MERITSTORE

NEET FULL PORTION **TEST ID: Day 21 – Test 5**

Time: 03 hrs **PCB** **Marks : 720**

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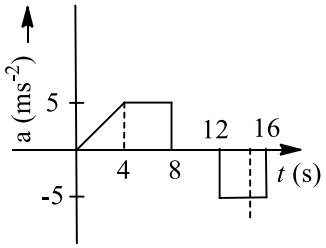
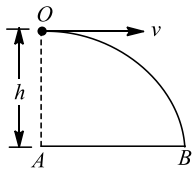
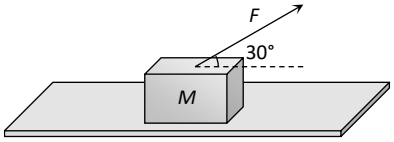
1. Surface tension has the same dimensions as that of
   a) Coefficient of viscosity
   b) Impulse
   c) Momentum
   d) Spring constant
2. Dimensional formula for angular momentum is
   a) ML^2T^{-2} b) $ML^2\,T^{-1}$ c) MLT^{-1} d) $M^0L^2T^{-2}$
3. The acceleration of a train between two stations 2 km apart is shown in the figure. The maximum speed of the train is



   a) 60ms^{-1} b) 30 ms^{-1}
   c) 120 ms^{-1} d) 90 ms^{-1}
4. An aeroplane is flying in a horizontal direction with a velocity 600kmh^{-1} at a height of 1960 m. when it is vertically above the point A on the ground, a body is dropped from it. The body strikes the ground at point B. Calculate the distance AB.



   a) 3.33 km
   b) 333 km
   c) 33.3 km
   d) 3330 km
5. A projectile is thrown with a speed u at an angle θ to the horizontal. The radius of curvature of its trajectory when the velocity vector of the projectile makes an angle α with the horizontal is
   a) $\frac{u^2\cos^2\alpha}{g\cos^2\theta}$ b) $\frac{2u^2\cos^2}{g\cos^2\theta}$ c) $\frac{u^2\cos^2\theta}{g\cos^3\alpha}$ d) $\frac{u^2\cos^2\theta}{g\cos^2\alpha}$
6. A block of mass $M = 5\ kg$ is resting on a rough horizontal surface for which the coefficient of friction is 0.2. When a force $F = 40\ N$ is applied, the acceleration of the block will be $(g = 10\ ms^2)$



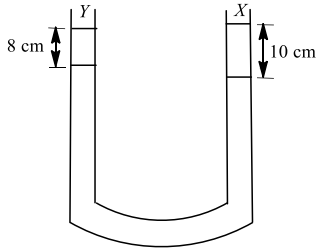
   a) $5.73\ m/sec^2$ b) $8.0\ m/sec^2$
   c) $3.17\ m/sec^2$ d) $10.0\ m/sec^2$
7. The one –rupee coins are put on top of each other on a table. Each coin has a mass m. Which of the following statements is not true
   a) The force on the 6^{th} (counted from the bottom) due to all the coins on its top is equal to $4\ mg$ (downwards)
   b) The force on the 6^{th} coin due to 7^{th} coin is $4mg$ (downwards)
   c) The reaction of the 6^{th} coin on the 7^{th} coin is $4\ mg$ (upwards)
   d) The total force on the 10^{th} coin is $9\ mg$ (downwards)
8. A body moves a distance of $10\ m$ along a straight line under the action of a force of $5\ N$. If the work done is $25\ joules$, the angle which the force makes with the direction of motion of the body is
   a) 0° b) 30° c) 60° d) 90°
9. If the earth suddenly changes its radius x times the present value, the new period of rotation would be
   a) $6x^2$h b) $12x^2$h
   c) $24x^2$h d) $48x^2$h
10. A horizontal platform is rotating with uniform angular velocity around the vertical axis passing through its centre. At some instant of time a viscous fluid of mass 'm' is dropped at the centre and is allowed to spread out and finally fall. The angular velocity during this period
    a) Decreases continuously
    b) Decreases initially and increases again
    c) Remains unaltered
    d) Increases continuously
11. LANDSAT series of satellites move in near polar orbits at an altitude of

a) 3600 km b) 3000 km
c) 918 km d) 512 km

12. A wire ($Y = 2 \times 10^{11}$ Nm^{-2}) has length 1 m and area of cross-section 1 mm^2. The work required to increase its length by 2 mm is
a) 400 J b) 40 J c) 4 J d) 0.4 J

13. An aeroplane of mass 3×10^4 kg and total wing area of 120 m^2 is in a level flight at some height. The difference in pressure between the upper and lower surface of its wings in kilo pascals is ($g = 10$ ms^{-2})
a) 2.5 b) 5.0 c) 10.0 d) 12.5

14. A liquid X of density 3.36 g cm^{-3} is poured in a U-tube, which contains Hg. Another liquid Y is poured in left arm with height 8 cm, upper levels of X and Y are same. What is density of Y?



a) 0.8 gcc^{-1} b) 1.2 gcc^{-1}
c) 1.4 gcc^{-1} d) 1.6gcc^{-1}

15. A black body radiates energy at the rate of E Wm^{-2} at a high temperature T K. When the temperature is reduced to $\left(\frac{T}{2}\right)$ K, the radiant energy is
a) $\frac{E}{2}$ b) $2E$ c) $\frac{E}{4}$ d) $\frac{E}{16}$

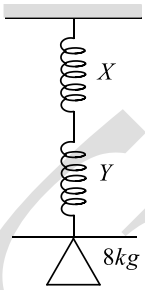
16. A gas at pressure 6×10^5 Nm^{-2} and volume 1 m^3 and its pressure falls to 410^5 Nm^{-2}, When its volume is 3m^3. Given that the indicator diagram is a straight line, work done by the system is
a) 6×10^5 J b) 3×10^5 J
c) 4×10 J d) 10×10^5 J

17. An ideal gas is heated at constant pressure and absorbs amount of heat Q. If the adiabatic exponent is γ, then the fraction of heat absorbed in raising the internal energy and performing the work, in
a) $1-\frac{1}{\gamma}$ b) $1+\frac{1}{\gamma}$ c) $1-\frac{2}{\gamma}$ d) $1+\frac{2}{\gamma}$

18. The temperature of an ideal gas is reduced from 927℃ to 27℃. The $r.m.s.$ velocity of the molecules becomes
a) Double the initial value
b) Half of the initial value
c) Four times the initial value
d) Ten times the initial value

19. The equation of a simple harmonic wave is given by $y = 6\sin 2\pi(2t - 0.1x)$, where x and y are in mm and t is in seconds. The phase difference between two particles 2 mm apart at any instant is
a) 54° b) 72° c) 18° d) 36°

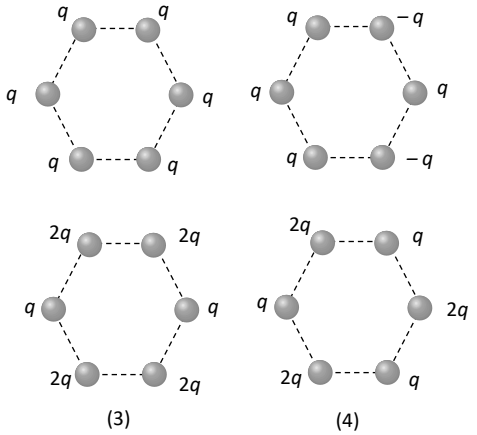
20. A body of mass 8 kg is suspended through two light springs X and Y connected in series as shown in figure. The readings in X and Y respectively are



a) 8 kg, zero b) zero, 8 kg
c) 8 kg, 8 kg d) 2 kg ,6 kg

21. Two waves having equations
$x_1 = a\sin(\omega t + \phi_1)$, $x_2 = a\sin(\omega t + \phi_2)$
If in the resultant wave the frequency and amplitude remain equal to those of superimposing waves. Then phase difference between them is
a) $\pi/6$ b) $2\pi/3$ c) $\pi/4$ d) $\pi/3$

22. Figures below show regular hexagons, which charges at the vertices. In which of the following cases the electric field at the centre is not zero



a) 1 b) 2 c) 3 d) 4

23. A molecule with a dipole moment p is placed in an electric field of strength E. Initially the dipole is aligned parallel to the field. If the

dipole is to be related to be anti-parallel to the field the work required to be done by an external agency is

a) $-2pE$ b) $-pE$ c) pE d) $2pE$

24. The energy of a charged capacitor is U. Another identical capacitor is connected parallel to the first capacitor, after disconnecting the battery. The total energy of the system of these capacitors will be

a) $\frac{U}{4}$ b) $\frac{U}{2}$ c) $\frac{3U}{2}$ d) $\frac{2U}{4}$

25. The length of a potentiometer wire is 5m. An electron in this wire experiences a force of 4.8×10^{-19}N, emf of the main cell used in potentiometer is

a) 3 V b) 15 V c) 1.5 V d) 5 V

26. A wire of resistance 5.5 ohm is drawn out uniformly so that its length is increased twice. Then its new resistance is

a) 44Ω b) 42Ω c) 40Ω d) 22Ω

27. Two bulbs are working in parallel order. Bulb A is brighter than bulb B. If R_A and R_B are their resistance respectively then

a) $R_A > R_B$ b) $R_A < R_B$
c) $R_A = R_B$ d) None of these

28. An arbitrary shaped closed coil is made of a wire of length L and a current I ampere is flowing in it. If the plane of the coil is perpendicular to magnetic field $\vec{B}$, the force on the coil is

a) Zero b) IBL c) $2IBL$ d) $\frac{1}{2}IBL$

29. A solenoid has core of a material with relative permeability 500 and its windings carry a current of $1A$. The number of turns of the solenoid is 500 per metre. The magnetization of the material is nearly

a) $2.5 \times 10^3\ Am^{-1}$ b) $2.5 \times 10^5\ Am^{-1}$
c) $2.0 \times 10^3\ Am^{-1}$ d) $2.0 \times 10^5\ Am^{-1}$

30. Two magnets A and B are identical in mass, length and breadth but have different magnetic moments. In a vibration magnetometer, if the time period of B is twice the time period of A. The ratio of the magnetic moments M_A/M_B of the magnets will be

a) 1/2 b) 2 c) 4 d) 1/4

31. In step-up transformer, relation between number of turns in primary (N_p) and number of turns is secondary (N_s) coils is

a) N_s is greater than N_p b) N_p is greater than N_s
c) N_s is equal to N_p d) $N_p = 2N_s$

32. In a purely resistive ac circuit, the current

a) Lags behind the e.m.f. in phase
b) Is in phase with the e.m.f.
c) Leads the e.m.f. in phase
d) Leads the e.m.f. in half the cycle and lags behind it in the other half

33. In a LCR circuit having $L = 8.0\ henry, C = 0.5\ \mu F$ and $R = 100\ ohm$ in series. The resonance frequency in per second is

a) 700 $radian$ b) 600 Hz
c) 500 $radian$ d) 500 Hz

34. The rms value of the electric field of the light coming from the sun is 720 NC^{-1}. The average total energy density of the Electromagnetic Wave is

a) $4.58 \times 10^{-6}\ Jm^{-3}$ b) $6.37 \times 10^{-9}\ Jm^{-3}$
c) $81.35 \times 10^{-12}\ Jm^{-3}$ d) $3.3 \times 10^{-3} Jm^{-3}$

35. The spectrum of light emitted by a glowing solid is

a) Continuous spectrum b) Line spectrum
c) Band spectrum d) Absorption spectrum

36. The minimum temperature of a body at which it emits light is

a) 1200°C b) 1000°C c) 500°C d) 200°C

37. The wavelength of the light used in Young's double slit experiment is λ. The intensity at a point on the screen is I, where the path difference is $\frac{\lambda}{6}$. If I_0 denotes the maximum intensity, then the ratio of I and I_0 is

a) 0.866 b) 0.5 c) 0.707 d) 0.75

38. K_α and K_β X-rays are emitted when there is a transition of electron between the levels

a) n=2 to n=1 and n=3 to n=1 respectively
b) n=2 to n=1 and n=3 to n=2 respectively
c) n=3 to n=2 and n=4 to n=2 respectively
d) n=3 to n=2 and n=4 to n=3 respectively

39. In the photoelectric effect the velocity of ejected electrons depends upon the nature of the target and

a) The frequency of the incident light
b) The polarisation of the incident light
c) The time for which the light has been incident
d) The intensity of the incident light

40. When hydrogen atom is in its first excited level, its radius is how many times its ground state radius?

a) Half b) Same
c) Twice d) Four times

41. The mass defect in a particular nuclear reaction is 0.3 $grams$. The amount of energy liberated in kilowatt hours is
(Velocity of light $= 3 \times 10^8 m/s$)
a) 1.5×10^6 b) 2.5×10^6 c) 3×10^6 d) 7.5×10^6

