Nitrogin*

732. Quantity of nitrogen fixed by azolla in biological nitrogen fixation is
- a. 25-30 kg/ha b. < 5 kg/ha
- c. 105 kg/ha d. 60-70 kg/ha

733. Quantity of nitrogen fixed by azolla-anbaena in biological nitrogen fixation is
- a. 25-30 kg/ha b. < 5 kg/ha
- c. 105 kg/ha d. 60-70 kg/ha

734. Quantity of nitrogen fixed by azotobacter, clostridium in biological nitrogen fixation is
- a. 25-30 kg/ha b. < 5 kg/ha
- c. 105 kg/ha d. 60-70 kg/ha

735. Quantity of nitrogen fixed by rhizobium in biological nitrogen fixation is
- a. 50×10^6 mt N/ha/year
- b. 70×10^6 mt N/ha/year
- c. 90×10^6 mt N/ha/year
- d. $40\text{-}50 \times 10^6$ mt N/ha/year

Answers			
	729. c	732. a	735. c
	730. b	733. c	
	731. d	734. b	

8

Soil & Water Conservation

Questions :

1. Erosion created by the activities of man and sometimes by animals is called as
   a. Natural geological erosion
   b. Geologic erosion
   c. Accelerated soil erosion
   d. All

2. Scattering of detached soil particles by the impact of rain drops is called
   a. Splash erosion b. Sheet erosion
   c. Gully erosion d. Ravines

3. Removal by rain of a very thin layer of soil from the entire surface of large area is called
   a. Splash erosion b. Sheet erosion
   c. Rill erosion d. Ravines

4. Sheet erosion is observed on
   a. Deeply sloping land
   b. Moderately sloping land
   c. Slopy land
   d. Gently sloping land

5. Muddy run-off from the field is an indication of
   a. Splash erosion b. Sheet erosion
   c. Rill erosion d. Ravines

6. Formation of small channels a few centimeters deep all over the field along the watercourse is observed in
   a. Rill erosion
   b. Slight gully erosion
   c. Moderate gully erosion
   d. Ravines

7. Run-off and soil loss can be calculated by
   a. Ramser's formula
   b. Chepil equation
   c. Chepil and Woodruff equation
   d. All

8. Device used to study the run-off and soil loss under laboratory conditions
   a. Run-off plots
   b. Multislot device
   c. Standing wavefumes
   d. Rainfall simulator

9. The quantity of soil materials of a given size in the run-off varies as the _____ power of the speed of run-off.
   a. Third b. Fourth
   c. Fifth d. Sixth

10. Erosion permitting crops is/are
    a. Maize b. Wheat
    c. Bajra d. All

11. Erosion resisting crops is/are
    a. Grasses b. Legumes
    c. Cereals d. Both a and b
    e. All the above

12. Soils more susceptible to water erosion are
    a. Coarse textured soils
    b. Medium textured soils
    c. Fine textured soils
    d. All

13. The ratio of dispersion ratio to colloidal moisture equivalent ratio is
    a. Erosion index b. Erosion ratio
    c. Soil detachability d. Soil erosivity

14. In Universal soil loss equation, A = RKLSCP, K denotes
    a. Soil conservation practices
    b. Soil roughness
    c. Soil erodability
    d. Rainfall factor

Answers													
	1.	c	4.	d	7.	a	10.	d	13.	b
	2.	a	5.	b	8.	d	11.	d	14.	c
	3.	b	6.	a	9.	c	12.	c		

15. In Universal soil loss equation, A = RKLSCP, P denotes
    a. Soil conservation practices
    b. Soil roughness
    c. Soil erodability
    d. Rainfall factor

16. Growing of erosion resisting and erosion permitting crops on alternate strips of suitable width along the contour and across the slope is called as
    a. Contour cropping
    b. Contour farming
    c. Contour strip cropping
    d. Strip cropping

17. Contour bunding is also called as
    a. Level terraces
    b. Ridge-type terraces
    c. Absorption type terraces
    d. All

18. Strong dusty winds are locally called as
    a. Aeolian b. Loo
    c. Loess d. None

19. Minimum wind speed required to initiate the movement of most erodable soil particles is
    a. 10 km b. 12 km
    c. 14 km d. 16 km