42. ${}^{235}_{92}X \rightarrow {}^{231}_{91}Y$
Number of particles emitted in the reaction is
a) One electron and one neutron
b) One neutron and one electron
c) One α and one neutron
d) One α and one electron

43. The maximum efficiency of full wave rectifier is
a) 100 % b) 25.20 % c) 40.6 % d) 81.2 %

44. In satellite communication
1. The frequency used lies between 5 MHz and 10 MHz
2. The uplink and downlink frequencies are different.
3. The orbit of geostationary satellite lies in the equatorial plane at an inclination of 0°.
In the above statements
a) Only 2 and 3 are true b) All are true
c) Only 2 is true d) Only 1 and 2 are true

45. With reference to ionospheric propogation, an electromagnetic wave with a critical frequency of 15 MHz and incident at an angle of 45° will have MUF of
a) 15 MHz b) $15/\sqrt{2}$ MHz
c) $15\sqrt{2}$ MHz d) None of these

46. Stoichiometric ratio of sodium dihydrogen orthophosphate and sodium hydrogen orthophosphate required for synthesis of $Na_5P_3O_{11}$ is
a) 1.5 : 3 b) 3 : 1.5 c) 1 : 1 d) 2 : 3

47. Mixture $X = 0.02$ mole of $[Co(NH_3)_5SO_4]Br$ and 0.02 mole of $[Co(NH_3)_5Br]SO_4$ was prepared in 2 L of solution.
1 L of mixture X + excess $AgNO_3 \rightarrow Y$
1 L of mixture X + excess $BaCl_2 \rightarrow Z$
Number of moles of Y and Z are
a) 0.01, 0.01 b) 0.02, 0.01
c) 0.01, 0.02 d) 0.02, 0.02

48. Einstein's photoelectric equation states that $E_k = hv - W$
Here, E_k refers to
a) Kinetic energy of all ejected electrons
b) Mean kinetic energy of emitted electrons
c) Minimum kinetic energy of emitted electrons
d) Maximum kinetic energy of emitted electrons

49. If the quantum number for the 5th electron in carbon atoms are 2,1,1,+1/2, then for the 6th electron, these values would be
a) $2, 1, 0, -\frac{1}{2}$ b) $2, 0, 1, +\frac{1}{2}$
c) $2, 1, 1, -\frac{1}{2}$ d) $2, 1, -1, +-\frac{1}{2}$

50. The correct order of ionisation energy of C, N, O, F is
a) F < O < N < C b) F < N < C < O
c) C < N < O < F d) C < O < N < F

51. Which of the following compound is covalent?
a) H_2 b) KCl c) Na_2S d) CaO

52. Hybridisation of central atom in NF_3 is
a) sp^3 b) sp c) sp^2 d) dsp^2

53. A preweighted vessel was filled with CO_2 at STP and weighed. It was then evaluated, filled with SO_2 at the same temperature and pressure and again weighted. The weight of the CO_2 will be
a) The same as that of the SO_2
b) Twice of that of the SO_2
c) Half that of the SO_2
d) Two third of that of SO_2

54. 1 mole of H_2SO_4 is mixed with 2 moles of NaOH. The heat evolved will be
a) 57.3 kJ
b) 2×57.3 kJ
c) 57.3/2 kJ
d) Cannot be predicated

55. The decreasing order of bond dissociation energies of C − C, C − H and H − H bonds is
a) H − H > −C − H > −C − C −
b) −C − C−> −C − H > H − H
c) −C − H > −C − C− > H − H
d) −C − C− > H − H > −C − H

56. The indicator used in titration of oxalic acid with caustic soda solution is
a) Methyl orange b) Methyl red
c) Fluorescein d) Phenolphthalein

57. Arrange the following as increase in oxidation number
(i) Mn^{2+} (ii) MnO_2

(iii) $KMnO_4$ (iv) K_2MnO_4

a) (i)>(ii)>(iii)>(iv) b) (i)<(ii)<(iv)<(iii)

c) (ii)<(iii)<(i)<(iv) d) (iii)>(i)>(iv)>(ii)

58. Which one of the following reaction is possible at anode?

a) $F_2 + 2e^- \longrightarrow 2F^-$

b) $2H^+ + \frac{1}{2}O_2 + 2e^- \longrightarrow H_2O$

c) $2Cr^{3+} + 7H_2O \longrightarrow Cr_2O_7^{2-} + 14H^+ + 6e^-$

d) $Fe^{2+} \longrightarrow Fe^{3+} + e^-$

59. Which one of the following is a true peroxide?

a) SO_2 b) MnO_2 c) NO_2 d) BaO_2

60. When Na reacts with liquid NH_3 the following substance is formed

a) $Na(NH_3)_x]^-$ b) $[e(NH_3)_y]^-$

c) $NaNH_2$ d) $Na_x(NH_3)_y$

61. Which of the following form dimeric halides?

a) Al b) Mg c) In d) Ca

62. Which is used to produce smoke screens?

a) Calcium phosphide b) Sodium carbonate

c) Zinc sulphide d) Zinc phosphide

63. The correct order of increasing basicity of the given conjugate bases (R=CH_3) is

a) $RCO\bar{O} < HC \equiv \bar{C} < \bar{R} < \bar{N}H_2$

b) $\bar{R} < HC \equiv \bar{C} < RCO\bar{O} < \bar{N}H_2$

c) $RCO\bar{O} < NH_2 < HC \equiv \bar{C} < \bar{R}$

d) $RCO\bar{O} < HC \equiv \bar{C} < \bar{N}H_2 < \bar{R}$

64. Propylene on hydrolysis with sulphuric acid forms

a) n-propyl alcohol b) Isopropyl alcohol

c) Ethyl alcohol d) Butyl alcohol

65. Which of the following will give three mono-bromo derivatives?

a) $CH_3CH_2CH_2CH(CH_3)CH_3$

b) $CH_3CH_2C(CH_3)_2CH_3$

c) $CH_3CH_3(CH_3)CH\ (CH_3)CH_3$

d) All the above can give

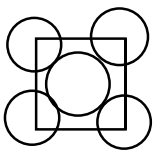
66. Green house effect is caused by

a) NO_2 b) CO c) NO d) CO_2

67. A solid is made of two elements X and Z. The atoms Z are in ccp arrangement while the atom X occupy all the tetrahedral sites. What is the formula of the compound?

a) XZ b) XZ_2 c) X_2Z d) X_2Z_3

68. The packing efficiency of the two dimensional square unit cell shown below is



a) 39.27% b) 68.02% c) 74.05% d) 78.54%

69. The vapour pressure of a pure liquid A is 40 mm Hg at 310 K. The vapour pressure of this liquid in a solution with liquid B is 32 mm Hg. What is the mole fraction of A in the solution if it obeys the Raoult's law?

a) 0.5 b) 0.6 c) 0.7 d) 0.8

70. 0.004 M Na_2SO_4 is isotonic with 0.01 M glucose.Degree of dissociation of Na_2SO_4 is

a) 75% b) 50% c) 25% d) 85%

71. The reduction potential of hydrogen half-cell will negative if

a) $p(H_2) = 1$ atm and $[H^+] = 2.0$ M

b) $p(H_2) = 1$ atm and $[H^+] = 1.0$ M

c) $p(H_2) = 2$ atm and $[H^+] = 1.0$ M

d) $p(H_2) = 2$ atm and $[H^+] = 2.0$ M

72. For the reaction, $H_2 + I_2 \rightarrow 2HI$, the differential rate law is

a) $-\frac{d[H_2]}{dt} = -\frac{d[I_2]}{dt} = \frac{1}{2}\frac{d[HI]}{dt}$

b) $-\frac{d[H_2]}{dt} = -2\frac{d[I_2]}{dt} = \frac{1}{2}\frac{d[HI]}{dt}$

c) $-\frac{d[H_2]}{dt} = -\frac{d[I_2]}{dt} = \frac{d[HI]}{dt}$

d) $-\frac{d[H_2]}{dt} = -\frac{d[I_2]}{dt} = -\frac{d[HI]}{dt}$

73. A drop of a solution (volume = 0.05 mL) contains 6×10^{-7} mol of H^+. If the rate of disappearance of H^+ is 6.0×10^5 mol/L × s, how long will it take for H^+ to disappear from the drop

a) 8.0 $\times 10^{-8}$ s b) 2.0 $\times 10^{-8}$ s c) 6.0 $\times 10^{-6}$ s d) 2.0 $\times 10^{-2}$ s

74. The sky looks blue due to

a) Dispersion effect b) Reflection effect

c) Transmission effect d) Scattering effect

75. Bronze is a mixture of

a) Pb+ Sn b) Cu+ Sn

c) Cu+ Zn d) Pb+ Zn

76. Which of the following is a carbonate ore?

a) Pyrolusite b) Diaspore

c) Cassiterite d) Malachite

77. Ozone is used for purifying water because

a) It dissociates and release oxygen

b) Do not leave any foul smell like chlorine.

c) Kills bacteria, cyst, fungi and acts as a biocide.

d) All of the above

78. By annealing, steel

a) Becomes soft

b) Becomes liquid

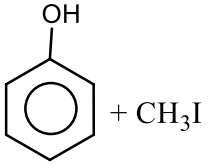
c) Becomes hard and brittle
d) Is covered with a thin film of Fe_3O_4

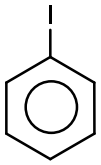
79. Which of the following compounds volatilises on heating?
a) $MgCl_2$ b) $HgCl_2$ c) $CaCl_2$ d) $FeCl_3$

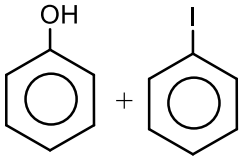
80. An alkane forms isomers if minimum number of C-atom is:
a) 1 b) 2 c) 3 d) 4

81. Reaction of *t*-butyl bromide with sodium methoxide produces
a) Isobutane b) Isobutylene
c) Sodium *t*-butoxide d) *t*-butylmethyl ether

82. The products obtained when anisole is heated in a sealed tube with HI are

a)  $+ CH_3I$

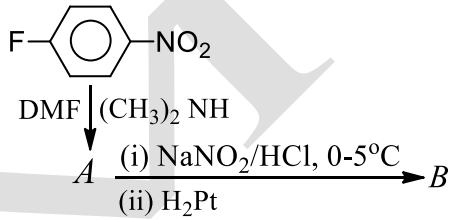
b)  $+ CH_3OH$

c) 

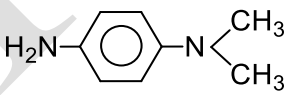
d) $CH_3OH + CH_3I$

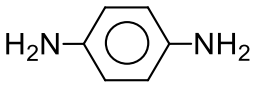
83. Catalytic dehydrogenation of a primary alcohol gives a
a) Secondary alcohol b) Aldehyde
c) Ketone d) Ester

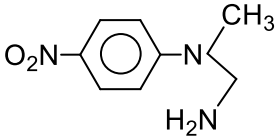
84. An organic compound of molecular formula C_3H_6O did not give a silver mirror with Tollen's reagent, but gave an oxime with hydroxylamine, it may be
a) $CH_3 - CO - CH_3$
b) C_2H_5CHO
c) $CH_2 = CH - CH_2 - OH$
d) $CH_3 - O - CH = CH_2$

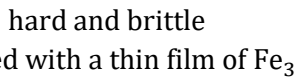
85. 

In the above sequence *B* is

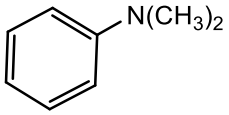
a) 

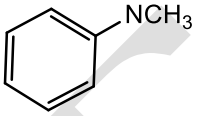
b) 

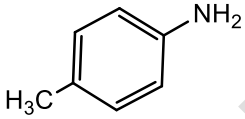
c) 

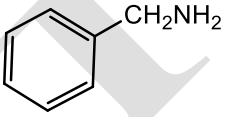
d) 

86. Amongst the compound given, the one that would form a brilliant coloured dye on treatment with $NaNO_2$ in dil. HCl followed by addition to an alkaline solution of β −naphthol is

a) 

b) 

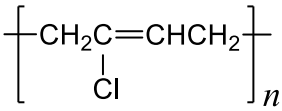
c) 

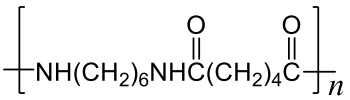
d) 

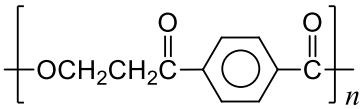
87. Which one is involved in the formation of nicotinamide and indole -3-acetic acid?
a) Lysine b) Tryptophan
c) Tyrosine d) Glutamic acid

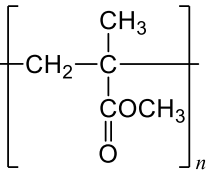
88. The polymer obtained by condensation of sebacic acid and hexamethylenediamine is named as
a) Nylon-6 b) Nylon-6-nylon-10
c) Nylon-6,6 d) Nylon-6,10

89. Which one of the following is not correctly matched?

a) Neoprene 

b) Nylon-66 

c) Terylene 

d) PMMA 

90. Aspirin is an acetylation product of
a) *o*-hydroxybenzoic acid
b) *o*-hydroxybenzene
c) *m*-hydroxybenzoic acid
d) *p*-dihydroxybenzene

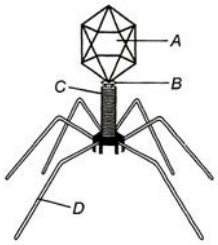
91. Which one of the following taxonomic categories can categorized rest all others
a) Family
b) Genus

c) Class
d) order

92. What is the prime source of taxonomic studies?
a) Collection of actual specimens of organisms species
b) Identification of actual specimen of organism species
c) Both (a) and (b)
d) None of the above

93. Two plants can be conclusively said to belong to the same species if they
a) Can reproduce freely with each other and form seeds
b) Have more than 90 percent similar genes
c) Look similar and possess identical secondary metabolites
d) Have same number of chromosomes.