20. Diameter of particles that is most susceptible to wind erosion is
    a. 0.1 mm b. 0.2 mm
    c. 0.02 mm d. 0.01 mm

21. Dominant type of wind erosion in soil is
    a. Saltation b. Surface creep
    c. Suspension d. All

22. Size range of soil particles in saltation type of wind erosion is
    a. Less than 0.05 mm
    b. 0.5 – 1.0 mm
    c. 0.5 – 2.0 mm
    d. 0.05 – 0.5 mm

23. Size range of soil particles in suspension type of wind erosion is
    a. Less than 0.05 mm
    b. 0.5 – 1.0 mm
    c. 0.5 – 2.0 mm
    d. 0.05 – 0.5 mm

24. Size range of soil particles in surface creep type of wind erosion is
    a. Less than 0.05 mm
    b. 0.5 – 1.0 mm
    c. 0.5 – 2.0 mm
    d. 0.05 – 0.5 mm

25. In surface creep wind erosion, soil particles are moved primarily by the action of
    a. Wind b. Saltation
    c Suspension d. All

26. Most important factors that influence the erodability of soil by wind
    a. Soil texture b. Soil structure
    c. Soil water status d. All

27. Wind erosion is calculated by
    a. Ramser's formula
    b. Chepil equation
    c. Chepil and Woodruff equation
    d. All

28. In Chepil and Woodruff's equation of soil loss calculation by wind erosion, E = f (ICKLV), I denotes
    a. Soil erodability
    b. Rainfall intensity
    c. Soil roughness
    d. Soil type

Answers											
	15.	a	18.	b	21.	a	24.	c	27.	c
	16.	c	19.	d	22.	d	25.	b	28.	a
	17.	d	20.	a	23.	a	26.	d		

29. In Chepil and Woodruff's equation of soil loss calculation by wind erosion, E = f (ICKLV), K denotes
    a. Soil erodability
    b. Rainfall intensity
    c. Soil roughness d. Soil type

30. The process that lowers the current and/or potential capability of soil to produce goods or services is called
    a. Soil degradation
    b. Land degradation
    c. Mass degradation
    d. All

31. The desertification was first used by
    a. Chepil and Woodruff
    b. Weischner
    c. Abreville d. None

32. The process that transforms the productive land into unproductive land
    a. Desertification b. Desertization
    c. Mass movement d. Both a and b
    e. All the above

33. Extension of tropical desert landscapes and landforms to area where they did not occur in the recent past is called as
    a. Desertification b. Desertization
    c. Mass movement d. Both a and b
    e. All the above

34. In north-eastern hill regions of India, shifting cultivation is also called as
    a, Jhum cultivation
    b. Jhuming cultivation
    c. Both a and b d. None

35. Total number of land capability classes in the land capability classification scheme
    a. Six b. Seven
    c. Eight d. Nine

36. Land capability classes are subdivided in to land capability subclasses based on their
    a. Major characteristics
    b. Kind of managements
    c. Kind of limitations
    d. Both a and b
    e. All the above

37. Total number of classes in the group, land suitable for cultivation is
    a. Eight b. Four
    c. Six d. Two

38. In land capability classification scheme, the classes V, VI and VII are suitable for
    a. Cultivation
    b. Pasture and grazing
    c. Wildlife and water shed management
    d. All

39. Land capability subclasses are further subdivided into land capability units on the basis of
    a. Major characteristics
    b. Kind of managements
    c. Kind of limitations
    d. Both a and b
    e. All the above

40. Rills with more than _____ cm depth are generally called as gullies.
    a. 15 b. 20
    c. 25 d. 30

41. Of the following, which one is important with regards to soil erosion by water?
    a. Intensity of rainfall
    b. Duration of rainfall
    c. Amount of rainfall
    d. Frequency of rainfall

Answers											
	29.	c	32.	a	35.	c	38.	b	41.	a
	30.	b	33.	b	36.	c	39.	d		
	31.	c	34.	c	37.	b	40.	d		

42. If the velocity of water is doubled, its erosion power increases _____ times, and carrying capacity increases _____ times.
a. 2 .... 16 b. 4 16
c. 4 .... 32 d. 4 64