94. Identify the label A, B, C and D in the following figures



Codes

a) A-Head, B-collar, C-Sheath, D-Tail fibres
b) A-Collar, B-Head, C-Sheath, D-Tail fibres
c) A-Head, B-Collar, C-Tail fibres, D-Sheath
d) A-Collar, B-Tail fibres, C-Head, D-Sheath

95. The association mycorrhiza is
a) Relationship of algae and fungi
b) Relationship of fungi and higher plants
c) Relationship of algae and higher plants
d) None of these

96. Characters of both conifers and cycads are found in
a) *Ginkgo*
b) *Ephedra*
c) *Cupressus*
d) *Tsuga*

97. Which region is responsible for origin of rhizoids in *Funaria*?
a) Lateral region
b) Dorsal region
c) Ventral region
d) Basal region

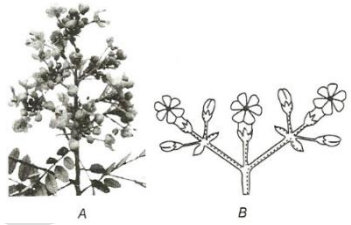
98. True segmentation is also called
a) Metagenesis
b) Metamorphosis
c) Metamerism
d) Metasegmerism

99. The secondary host of *Taenia saginata* is
a) Cow
b) Pig
c) Dog
d) None of these

100. Which of the following groups includes only arthropods?
a) Prawn, *Schistosoma, Planaria*
b) Cockroach, scorpion, prawn
c) *Chiton, Neopilina*, scorpion
d) *Chiton*, prawn, cockroach

101. Arrange the following plants in the ascending order based on the number of carpels they possess
I. *Oenothera*
II. *Acacia melanoxylon*
III. Squill
IV. Lettuce
a) IV, III, I, II
b) II, IV, III, I
c) II, III, IV, I
d) I, IV, III, II

102. Identify the type of inflorescence in the given diagrams (A and B)



a) A-Racemose; B-Cymose
b) A-Cymose; B-Racemose
c) A-Cymose; B-Cymose
d) A-Racemose; B-Racemose

103. The difference in phloem of gymnosperms and angiosperms is due to
a) Parenchyma
b) Sieve cell
c) Companion cell
d) Fibres

104. Leaf
a) Is a lateral generally flattened structure born on the stem
b) Is a vegetative organ for photosynthesis
c) Originates from shoot apical meristem
d) All of the above

105. In dicot stem, secondary growth is due to the activity of
a) Apical meristem
b) Lateral meristem
c) Cork
d) Bark

106. Atactostele type of stele is found in
a) Dicot
b) Monocots
c) Both (a) and (b)
d) Only in gymnosperm

107. The number of vasa efferentia that arises from testes in frog's male reproductive system is
a) 9 – 12 b) 10 – 12 c) 13 – 16 d) 16 – 19

108. Excretory system of the frog consists of
a) Pair of kidneys, ureters, urinary bladder, cloaca
b) Single kidney, urinary bladder and cloaca
c) Kidney, and cloaca only
d) Urethra and cloaca only

109. In DNA of certain organisms, guanine constitutes 20% of the bases. What percentage of the bases would be adenine?
a) 0% b) 10% c) 20% d) 30%

110. Wall of eukaryotic cell (fungus) is made up of a polymer of
a) α, 1-4 acetyl glucosamine
b) β, 1-4 acetyl glucosamine
c) α, β, 1-4 acetyl glucosamine
d) Acetyl glucosamine

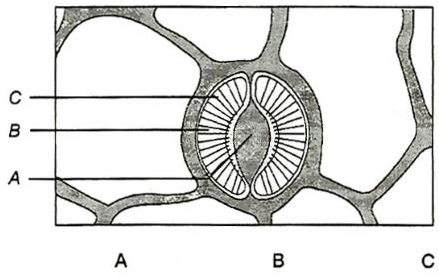
111. Fluidity of bio-membranes can be shown by
a) Electron microscope
b) Tissue culture
c) Phase-contrast microscope
d) Fluorescence microscope

112. Catabolic and anabolic pathways are often coupled in cell. Why?
a) Both the path are the same energy
b) The free energy released from are pathway is used to drive other
c) The intermediate of a catabolic pathway are used in the anabolic pathway
d) Their enzymes are controlled by their activators and inhibitors

113. During cell cycle, RNA and non-histone proteins are synthesized in
a) S-phase b) G_0-phase
c) G_1-phase d) M-phase

114. In which of the following stage of the cell cycle, the attachment of spindle fibres to kinetochores of chromosomes occurs?
a) Prophase
b) Metaphase
c) Anaphase
d) Telophase

115. Choose the correct option to label A-C in the given diagram of stomatal apparatus



A B C
a) Stomatal aperture Subsidiary Guard cells
b) Cellulose micro fibrils Subsidiary cells Stomatal aperture
c) Stomatal aperture Guard cell Epidermal cells
d) Stomatal aperture Guard cell Cellulosic micro fibrils

116. Which of the following theories for ascent of sap was proposed by an eminent Indian scientist J C Bose?
a) Pulsation theory
b) Relay pump theory
c) Transpiration pull theory
d) Root pressure theory

117. Imbibition is always accompanied by swelling or increase in the volume of imbibint However, the increase in the volume of the imbibant is
a) More than the volume of water imbibed
b) Same as the volume of the water imbibed
c) Less than the volume of the water imbibed
d) Depends upon the type of imbibant

118. What is the correct order of nitrogen assimilation?
a) $N_2 \rightarrow NO_2 \rightarrow NO_3 \rightarrow NH_2OH \rightarrow NH_3$
b) $N_2 \rightarrow NO_3 \rightarrow NO_2 \rightarrow NH_2OH \rightarrow NH_3$
c) $N_2 \rightarrow NO_2 \rightarrow NO_3 \rightarrow NH_3 \rightarrow NH_2OH$
d) $N_2 \rightarrow NO_3 \rightarrow NO_2 \rightarrow NH_3 \rightarrow NH_2OH$

119. 'Khaira disease of rice' is due to
a) Fungus b) Bacteria
c) Zn deficiency d) Mo deficiency

120. C_4-plant minimises the photorespiration because C_4-plants
a) Use PEPcase to initiate CO_2 fixation
b) Do not carry out the Calvin cycle in low CO_2 level
c) Exclude Calvin cycle
d) Show photorespiration

121. Main biosynthetic pathway for CO_2 fixation in C_4-plant is
a) C_4 pathway b) C_3 pathway

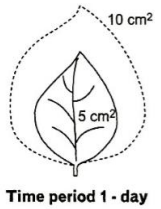
c) C_2 pathway d) Both (a) and (b)

122. The reactions of Pentose Phosphate Pathway (PPP) take place in
a) Mitochondrion
b) Cytoplasm
c) Chloroplast, peroxisome and mitochondrion
d) Chloroplast, glyoxysome and mitochondrion

123. Instantaneous source of energy is
a) Protein b) Lipid c) Fats d) Glucose

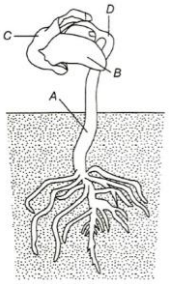
124. Which plant hormone is found in gaseous form?
a) Auxin b) Cytokinin
c) Ethylene d) ABA

125. In the given figure find out the absolute and relative growth rate and choose the correct option



	Absolute Growth Rate	Relative Growth Rate
a)	1 cm^2	1 cm^2
b)	100 cm^2	5 cm^2
c)	5 cm^2	100 cm^2
d)	0.5 cm^2	100 cm^2

126. Identify *A*, *B*, *C* and *D* from the given figure and choose the correct accordingly



a) A-Hypocotyl, B-Cotyledons, C-Seed coat, D-Epicotyl
b) A-Epicotyl, B-Cotyledons, C-Hypocotyl, D-Seed coat
c) A-Epicotyl, B-Seed coat, C-Hypocotyl, D-Cotyledon
d) A-Hypocotyl, B-Seed coat, C-Epicotyl, D-Cotyledon

127. Which of the following are required in minimum amount by human?
a) Iron, iodine, carbon, manganese, copper, oxygen
b) Iron, iodine, manganese, copper, zinc, fluorine
c) Iron, iodine, manganese, zinc, hydrogen
d) Nitrogen, oxygen, zinc, fluorine

128. Secretion of gastric juice is controlled by
a) Gastrin b) Cholecystokinin
c) Enterogastrin d) None of these

129. Arrange the given steps by which the pulmonary volume increases in the sequence of events occurring first
I. Contraction of intercostal muscles
II. Lifting up of the ribs
III. Sternum causing an increase in the volume of the thoracic chamber in dorsoventral axis
IV. Contraction of the diaphragm which increases the volume of the thoracic chamber in antero-posterior axis
Choose the correct option
a) I → II → III → IV b) IV → I → II → III
c) IV → I → III → II d) I → III → IV → II

130. Partial pressure of the gas is the pressure contributed by
a) All gases in a mixture
b) Individual gas in a mixture
c) Pressure exerted by atmosphere on gases
d) Atmosphere on O_2 only

131. Platelets are
a) Also called thrombocytes
b) Cell fragments
c) Produced from megakaryocytes
d) All of the above

132. In the ventricular diastole, the …A… valve closes. This causes the second heart sound …B… . Choose the correct option for A and B
a) A-Semilunar; B-Dub b) A-Mitral; B-Dub
c) A-Bicuspid; B-Dub d) A-Tricuspid; B-Dub

133. The process of release of urine is called
a) Micturition b) Sweatening
c) Defeciation d) Perspiring

134. All Bowman's capsules of the kidney are found in
a) Pelvis b) Medulla
c) Cortex d) None of these

135. The principle nitrogenous excretory compound in humans is synthesized
a) In kidneys, but eliminated mostly through liver
b) In kidneys as well as eliminated by kidneys
c) In liver and also eliminated by the same through bile
d) In the liver, but eliminated mostly through kidneys

136. Myofilaments or myofibrils are
a) Obliquely arranged filaments of muscle fibre

b) Parallely arranged filaments of muscle fibre
c) Horizontally arranged filaments of muscle fibre
d) Radially arranged filaments of muscle fibre

137. Zygomatic arch of rabbit is formed of
a) Maxilla, periotic and jugal
b) Periotic, jugal and palatine
c) Maxilla, squamosal and jugal
d) Maxilla, premaxilla and squamosal

138. Ciliary movement occurs in most of our internal tubular organs which are lined by …A epithelium. The coordinated movement of cilia in the …B… help us in removing dust particles. Passage of ova through female reproductive tract is facilitated by the …C… movement Identify A, B and C to complete the given NCERT statement
a) A-squamous, B-trachea, C-ciliary
b) A-cuboidal, B-trachea, C-ciliary
c) A-ciliated B-trachea, C-amoeboid
d) A-stratified, B-trachea, C-amoeboid

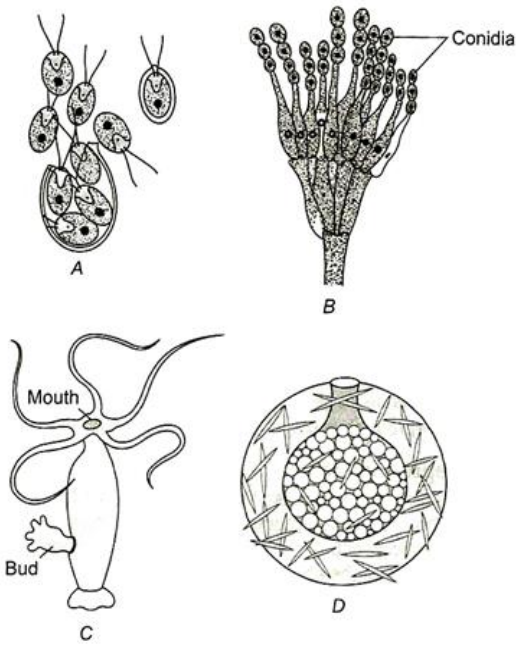
139. Which part of brain is associated with strong emotions?
a) Limbic system b) Medulla
c) Cerebellum d) Cerebral cortex

140. Our paired eyes are located in sockets of the skull called
a) Orbits b) Cornea c) Iris d) Lens

141. Insulin and glucagon are transported to target organ by
a) Lymph b) Blood
c) Pancreatic duct d) Cystic duct

142. Significant role of calcium balance in the body is maintained by
a) PTH and FSH b) PTH and TCT
c) TCT and FSH d) TCT and GH

143. Identify the following diagram



a. Zoospore in *Chlamydomonas*
b. Conidia of *Penicillium*
c. Buds in *Hydra*
d. Gemmules in sponge
All the above are
a) Bodies involved in sexual reproduction
b) Bodies involved in asexual reproduction
c) Bodies of young ones
d) All the above are correct

144. One of the followings is not the characteristic feature of cyanobacteria:
a) They are multicellular
b) They form colonies
c) They form blooms in polluted water bodies
d) They can fix atmospheric nitrogen

145. Non-endospermic seeds are seen in
a) Groundnut b) Pea
c) Beans d) All of these

146. Polar nuclei are located in
a) Embryo sac b) Thalamus
c) Pollen tube d) Ovule

147. Chalazal pole is present
a) Opposite to micropyle b) At the origin of integuments
c) Opposite to nucellus d) Near the embryo sac

148. Fluid filled cavity called …A… is present in …B… follicle called …C…. Here A, B and C are
a) A-secondary follicle, B-primary follicle, C-tertiary follicle b) A- primary follicle, B-antrum, C-secondary follicle
c) A- tertiary follicle, B-secondary follicle, C-antrum d) A- antrum, B-secondary follicle, C-tertiary follicle

149. Skin epidermis, tooth, enamel, lens and corner of outer ear, brain, spinal cord, skeletal muscles of human head are derived from
a) Ectoderm
b) Mesoderm
c) Endoderm
d) Both (c) and (d)

150. Select the correct statement.
a) Cleavage follows gastrulation
b) Yolk content in egg has no role in cleavage
c) Cleavage is repeated mitotic division of zygote
d) Gastrulation and blastulation are followed by each other

151. Ageing is retarded by
a) ABA b) CKN c) GA d) C_2H_4

152. A woman who substitutes or takes the place of the real mother to nurse the embryo is called
a) Interrogate mother
b) Surrogate mother
c) Both (a) and (b)
d) None of the above

153. Detection technique for AIDS is
a) PCR b) ELISA c) Both (b) and (c) d) Clinical culture

154. Genotypic and phenotypic ratios remains the same in
a) Sex-linked genes b) Pseudoallelic genes
c) Intermediate inheritance d) Dominance and recessive genes

155. The alternate forms of a gene is called
a) Recessive character
b) Dominant character
c) Alleles
d) Alternative gene

156. Inheritance of skin colour in human is an example of
a) Chromosomal aberration
b) Codominance
c) Point mutation
d) Polygenic inheritance

157. How many types of nucleic acids are found in living system?
a) One
b) Two
c) Three
d) Four

158. Twin studies in humans are useful because
a) They allow more refined estimates of the chromosome location to be made
b) They allows an improved expression of genes
c) Cloning of genes is facilitated by the presence of an extra copy
d) They allows genetic *vs* environmental influences on variation in a trait to be estimated

159. Development of different functional structures from a common ancestral form is called
a) Differential evolution
b) Adaptive radiation
c) Non-adaptive radiation
d) Regressive evolution

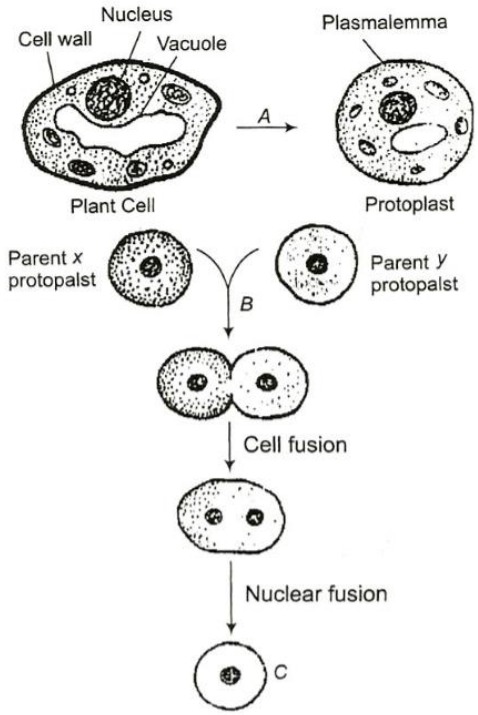
160. Theory of continuity of germplasm was given by
a) August Weismann
b) Lamarck
c) Darwin
d) Wallace

161. Which of the following is correct for immuno-modulators?
a) They always suppress immune system
b) They never suppress immune system
c) They always stimulate immune system
d) Specific immuno-modulators stimulate the immuno-response of immune system, whereas some other immuno-modulators inhibit it

162. Which of the following diseases is caused due to helminth infection?
a) Ascariasis
b) Wuchereriasis
c) Both (a) and (b)
d) None of these

163. Regarding common cold consider the following statements
I. Rhinovirus is responsible for common cold which infects the nasal epithelium and respiratory passage but not the lungs
II. The symptoms of common cold included nasal congestion and discharge, sore throat, gruffiness, cough, headache and tiredness
Which of the statement given above is/are correct?
a) Only I
b) Only II
c) I and II
d) None of these

164. The following diagram refers to protoplast fusion



Here A, B and C refers to

a) A-Cellulase and bactinase, B-Polyethylene glycol, C-Somatic hybrid cell
b) A-Pectinase, B-Cellulase, C-Zygotic cell
c) A-Proteinase, B-Polyethylene glycol, C-Somatic hybrid cell
d) A-Cellulase, pectinase, B-Proteinase, C-Germ cell

165. Consider the following statements

I. Breeding of animal is very important for animal husbandry
II. Both the male and female animals selected for breeding should be of superior quality
III. The word 'husbandry' means the management of domestic affair
IV. In our country, poultry mainly means chickens, domesticated for egg
V. Cows and buffaloes generally give more milk than goats and sheep
VI. The yellow colour of buffalo milk is due to carotene

Which of the statement given above are true and which are false?

I II III IV V VI

a) F F T T F F
b) T T F F T F
c) T T T F T F
d) F T F T T F

166. Which of the following is correct?

I. Wine and beer are produced without distillation of fermented broth
II. Whisky, brandy and rum are produced by distillation of the fermented broth
III. Wine and beer are produced by distillation of the fermented broth
IV. Whisky, brandy and rum are produced without distillation of the fermented broth

Choose the correct option

a) I and II
b) I and III
c) II and III
d) III and IV

167. …A… released by LAB during growth coagulate and partially digest …B… . Here A and B refers to

a) A-Acid; B-milk protein
b) A-Base; B-harmful bacteria
c) A-Enzyme; B-milk protein
d) A-Bacteria; B-other microbes

168. Which one is a true statement regarding DNA polymerase used in polymerase chain reaction?

a) DNA polymerase is responsible for DNA synthesis
b) It is isolated from Protozoa
c) It is serves as a selectable marker
d) It is used to ligate introduced DNA in recipient plant cell

169. The first restriction endonuclease type II …A…, was isolated by Smith, Wilcox and Kelley from …B… bacterium. It was formed to cut DNA molecules at a particular point by recognizing a specific sequence of six base pairs, known as the …C… . Here A, B and C can be

	A	B	C
a)	*Eco* RI	*Escherichia* RY 13	Restriction sequence
b)	*Eco* RII	*E. coli* R 245	Recognition sequence
c)	*Hind* II	*Haemophilus influenza*	Recognition sequence
d)	*Bam* HI	*Bacillus amyoliquefaciens*	Restriction sequence

170. In which of the following method, a probe is allowed to hybridise to its complementary DNA in the clone of cells?

a) Gene therapy
b) Recombinant DNA technology
c) Polymerase chain reaction
d) Enzyme Linked Immuno-Sorbent Assay (ELISA)

171. Golden rice

I. It is a transgenic variety of rice

II. It contains a goods quality of β-carotene (provitamin-A)
III. β-carotene is a principal source of vitamin-A
IV. The grains of the rice are yellow in colour due to β-carotene. The rice is commonly called golden rice
Which of the statements given above are correct?
a) I, II and III
b) II, III and IV
c) I, III and IV
d) I, II, III and IV

172. Which of the following technique is based on the principle of antigen-antibody interaction?
a) PCR
b) ELISA
c) Recombinant DNA technology
d) Gene therapy

173. Which one of the following expressions is associated with a 'mangrove plant'?
a) Capable of absorbing water rapidly and retaining it
b) Capable of minimizing water loss and facilitating aeration to underground parts
c) Capable of reducing transpiration and able to store absorbed water
d) Presence of well organized leaves that are adapted to absorb nitrogenous matter

174. The science dealing with soil is
a) Edaphology b) Paedology
c) Pedology d) All of these

175. Which of the following organisms form the decomposers?
a) *Pteris* b) Bacteria
c) Saprophytic fungi d) Both (b) and (c)

176. Pyramids of biomass in pond ecosystem is
a) Inverted b) Upright c) Linear d) Irregular

177. What is/are the correct explanations about higher diversity in tropical areas in comparison to the temperate areas?
I. There are no favourable seasons in tropics
II. Less solar energy is available in tropics
III. Rate of extinction is low in tropics
IV. Resource availability is higher in tropics
Choose the correct option
a) I, III and IV b) I, II, III and IV
c) I, II, III d) III and IV

178. What is the sustainable use of resources?
a) Protected strips of the land that allows organisms to migrate from one wilderness area to another
b) A law that makes it illegal to do harm to the species that are listed as endangered or threatened
c) The ability to use natural resources in a way that helps people to protect the ecosystem
d) The study of the methods to help protect biodiversity

179. Which of the following is non-biodegradable?
a) Sewage b) DDT
c) Livestock waste d) Market garbage

180. Which of the following are correctly matched?
I. Arsenic poisoning - Black foot disease
II. Secondary effluent treatment - Biological process
III. Pyrolysis - Solid soil waste disposal
IV. *Tubifex* - Water pollution indicator
V. Biomagnification - Degradable pollutants
a) I,II,III and V b) I,III,IV and V
c) II,III,IV and V d) I,II,IV and V

Mukesh Sir's Group Tuitions

Date : **NEET FULL PORTION** **TEST ID: 36**

Time: 03 hrs **PCB** **Marks : 720**

: ANSWER KEY :

1)	d	2)	b	3)	b	4)	a	5)	c	6)	a	7)	d
8)	c	9)	c	10)	b	11)	c	12)	d	13)	a	14)	a
15)	d	16)	a	17)	a	18)	b	19)	b	20)	c	21)	b
22)	b	23)	d	24)	b	25)	b	26)	d	27)	b	28)	a
29)	b	30)	c	31)	a	32)	b	33)	c	34)	a	35)	a
36)	c	37)	d	38)	a	39)	a	40)	d	41)	d	42)	d
43)	d	44)	a	45)	c	46)	b	47)	a	48)	d	49)	d
50)	d	51)	a	52)	a	53)	c	54)	b	55)	a	56)	d
57)	b	58)	d	59)	d	60)	b	61)	a	62)	a	63)	d
64)	b	65)	b	66)	d	67)	c	68)	d	69)	d	70)	a
71)	c	72)	a	73)	b	74)	d	75)	b	76)	d	77)	c
78)	a	79)	b	80)	d	81)	b	82)	a	83)	b	84)	a
85)	a	86)	c	87)	b	88)	a	89)	c	90)	a	91)	c
92)	c	93)	a	94)	a	95)	b	96)	a	97)	d	98)	c
99)	a	100)	b	101)	b	102)	a	103)	c	104)	d	105)	b
106)	b	107)	b	108)	a	109)	d	110)	b	111)	d	112)	b
113)	c	114)	b	115)	d	116)	a	117)	c	118)	b	119)	c
120)	a	121)	b	122)	b	123)	d	124)	c	125)	c	126)	a
127)	b	128)	a	129)	b	130)	b	131)	d	132)	a	133)	a
134)	c	135)	d	136)	b	137)	c	138)	c	139)	a	140)	a
141)	d	142)	b	143)	c	144)	a	145)	d	146)	a	147)	a
148)	d	149)	a	150)	c	151)	b	152)	b	153)	c	154)	c
155)	c	156)	d	157)	b	158)	a	159)	b	160)	a	161)	d
162)	c	163)	c	164)	a	165)	c	166)	a	167)	a	168)	a
169)	c	170)	b	171)	d	172)	b	173)	b	174)	d	175)	d
176)	a	177)	d	178)	c	179)	b	180)	d				

: HINTS AND SOLUTIONS :

Single Correct Answer Type

1 **(d)**

Surface Tension $= \frac{\text{Force}}{\text{Length}}$

$= \frac{[MLT^{-2}]}{[L]} = [ML^0T^{-2}]$

Spring constant $= \frac{\text{Force}}{\text{Length}}$

$= \frac{[MLT^{-2}]}{[L]} = [ML^0T^{-2}]$

2 **(b)**

Angular momentum $= mvr$

$= [MLT^{-1}][L] = [ML^2T^{-1}]$

3 **(b)**

From the give graph. From 0s to 8s, particle is accelerated, then from 8 to 12 s, particle moves

with constant acceleration. The form 12 to 16s, the particle is in the condition of deceleration. Hence, maximum velocity will be during 8s to 12s. During 0 to 4s, the acceleration will be function of time. The equation of straight lines is

$a = \frac{5}{4}t$

$\therefore \ \frac{dv}{dt} = \frac{5}{4}t$

$\therefore \ v = \int_0^t \frac{5}{4}t\,dt = \frac{5}{4}\frac{t^2}{2} = \frac{5}{8}t^2$

The velocity at $t = 4$s is $u = 10\text{ms}^{-1}$

The distance travelled during 4 to 8s is

$s_2 = ut + \frac{1}{2}at^2$

$= 10 \times 4 + \frac{1}{2} \times 5 \times 4^2$

$= 40 + 40 = 80\text{m}$

The velocity at $t = 8$s is

$v = 10 + 5 \times 4 = 30\text{ms}^{-1}$

This is the maximum velocity.