43. The most serious sheet erosion occurs in
a. Red and Black soils
b. Red and Alluvial soils
c. Black and Alluvial soils
d. Red & laterite soils

44. Wind erosion is mainly due to
a. A strong wind regime
b. Low atmospheric humidity
c. High solar radiation
d. Single grain structure of sandy soils
e. All the above

45. Which of the following mechanical soil conservation measures is more suitable for fruit trees or other plantation crops on steep slopes?
a. Contour bunds
b. Half moon terraces
c. Graded bunds d. Bench terraces

46. Land degradation first starts with the
a. Reduction in vegetative cover
b. Exposing the soil surface to accelerated erosion
c. Reduction in soil organic matter and nutrient content
d. All the above

47. Tillage is a process to optimize conditions for germination bringing seedling establishment and crop growth and is
a. A physical b. Chemical
c. Biological soil manipulation
d. All the above

48. The primary objectives of tillage is
a. Seedbed preparation
b. Provision of a good medium for plant roots
c. Water infiltration and retention
d. Erosion and weed control

49. Conservation tillage can be defined as
a. A crop planting system that allows minimum disturbance of the soil to allow seeds to be sown while ensuring maintenance of crop residues on the surface
b. A tillage operation is mainly done to prevent the weed population
c. A tillage operation is mainly done to prepare a fine seed bed
d. All the above

50. What is important reason of soil erosion?
a. Erosion removes topsoil
b. Reduces levels of soil organic matter
c. It contributes to the breakdown of soil structure
d. All the above

51. What are signs of wind erosion?
a. Dust clouds
b. Soil accumulation along fencelines or snowbanks
c. A drifted appearance of the soil surface
d. All the above

52. What are signs of water erosion?
a. Small rills and channels on the soil surface
b. Soil deposited at the base of slopes
c. Sediment in streams, lakes, and reservoirs
d. All the above

Answers							
	42.	d	45.	b	48.	a	51. d
	43.	a	46.	d	49.	a	52. d
	44.	e	47.	d	50.	d	

53. What are signs of water erosion?
a. Pedestals of soil supporting pebbles and plant material
b. Convex landscape positions
c. Both a and b
d. None of the above

54. Long-term soil erosion results in
a. Persistent and large gullies
b. Exposure of lighter colored subsoil at the surface
c. Poorer plant growth
d. All the above

55. How can soil erosion be measured?
a. Visual b. Physical
c. Chemical
d. Biological indicators
e. All the above

56. Which of the following is a visual indicators of soil erosion?
a. Comparisons of aerial photographs taken over time
b. Presence of moss and algae (crypotogams) crusts in desert or arid soils
c. Changes in soil horizon thickness
d. Deposition of soil at field boundaries
e. All the above

57. Which of the following is a physical indicator of soil erosion?
a. Measurements of aggregate stability
b. Increasing depth of channels and gullies
c. Both a and b
d. None of the above

58. Which of the following is a chemical indicator of soil erosion?
a. Decreases in soil organic matter content
b. Increases in calcium carbonate content at the surface
c. Provided greater content exists in subsurface layers
d. Changes in cation-exchange capacity (CEC)
e. All the above

59. Which of the following is a biological indicator of soil erosion?
a. Decreased microbial biomass
b. Lower rate of respiration
c. Slower decomposition of plant residues
d. All the above

60. What causes water erosion?
a. Lack of protection against raindrop impact
b. Decreased aggregate stability
c. Long and steep slopes
d. Intense rainfall or irrigation events when plant or
e. Residue cover is at a minimum
f. Decreased infiltration by compaction or other means

61. What causes mechanical erosion?
a. Removal by harvest of root crops
b. Tillage and cultivation practices that move soil
c. Downslope
d. All the above

62. What causes wind erosion?
a. Exposed surface soil during critical periods of the year
b. Occurrence of wind velocities that are sufficient to lift
c. Individual soil particles
d. Long, unsheltered, smooth soil surfaces
e. All the above

Answers							
	53.	c	56.	e	59.	d	62. e
	54.	d	57.	c	60.	f	
	55.	e	58.	e	61.	d	

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