Tricky approach: The area of $a - t$ graph gives change in velocity. The area of the graph from 0 to 8s

$= v - u = \frac{1}{2} \times 4 \times 5 + 4 \times 5 = 30$

But $u = 0$

$v = 30\text{ms}^{-1}$

4 **(a)**

From $h = \frac{1}{2}\text{g}t^2$

We have $t_{OB} = \sqrt{\frac{2h_{OA}}{\text{g}}}$

$= \sqrt{\frac{2 \times 1960}{9.8}} = 20\text{s}$

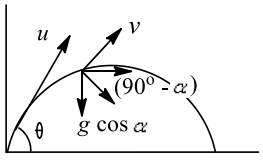
Horizontal distance $AB = vt_{\text{OB}}$

$= \left(600 \times \frac{5}{18}\right)(20)$

$= 3333.33\text{ m} = 3.33\text{ km}$

5 **(c)**

Refer figure when the velocity vector makes an angle α with the horizontal, the component of acceleration, perpendicular to velocity, *ie*, the centripetal acceleration is g cos α. As horizontal component of velocity remains unchanged in angular projection of projectile, hence

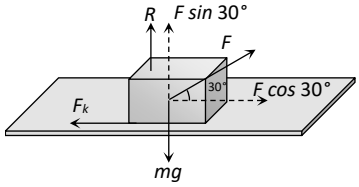


$v\cos\alpha = u\cos\theta$ or $v = \frac{u\cos\theta}{\cos\alpha}$

As, g cos α provides centripetal acceleration, hence

$\text{g}\cos\alpha = \frac{v^2}{r}$ or $\frac{v^2}{\text{g}\cos\alpha} = \frac{u^2\cos^2\theta}{\text{g}\cos^3\alpha}$

6 **(a)**



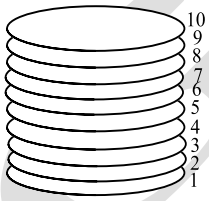
Kinetic friction $= \mu_k R = 0.2(mg - F\sin 30°)$

$= 0.2\left(5 \times 10 - 40 \times \frac{1}{2}\right) = 0.2(50 - 20) = 6N$

Acceleration of the block $= \frac{F\cos 30° - \text{Kinetic friction}}{\text{mass}}$

$= \frac{40 \times \frac{\sqrt{3}}{2} - 6}{5} = 5.73\ m/s^2$

7 **(d)**



(a) Is correct 6th coin has four coins on its top which exert a force $4mg$ on it

(b) Is correct. 7th coin has three coins, placed over it. Thus 7th coin exerts a force $4mg$ on 6th coin (downwards)

(c) Is correct. As what is explained in (b), the reaction of 6th coin on the 7th coin is $4mg$ (upwards)

(d) Is wrong 10th coin, which is the topmost coin, experiences a reaction force of mg (upwards) from all the coins below it

8 **(c)**

$W = Fs\cos\theta \Rightarrow \cos\theta = \frac{W}{F_s} = \frac{25}{50} = \frac{1}{2} \Rightarrow \theta = 60°$

9 **(c)**

As on torque is applies, angular momentum

$L = I\omega = \text{constant} = \left(\frac{2}{5}\ MR^2\right)\left(\frac{2\pi}{T}\right)$

$= \text{constant } ie,$

$\frac{R^2}{T} = \text{constant or} \frac{R_1^2}{T_1} = \frac{R_2^2}{T_2}$

$T_2 = \frac{R_2^2}{T_2}\ T_1 = \left(\frac{xR_1}{R_1}\right)^2 \times 24\text{ h}$

$= 24\ x^2\text{h}$

10 **(b)**

According to law of conservation of momentum

$I\omega = \text{constant}$

When viscous fluid of mass m is dropped and start spreading out then its moment of inertia increases and angular velocity decreases. But when it falls from the platform moment of inertia decreases so angular velocity increases again

11 **(c)**

Landsats 1 through 3 operated in a near polar orbit at an altitude of 920 km with an 18 day repeat coverage cycle. These satellites circled the earth every 103 min completing 14 orbits a day.

12 **(d)**

$Y = \frac{F}{A} \times \frac{l}{x}$ or $F = \frac{YAx}{l}$

Work done $W = \frac{1}{2} F \times x = \frac{1}{2}\frac{YAx'}{l}$

$= \frac{1\times2\times10^{11}\times(10^{-6})\times(2\times10^{-3})^2}{2\times1} = 0.4$ J

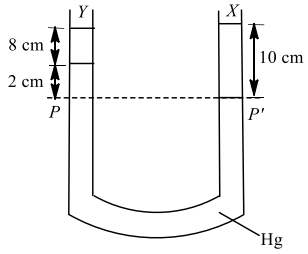
13 **(a)**

In level flight of aeroplane, $mg = pA$

Or $p = \frac{mg}{A} = \frac{3\times10^4\times10}{120}$ Pa $= 2.5$ kPa

14 **(a)**

As shown in figure, in the two arms of a tube pressure remains same on surface *PP'.*



Hence, $8 \times \rho_y \times g \times 2 \times \rho_{Hg} \times g = 10 \times \rho_x \times g$

$\therefore 8\rho_y + 2 \times 113.6 = 10 \times 3.36$

or $\rho_y = \frac{36.6-27.2}{8} = 0.8$ g cc^{-1}

15 **(d)**

According to Stefan's law,

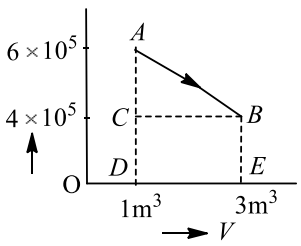
$E \propto T^4$

or $\frac{E_2}{E_1} = \left(\frac{T_2}{T_1}\right)^4$

or $\frac{E_2}{E} = \left(\frac{T/2}{T}\right)^4 = \left(\frac{1}{2}\right)^4$

or $E_2 = \frac{E}{16}$

16 **(a)**



Work done by the system

= area under $p - V$ diagram

= area of rectangle $BCDE$+ area of ΔABC

$= 4 \times 10^5 \times 2 + \frac{2 \times 10^5 \times 2}{2}$

$W = 10 \times 10^5$ J

17 **(a)**

Heat absorbed by the system at constant pressure $Q = nc_p\Delta T$

Change in internal energy $\Delta U = nc_v\Delta T$

$W = Q - \Delta U$

$\therefore \frac{W}{Q} = \frac{Q-\Delta U}{Q} = 1 - \frac{\Delta U}{Q}$

$= 1 - \frac{nc_v\Delta T}{nc_p\Delta T} = 1 - \frac{c_v}{c_p}$

$= \left(1 - \frac{1}{\gamma}\right)$

18 **(b)**

Temperature becomes $\frac{1}{4}th$ of initial value

$[1200K = 927°C \rightarrow 300K = 27°C]$

So, using $v_{rms} \propto \sqrt{T}.r.m.s.$ velocity will be half of the initial value

19 **(b)**

The equation for a harmonic progressive wave is $y = 6\sin 2\pi(2t - 0.1x)$

$\Rightarrow y = 6\sin(4\pi t - 2\pi \times 0.1x)$ This is of the form $y = A\sin(\omega t - kx)$ where $k = \frac{2\pi}{\lambda}$ $\therefore \lambda = 10mm$

The phase difference for two particles separated by 2 mm is $\phi = \frac{2\pi}{10} \times 2 \Rightarrow \phi = \frac{2\pi}{5} = 72°$

20 **(c)**

As X and Y have negligible mass, both the spring balances read the same force $8kg$ or $8kg$

21 **(b)**

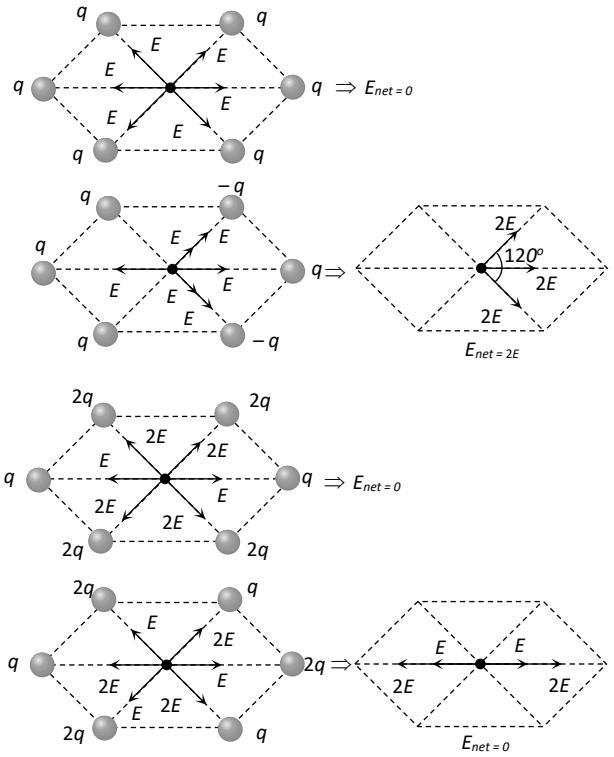
Superposition of waves does not alter the frequency of resultant wave and resultant amplitude

$\Rightarrow a^2 = a^2 + a^2 + 2a^2\cos\phi = 2a^2(1 + \cos\phi)$

$\Rightarrow \cos\phi = -1/2 = \cos 2\pi/3 \ \therefore \phi = 2\pi/3$

22 **(b)**

Electric field at a point due to positive charge acts away from the charge and due to negative charge it act's towards the charge



23 **(d)**

Work done in rotating an electric dipole in an uniform electric field (E) through an angle θ from the direction of field is

$W = pE(1 - \cos\theta)$

Where p is electric dipole moment.

If the dipole is to be rotated to be and anti-parallel to the field ($\theta - 180°$), then

$W = pE(1 - \cos 180°)$

$= pE[1 - (-1)] = 2pE$

24 **(b)**

Common potential $= \frac{C_1V_0 + C_2 \times 0}{C_1 + C_2} = \frac{C_2V_0}{C_1 + C_2}$

$U_{\text{before}} = \frac{1}{2}C_1V_0^2$

$U_{\text{after}} = \frac{1}{2}C_1\left[\frac{C_1V_0}{C_1 + C_2}\right]^2 + \frac{1}{2}C_2\left[\frac{C_1V_0}{C_1 + C_2}\right]^2$

$= \frac{1}{2}\left[\frac{C_1V_0}{C_1 + C_2}\right]^2 (C_1 + C_2)$

$\Rightarrow \quad \frac{U_{\text{before}}}{U_{\text{after}}} = \frac{C_1 + C_2}{C_1}$

Here, $C_1 = C_2 = C$

$\therefore \quad \frac{U_{\text{before}}}{U_{\text{after}}} = \frac{2C}{C}$

$\Rightarrow \quad U_{\text{after}} = \frac{U}{2}$

25 **(b)**

Force =Electric intensity ×charge

$= \frac{\text{Potential diffsrence}}{\text{distance}} \times \text{charge}$

$\therefore \; 4.8 \times 10^{-19} = \frac{V}{5} \times 1.6 \times 10^{-19}$

or $V = 15$ volt

26 **(d)**

$R_2 = n^2R = (2)^2 \times 5.5 = 22\Omega$

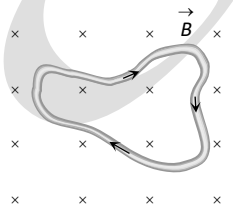
27 **(b)**

In parallel $P_{consumed} \propto$ Brightness $\propto \frac{1}{R}$

$P_A > P_B$ [Given] $\therefore R_A < R_B$

28 **(a)**

As shown in figure, since $\vec{L} = 0$



Hence according to $\vec{F} = i(\vec{L} \times \vec{B}) \Rightarrow \vec{F} = 0$

29 **(b)**

Here, $n = 500$ turns/m, $I = 1A, \mu_r = 500$

Magnetic intensity, $H = nI = 500m^{-1} \times 1A = 500Am^{-1}$

As $\mu_r = 1 + \chi$, where χ is the magnetic susceptibility of the material

or $\chi = (\mu_r - 1)$

Magnetisation, $M = \chi H = (\mu_r - 1)H$

$= (500 - 1) \times 500Am^{-1} = 499 \times 500Am^{-1}$

$= 2.495 \times 10^5\ Am^{-1}$

$= 2.5 \times 10^5\ Am^{-1}$

30 **(c)**

$T = 2\pi\sqrt{\frac{1}{MB_H}} \Rightarrow T \propto \frac{1}{\sqrt{M}} \Rightarrow \frac{M_A}{M_B} = \left(\frac{T_B}{T_A}\right)^2 = \frac{4}{1}$

31 **(a)**

In step-up transformer, number of turns in primary coil is less than the number of turns in secondary coil.

ie, $\frac{N_s}{N_p} > 1$

33 **(c)**

Resonance frequency in $radian/second$ is

$$\omega = \frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{8 \times 0.5 \times 10^{-6}}} = 500\, rad/sec$$

34 **(a)**

Total average energy $= \varepsilon_0 E_{rms}^2$

$= 8.85 \times 10^{-12} \times (720)^2$

$= 4.58 \times 10^{-6}\, Jm^{-3}$

37 **(d)**

Phase difference, $\phi = \frac{2\pi}{\lambda} \times$ path difference

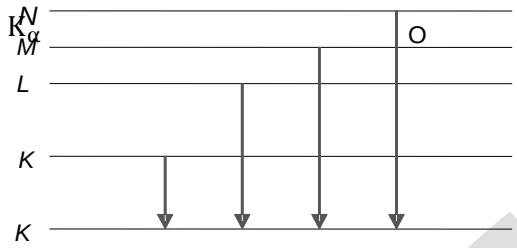
$$\phi = \frac{2\pi}{\lambda} \times \frac{\lambda}{6} = \frac{\pi}{3} = 60°$$

Intensity, $I = I_0 \cos^2\left(\frac{\phi}{2}\right)$

$$\frac{I}{I_0} = \cos^2(30°) = \left(\frac{\sqrt{3}}{2}\right)^2 = 0.75$$

38 **(a)**

When the colliding electron remove an electron from innermost k-shell (corresponding to n=1) of atom and electron from some higher shell jumps to k-shell to fill up this vacancy, characteristic X-ray of k- series are obtained



$\therefore K_\alpha$ and K_β X-rays are emitted when there is transition of electron between the levels n=2 to n=1 and n=3 to n=1 respectively.

39 **(a)**

The velocity of photoelectrons depends upon the frequency of the incident light

40 **(d)**

For ground state, $n = 1$

For first excited state, $n = 2$

As $r \propto n^2$

$\therefore$ radius becomes 4 times.

41 **(d)**

$$E = \Delta m c^2 \Rightarrow E = \frac{0.3}{1000} \times (3 \times 10^8)^2$$

$$= 2.7 \times 10^{13} J$$

$$= \frac{2.7 \times 10^{13}}{3.6 \times 10^6} = 7.5 \times 10^6 kWh$$

42 **(d)**

The complete reaction is

$$^{235}_{93}X \rightarrow {}^{231}_{91}Y + {}_2He^4 + {}_{-1}e^0$$

$(\alpha - \text{particle})$ (electron)

43 **(d)**

Efficiency of a rectifier is given by

$$\eta = \frac{\text{DC power output}}{\text{AC power input}}$$

For full wave rectifier

DC power output $= I_{DC}^2 \times R_L = \left(\frac{2I_0}{\pi}\right)^2 \times R_L$

AC input power $= I_{rms}^2 (r_f + R_L) = \left(\frac{I_0}{\sqrt{2}}\right)^2 (r_f + R_L)$

$\therefore$ Rectifier efficiency

$$\eta = \frac{\left(\frac{2I_0}{\pi}\right)^2 R_L}{\left(\frac{I_0}{\sqrt{2}}\right)^2 (r_f + R_L)} = \frac{0.812\, R_L}{r_f + R_L}$$

η will be maximum, if r_f is negligible as compared to R_L.

$\therefore$ Maximum rectified efficiency = 81.2%.

44 **(a)**

1. The frequency used for satellite communication is greater than 30 MHz.
2. Uplink and downlink frequencies are different to avoid interference.
3. Geostationary satellite lies in the equatorial plane of great circle. It should revolve in an orbit concentric and coplanar with the equatorial plane.

45 **(c)**

MUF $= v \sec\theta = 15 \sec 45° = 15\sqrt{2}$ MHz

46 **(b)**

$$2Na_2HPO_4 + NaH_2PO_4 + 2(NH_2)_2CO \rightarrow Na_5P_3O_{10} + 4NH_3 + 2CO_2$$

Hence, the stoichoimetric ratio of sodium dihydrogen orthophosphate and sodium hydrogen orthophosphate is 2 : 1 or 3 : 1.5

47 **(a)**

Mixture X contains 0.02 moles of $[Co(NH_3)_5SO_4]Br$ and 0.02 moles of $[Co(NH_3)_5Br]SO_4$ was prepared in 2L of solution. So, the concentration of $[Co(NH_3)_5SO_4]Br$ and $[Co(NH_3)_5Br]SO_4$ in solution are 0.01 mol/L and 0.01 mol/L respectively. During the reaction with $AgNO_3$(excess), AgBr is precipitated as follows

$$[Co(NH_3)_5\, SO_4]Br + AgNO_3 \rightarrow [Co(NH_3)_5SO_4]NO_3 + AgBr\downarrow$$

0.01 mol/L (excess) soluble (Y) 0.01 mol/L

Hence, number of moles of y=0.01

On addition of excess $BaCl_2$, $BaSO_4$ is precipitated as follows

$[Co(NH_3)_5Br]SO_4 + BaCl_2 \rightarrow BaSO_4$
$\downarrow + [Co(NH_3)_5Br]Cl_2$
0.01 mol/L (excess) 0.01 mol/L soluble
'Z'

Hence, number of moles of Z =0.01

Thus, the number of moles of Y and Z are 0.01 and 0.01 respectively.

49 **(d)**

$_6C = 1s^2, 2s^2, 2p^2$

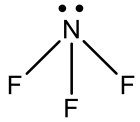
For 6th electron; $n = 2, l = 1, m = -1$ and $s = +\frac{1}{2}$

50 **(d)**

Ionisation energy generally increases from left to right in a period but ionisation energy of nitrogen is greater than oxygen due to stable p^3configuration. Hence, the order is as

$C < O < N < F$

52 **(a)**



(σ-bps + lps = 3+1=4)

In NF_3 N-atoms is sp^3-hybride, but due to presence of a lone pair of electron, NF_3 has pyramidal structure.

53 **(c)**

$$\frac{\text{M wt. of } CO_2}{\text{M wt. of } SO_2} = \frac{M_1}{M_2} = \frac{44}{64} = \frac{11}{16}$$

approx $= \frac{2}{3}$

54 **(b)**

∵ 1 mole of H_2SO_4=2 g equivalent of H_2SO_4

Hence, when 1 mole of H_2SO_4 is mixed with 2 moles of NaOH, the heat evolved will be 2 × 57.3 kJ.

55 **(a)**

The decreasing order of bond dissociation energies of $C - C, C - H$ and $H - H$ bonds is as

$H - H > -C - H > -C - C -$

56 **(d)**

In the titrationof weak acid with strong base, phenolphthalein is used

57 **(b)**

. Oxidation state of Mn in $Mn^{2+} = +2$

. Let oxidation state of Mn in $MnO_2 = x$

∵ $x + (2 \times -2) = 0$

∴ $x = +4$

(iii) Let the oxidation state of Mn in $KMnO_4 = x$

∴ $+1 + x + (-2 \times 4) = 0$

∴ $x = +7$

iv) Let oxidation state of Mn in $K_2MnO_4 = x$

∴ $(+1 \times 2) + x + (-2 \times 4) = 0$

∴ $x = +6$

∴ Increasing order of oxidation states is

(i) < (ii) < (iv) < (iii)

58 **(d)**

Oxidation takes place at anode (c) is not feasible, $i.e.$, Cr^{3+} is not oxidised to $Cr_2O_7^{2-}$ under given conditions. Hence, option (d) is correct.

60 **(b)**

$$Na + (x + y)NH_3 \rightarrow [Na(NH_3)x]^+ + [e(NH_3)_y]^-$$

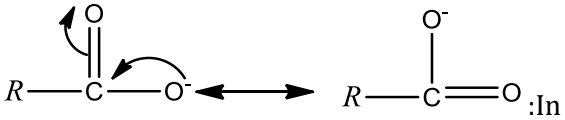
Sodium dissolves in liquid ammonia to produce deep blue colour in solution.

The blue coloured solution possesses high conducting power, stromy reducing nature due to ammoniated electrons. The cation is also solvated by ammonia.

61 **(a)**

$Al_2Cl_6, In_2Cl_6, Ca_2Cl_6$

63 **(d)**



:In carboxylate ion, the negative charge is present on oxygen, a most electronegative element here, thus it is resonance stabilised.

$HC \equiv C^-$: Carbon is sp-hybridised so its electronegativity is increased higher relative to nitrogen.

$\bar{N}H_2$: Nitrogen is more electronegative than sp^3-hybridised C-atom. From the above discussion, it is clear that the order of the stability of conjugated bases is as

$RCOO^- > HC \equiv C^- > \bar{N}H_2 > R^-$

and higher is the stability of conjugated bases, lower will be basic character. Hence, the order of basic character is as

$RCOO^- < HC \equiv C^- < \bar{N}H_2 < R^-$

64 **(b)**

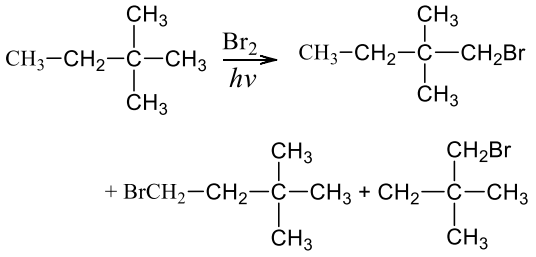
$$CH_2 = CH - CH_3 + H_2O \xrightarrow{H_2SO_4} CH_2 - \underset{|}{\overset{OH}{CH}} - CH_3$$

Propylene isopropyl alcohol

Thus, in this reaction isopropyl alcohol is formed.

65 **(b)**

The number of di-and poly-halogenation products depends upon (i) and the number of different types of hydrogens present in an alkane and (ii) the number of halogens introduced



66 **(d)**

Green house effect is caused by CO_2.

67 **(c)**

Given, A solid has two elements = X and Z

$Z$are in ccp arrangement and X occupy all tetrahedral sites.

Let the number of atoms of Z in ccp arrangement = 100

∴ Number of atoms of tetrahedral sites = 200

∴ Number of atoms of $X = 200$ (∵ They occupy all tetrahedral sites)

∴ Ratio of $X : Z = 200 : 100$

$= 2 : 1$

∴ The formula of compound is X_2Z.

68 **(d)**

$a = \left(\sqrt[2]{2r}\right)$ Packing fraction

$$= \frac{2 \times \pi r^2}{\left(\sqrt[2]{2r}\right)^2} = \frac{2\pi r^2}{8r^2}$$

$$= \frac{\pi}{4} = \frac{3.14}{4} = 0.78\ 54$$

$$= 78.54\%$$

69 **(d)**

According to Raoult's law,

$$P_A = P_A^\circ \varkappa_A$$

or $$\varkappa_A = \frac{P_A}{P_A^\circ}$$

$$= \frac{32\text{mm Hg}}{40\text{ mm Hg}} = 0.8$$

70 **(a)**

When 0.004 M Na_2SO_4 solution is isotonic with 0.01 M solution of glucose, so their osmotic pressures are equal to each other.

Osmotic pressure of 0.01 M glucose $(\pi)_{\text{glucose}}$ =CST

∴ C= concentration of solution =0.01 M

S= solution constant =0.0821 L atm/K/mol

T= absolute temperature

∴ $\pi_{\text{glucose}} = 0.01 \times 0.0821\ T$ ---(i)

$\pi_{\text{glucose}} = \pi_{Na_2SO_4}$

Na_2SO_4 is present in ionic state in solution

So, $Na_2SO_4 \rightleftharpoons 2Na^+ + SO_4^{2-}$

At t=0 1 0 0

At equilibrium $1-\alpha$ 2α α

(where, α is the degree of dissociation of Na_2SO_4)

$(\pi_{cal})_{Na_2SO_4} = C \times S \times T = 0.004 \times 0.0821 \times T$ ---(ii)

By van't Hoff facter

$$\frac{(\pi_{obs})_{Na_2SO_4}}{(\pi_{cal})_{Na_2SO_4}} = \frac{\text{number of particles after dissociation}}{\text{number of particles before dissociation}}$$

$$= \frac{1-\alpha+2\alpha+\alpha}{1}$$

∵ $(\pi_{obs})_{Na_2SO_4} = \pi_{\text{glucose}}$

∴ $\frac{0.01 \times 0.0821\ T}{0.004 \times 0.0821 \times T} = \frac{1+2\alpha}{1}$

Or $\frac{10}{4} = \frac{1+2\alpha}{1}$ or $10=4+8\alpha$

$\alpha = \frac{10-4}{8} = 0.75$

%of $\alpha = 75\%$

71 **(c)**

Reduction hydrogen half-cell is

$H^+ \mid (xM) \mid Pt\ (H_2)$

+

Pressure pH_2

Half – cell reaction is

$2H^+\ (aq) + 2e^- \longrightarrow H_2\ (g)$

Reaction quotient

$= Q = P_{H_2} / [H^+]^2, n = 2$

$E_{\text{red}} = E^\circ_{\text{red}} - \frac{0.0591}{n} \log Q = 0 - \frac{0.0591}{2} \log Q$

	P_{H_2}	$[H^+]$	Q	E_{red}
(a)	1atm	2.0 M	0.25	+ve
(b)	1atm	1.0 M	1.0	0
(c)	2atm	1.0 M	2.0	-ve
(d)	2atm	2.0 M	0.50	+ve

$E^\circ_{\text{red}} = 0.00$ V for standard hydrogen electrode

If $Q > 1$, then E_{red} = -ve.

Thus, correct answer is (c).

72 **(a)**

$H_2 + I_2 \rightarrow 2HI$

Rate of reaction,

$$= \frac{-d[H_2]}{dt} = \frac{-d[I_2]}{dt} = \frac{1}{2}\frac{d[HI]}{dt}$$

Or $= \frac{-2d[H_2]}{dt} = \frac{-2d[I_2]}{dt} = \frac{d[HI]}{dt}$

73 **(b)**

$[H^+] = \frac{6 \times 10^{-7}\ \text{mol}}{5 \times 10^{-5}\ \text{L}} = 1.2 \times 10^{-2}\text{M}$

$\text{rate} = \frac{dx}{dt}$ or $dt = \frac{dx}{\text{rate}} = \frac{1.2 \times 10^{-2}\text{M}}{6 \times 10^{5}\ \text{M/s}}$

$= 2 \times 10^{-8}$ s

74 **(d)**

The sky looks blue due to scattering of light.

75 **(b)**

Bronze is mixture of Cu and Sn

76 **(d)**

Pyrolusite $- \ MnO_2$

Malachite $- CuCO_3.Cu(OH)_2$

Diaspore $-Al_2O_3.H_2O$

Cassiterite $-SnO_2$

77 **(c)**

Ozone is used for purifying water because ozone kills bacteria, cysts, mold ,parasites ,viruses, contaminates etc. It is one of the effective way of eliminating microorganism in the water. Ozone is most effective oxidant. It inactivates and oxidises organic matter, contaminates, pesticides, viruses and bacteria faster than chlorine. Ozone do not form TMH which have unpleasant odour and also carcinogenic. Ozone is very good biocide, ozone also absorts UV radiation.

78 **(a)**

When the quenched steel is heated to temperature below red hot and then allowed to cool slowly. It becomes soft. This process is known as annealing

79 **(b)**

$HgCl_2$ compound is easily volatile. They are insoluble in water and soluble in acids.

80 **(d)**

Except alkynes, chain isomerism is observed when the number of carbon atoms is four or more than four

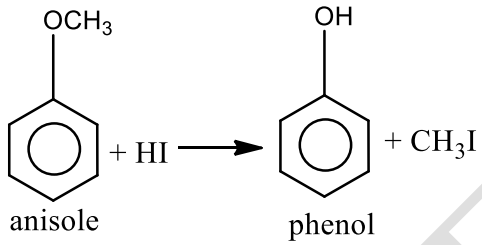
81 **(b)**

$$CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-Br + CH_3ONa \longrightarrow CH_3-\overset{\displaystyle CH_3}{\overset{|}{C}}= CH_2 + CH_3OH + NaBr$$

t-butyl bromide sodium methoxide 2-methyl propene (isobutylene) methanol

82 **(a)**

When an alkyl aryl ether is heated with HI, halogen goes with alkyl group. Therefore, heating anisole (methyl phenyl ether) with HI phenol and methyl iodide are obtained.



83 **(b)**

Primary alcohols get dehydrogenated with reduced copper at 573 K, to give corresponding aldehydes.

$$R-CH_2OH \xrightarrow{Cu,573\ K} R-CHO + H_2$$

primary alcohol aldehyde

84 **(a)**

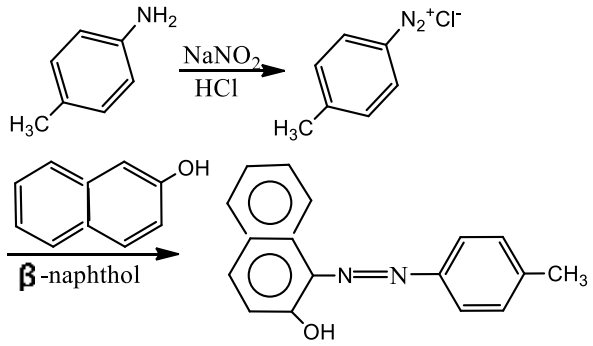
3. Organic compound gave an oxime with hydroxyl amine, therefore, it must be an aldehyde or ketone.

4. Organic compound did not give silver mirror with Tollen's reagent, therefore, it cannot be an aldehyde.

Therefore, compound is ketone and its molecular formulae with be CH_3COCH_3.

86 **(c)**

As we know, benzenediazonium salt forms brilliant coloured dye with β-naphthol, the compound under consideration must be *p*-toludine (c) as it is a primary aromatic amine. Primary aromatic amine, on treatment with $NaNO_2$ in dil. HCI forms the corresponding diazonium chloride salt.



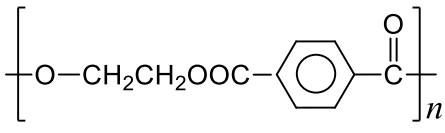
88 **(a)**

There are six carbon atoms is hexamethylenediamine and ten carbon atoms in sebacic acid, so the name of the nylon is nylon-6,

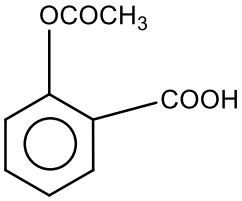
10. (Remember first the number of carbon atoms of amines are written).

89 **(c)**

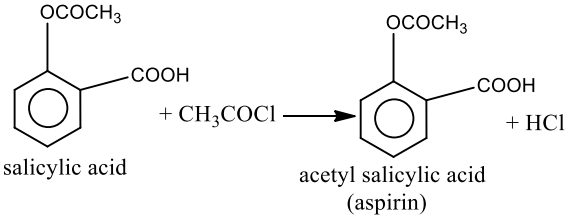
Terylene is



90 **(a)**



Which is acetylated product of salicylic acid(*o*-hydroxy benzoic acid).



91 **(c)**

Out of four given categories, class is the largest category. Therefore, can categorises rest three categories; order, family and genus

Kingdom → Division/Phylum → Class → Order → Family → Genus → Species

92 **(c)**

The prime source of taxonomic studies is collection and identification of actual specimen. Nomenclature the present scientific method of naming the organism can be completed only when actual specimen is collected and identified

93 **(a)**

Group of organisms capable of interbreeding and producing fertile offsprings but reproductively isolated from other such group is called **species.**

95 **(b)**

Mycorrhiza is the symbiotic association between fungus and root of higher plants. The mycorrhizal roots are usually covered with fungal wooly outgrowth. Fungus growth does not cause any harm to the plant. Along with water phosphones and nitrogen are also absorbed.

96 **(a)**

Ginkgo shows resemblance with both Cycadales and Coniferales. Resemblanes between *Ginkgo* and Cycadales are well-developed nuellar beak and pollen chamber, haustorial nature of pollen tube, multiflagellated spermatozoids, large egg, massive female gametophyte with well-developed venter, endoscopic embryo with two cotyledons, hypogeal seed germination.

Its resemblance with Coniferales are cone like appearance, long and dwarf shoots, pycnoxylic wood, uniseriate medullary rays, longitudinal dehiscence of microsporangia and sessile ovule, etc.

97 **(d)**

The rhizoids in *Funaria* arise from the **basal region** of the stem, which functions as roots.

98 **(c)**

True segmentation is also called metamerism

99 **(a)**

Cow and buffalo are secondary hosts for *Taenia saginata*.

100 **(b)**

Cockroach, scorpion and prawn belong to phylum-Arhropoda.

101 **(b)**

Acacia (family-Mimosaceae) has single carpel in ovary.

Lettuce (Lactuca sativa, family-Asteraceae) has two carpels in ovary.

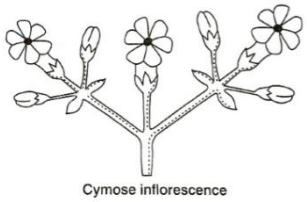
Red squill (family-Liliaceae) has three carpels.

102 **(a)**

In the given diagram, there is no flower at the tip of shoot. So, it have indefinitely growth. The flower borne laterally

Racemose inflorescence

In cymose, the shoot tip ends with a terminal flower so it have limited growth



Cymose inflorescence

103 **(c)**
The **companion cells** are found in angiosperms only, in gymnosperms no companion cells present but some special parenchyma cells associated to sieve cells, which are known as 'albuminous cells'.

104 **(d)**
The leaf is a lateral, generally flattened structure borne on the stem. It develops at the node and bears a bud in its axil. The axillary bud later develops into a branch. Leaves originate from shoot apical meristems and are arranged in an acropetal order. They are the most important vegetative organs for photosynthesis

105 **(b)**
In a dicot stem, secondary growth occurs due to lateral meristem.

106 **(b)**
Monocots have atactostele, in which vascular bundles are arranged into more than one ring and they are usually found at the centre of the stem

107 **(b)**
The number of vasa efferentia that arises from the testes in frog's male reproductive system is 10-12. They enter the kidneys on their sides and open into the Bidder's canal and finally, it communicates with the urinogenital duct that comes out of the kidneys and opens into the cloaca

108 **(a)**
Excretory system of a frog consists of a pair of kidneys, ureters, urinary bladder and cloaca

109 **(d)**
According to Chargaff's rule, in DNA, the proportion of adenine always equals to that of thymine and proportion of guanine always equal to that of cytosine, *i*. *e*., A=T and G=C. Thus, in a DNA, if guanine is 20%, cytosine also will be 20%. So, both adenine and thymine together will be 60%, *i*. *e*., 30% adenine and 30% thymine.

110 **(b)**
Primary wall of eukaryotic cell is made up of a polymer of β, 1-4 acetyl glucosamine

111 **(d)**
In fluorescence microscopy, the object is stained with a fluorescent substance and when stained cell or all parts are observed through ordinary microscope using UV light, appear as luminous objects. This technique is helpful to show the fluidity of biomembranes.

112 **(b)**
Catabolic and anabolic pathways are often coupled in a cell because the free energy released from one pathway is used to drive other pathways

113 **(c)**
G_2-phase or second gap phase is the gap between DNA synthesis and division. This particular phase is spent in synthesizing molecules other than DNA, which are required for cell division.

114 **(b)**
Metaphase plate is the plane of alignment of the chromosomes at metaphase.
During metaphase, spindle fibres attach to kinetochores of chromosomes.
Chromosome are moved to spindle equator and get aligned along metaphase plate through spindle fibres to both poles

115 **(d)**
A-Stomal aperture, B-Guard cell, C-Cellulosic microfibrils

116 **(a)**
Pulsation theory for ascent of sap was proposed by an eminent Indian scientist **J C Bose**.

117 **(c)**
It is because of the close packing of water molecules in the inter spaces and over the surface of the imbibant particles

118 **(b)**
By process of nitrogen fixation atmospheric nitrogen is fixed as nitrate which by denitrification converted to ammonia.

119 **(c)**
Deficiency of zinc causes leaf malformations like little leaf, leaf rosettes, interveinal chlorosis, khaira disease of rice and several types of leaf distortions.
Deficiency of molybdenum causes whiptail disease, loosening of inflorescence in cauliflower.

120 **(a)**
C_4-plants have very little photorespiration because its initial carbon fixation is done by PEP carboxylase not by Rubisco. Beside this, C_4-plant generate their own CO_2 by decarboxylation of C_4 acids in bundle sheath. Due to these reasons, the C_4-plants minimise photorespiration

121 **(b)**
C_3-pathway.

Plants that are adapted to dry tropical regions generally have the C_4 pathway. Though these plants have the C_4-oxaloacetic acid as the first CO_2 fixation product they use the C_3 pathway or the Calvin cycle as the main biosynthetic pathway

122 **(b)**

Pentose Phosphate Pathway (or Warburg-Lippman Dickens cycle) is an alternate method of aerobic respiration, which occurs in the cytoplasm of mature cell. This pathway accounts for 60% of total respiration in liver cells. In this, for every six molecules of glucose, one molecule is completely oxidized in CO_2 and reduced coenzymes, while 5 are regenerated.

123 **(d)**

In respiration, whether it is aerobic or anaerobic glucose undergoes oxidation to form energy. In plants glucose is derived from sucrose which is the end product of photosynthesis or from storage carbohydrate. Sucrose is converted into glucose and fructose by the enzyme invertase to enter into the first step of respiration which is glycolytic pathway

124 **(c)**

Ethylene is a simple gaseous PGR. It is synthesised in large amounts by tissues undergoing senescence and ripening fruits

125 **(c)**

Absolute Growth Rate (AGR) is the comparison of total growth per unit time

Initial surface area $= 5\ cm^2$, Final surface area $= 10\ cm^2$

AGR = Final surface area – Initial surface area

$= 10 - 5 = 5$

Relative Growth Rate (RGR)

$$= \frac{\text{Final surface area} - \text{Initial surface area}}{\text{Initial surface area}} \times 100$$

$$= \frac{10-5}{5} \times 100 \Rightarrow 100 = 100$$

126 **(a)**

A – Hypocotyl

B – Cotyledons

C – Seed coat

D – Epicotyle hook

127 **(b)**

Fe, I, Mn, Cu, Zn and fluorine are required in minimum amount by human.

128 **(a)**

Gastrin hormone is secreted by mammalian stomach and duodenal mucosae in response to proteins and alcohol. This hormone stimulates gastric glands to secrete large amount of gastric juice. However, its over- secretion may cause gastric ulcers.

129 **(b)**

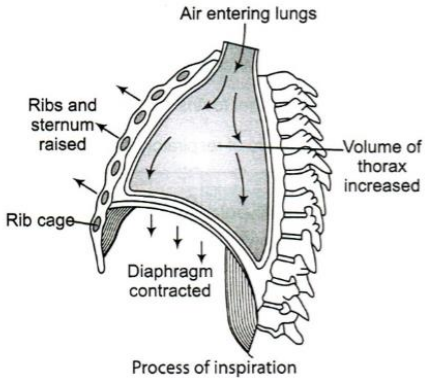
Pulmonary volume increases by the following steps

(i) Contraction of the diaphragm

(ii) Contraction of intercostal muscle

(iii) Lifting of the ribs

(iv) Sternum causing an increase in the volume of thoracic chamber in dorso ventral axis



130 **(b)**

Pressure contributed by the individual gas in a mixture of gases is called partial pressure and is represented as ρO_2 for oxygen and ρCO_2 for carbon dioxide

131 **(d)**

Blood platelets occur only in mammals. They are non-nucleated, round or oval biconvex and bud from megakaryocytes. They are much smaller than RBC. Blood platelets are the source of thromboplastin, necessary for blood clotting

132 **(a)**

Lub The first heart sound is associated with the closure of tricuspid and bicuspid valves

Dub The second heart sound is associated with the closure of semilunar valves

133 **(a)**

Micturition is a reflex of voiding urine. If the urine content of urinary bladder reaches more than 300 mL micturition reflex starts. Neural mechanism of micturition is called micturition reflex

134 **(c)**

Cortex region of kidney is outer region. The proximal end of each nephron forms a blind or closed enlarged and double walled cup, the Bowman's capsule in the cortex. Thus, all the Bowman's capsules of the kidney are found in the cortex.

135 **(d)**

In humans, the principle nitrogenous excretory compound (*i*. *e*., urea) is synthesized in liver by ornithine cycle. Urea is eliminated mostly through kidney as excretory product.

136 **(b)**

Parallely arranged filament of muscle fibre.

Each muscle fibre is lined by the plasma membrane called sarcolemma enclosing the sarcoplasm. Muscle fibre is a syncitium as the sarcoplasm contains many nuclei. The endoplasmic reticulum, *i.e.,* sarcoplasmic reticulum of the muscle fibres is the store house of calcium ions. A characteristic feature of muscle fibre is the presence of large number of parallely arranged filaments in the sarcoplasm called myofilaments or myofibrils

137 **(c)**

Jugal is a narrow wavy bone. It connects zygomatic processes of squamosal and maxilla forming 'zygomatic arch'.

138 **(c)**

A-Ciliated B-Trachea, C-Amoeboid

139 **(a)**

Limbic system.

The inner parts of cerebral hemisphere and a group of associated deep structures like amygdala, hippocampus, etc. form a complex structure called the limbic lobe or limbic system along with hypothalamus. It is involved in the regulation of sexual behavior expression of emotional reactions, (*e*. *g*., excitement, pleasure, rage and fear) and motivation

140 **(a)**

Our paired eyes are located in sockets of skull called orbits. The adult human eyeball is nearly spherical in structure. The wall of the eyeball is composed of three layers. The anterior portion of this layer is called cornea. The middle layer choroid contains many blood vessels and looks bluish in colour

The inner layer is retina and it contains three layers of cells, *i.e.,* from inside to outside called ganglion cells, bipolar cells and photoreceptor cells

141 **(d)**

Cystic duct transports insulin and glucagon to target organ.

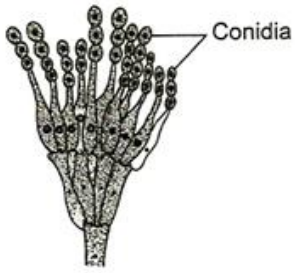
142 **(b)**

Parathyroid Hormone (PTH) increases the Ca^{2+} in the blood. PTH acts on bones and stimulates the process of bone resorption (dissolution/demineralisation). PTH also stimulates the reabsorption of Ca^{2+} by the renal tubules and increases Ca^{2+} absorption from the digested food. It is thus clear that PTH is hypercalcemic hormone, *i.e.,* it increases the blood Ca^{2+} level. Along with TCT, it plays a significant role in calcium balance in the body

143 **(c)**

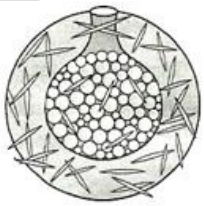
Bodies involved in asexual reproduction

Conidia are non-motile gametes found singly or in chain on the parent body, *e*. *g*., *Penicillium*



Conidia formation in *Penicillium*

False **Gemmule formation** is the type of reproduction in which the buds are formed with in the parent body, *e*. *g*., Sponge



Gemmule formation in sponge

145 **(d)**

Endosperm may either be completely consumed by the developing embryo (*e*. *g*., pea, ground nut, beans) before seed maturation or it may persist in mature seed (*e*. *g*., castor and coconut) and may be used up during seed germination. The first condition is called endospermic, while second condition is called non-endospermic

146 **(a)**

Two polar nuclei are located in **embryo sac**, which participate in triple fusion.

147 **(a)**

Chalazal pole is present just, opposite to the micropylar end and chalaza represents the basal part of the ovule

148 **(d)**

A- Antrum, B- Secondary follicle, C-Tertiary follicle

149 **(a)**

Ectoderm.

Fate of three germ layers

Mesoderm Dermis of skin, circulatory system, muscles, bones (except facial)
Endoderm Lining of Gl tract, lining of lungs, kidney ducts and bladder, thymus, thyroid tonsils
Ectoderm Epidermis of skin, tooth enamel, lens and cornea of the eye outer ear Brain and spinal cord, facial bones skeletal muscles in the head

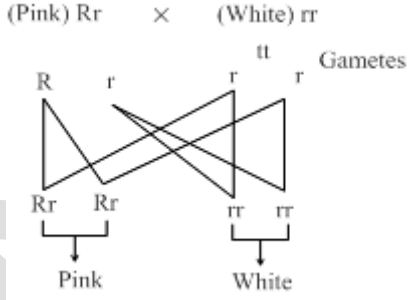
150 **(c)**
Fertilized zygote is divided by special type of mitotic divisions, known as **cleavage**. Cleavage increases the number of cells.

151 **(b)**
Ageing is retarded by CKN (cytokinins).

152 **(b)**
A developing embryo is transplanted in the uterus of another female. A woman who substitutes or takes place of the real mother to nurse the embryo is called surrogate mother

153 **(c)**
Generally, AIDS detection is done by ELISA (Enzyme Linked Immuno Sorbent Assay).
But sometimes the results of this technique may prove false. So, by combining it with PCR (Polymerase Chain Reaction), the realibility of the detection of AIDS increases

154 **(c)**
Intermediate inheritance also called the incomplete dominance. In that inheritance the phenotypic and genotypic ratio are same. The classical examples are = four O' clock plant and snapdragon.
Mirabilis jalapa shows incomplete dominance



The ratio of pink and white flower will be 1 : 1

155 **(c)**
Genes which codes for a pair a contrasting traits is called alleles. They are slightly different forms of the same gene, *e*. *g*., TT, tt, tT

156 **(d)**
The genes which individually have a small effect but collectively produce significant phenotypic expression are called polygenes. The inheritance of these genes is called polygenic inheritance, *e.g.*, skin colour in human.

157 **(b)**
There are two types of nucleic acids found in living system
I. DNA-Deoxyribonucleic Acid
II. Ribonucleic Acid

158 **(a)**
Twins are of two types
(i) **Monozygotic twins** Twins which are formed by one zygote. In them, the genetic constituent remains the same. They are useful for studing environmental effects on the genetic markeup. Most of the twins are monozygotic twins. They are also called maternal twins
(ii) **Dizygotic Twins** Twins which are formed by two zygotes when two sperms fertilizes the two ova at the same time then dizygotic twins are formed. They have different genetic make up so, they cannot be used to study influence of environment on genetic make up. They are also called paternal twins

159 **(b)**
The evolutionary process, which produces new species, diverged from a single ancestral form adapted to new invaded habitats and to modes of life necessary there, is known as adaptive radiation

160 **(a)**
Theory of continuity of germplasm was give by **August Weismann** (1834-1914).
Theory of continuity of germplasm by **August Weismann** (1834-1914). A German biologist, was the main opposer of the inheritance of acquired characters. He put forward the theory of continuity of germplasm. According to Weismann, the characters influencing the germ cells are only inherited. There is a continuity of germplasm (protoplasm of germ cells) but the somatoplams (protoplasm of somatic cells) is not transmitted to the next generation. Hence, it do not carry characters to the next generation. Weismann cut off the tails of rats for as many as 22 generations and allowed them to breed, but tailless rats were never born

161 **(d)**
Immuno-modulators are natural or synthetic substances that help to regulate or normalize the immune system. There are two types of immuno-modulators *viz,* immuno-suppressants, which

cause immuno-suppression of the immune system and immuno-stimulants (immuno-stimulators) which stimulate immune system by including or increasing activity of any of its components.

162 **(c)**
Ascaris (the common roundworm) and *Wuchereria* (the filarial worm), are some of the helminths which are known to be pathogenic to man. *Ascaris*, an intestinal parasite causes ascariasis and *Wuchereia causes* filariasis

163 **(c)**
Rhinovirus represents one such group of viruses, which causes one of the most infectious human ailments- the common cold. They infect the nose and respiratory passage. Symptoms of common cold are nasal congestion and discharge, sore throat, hoarseness, cough, headache, tiredness, etc.

164 **(a)**
A-Cellulase and pectinase, B-Polyethylene glycol, C-Somatic hybrid cell

165 **(c)**
In our country, poultry mainly means chickens domesticated for eggs and meat Cow milk is slightly yellow in colour due to presence of carotene, which is precursor for yellow colour in cow milk is in the form of vitamin-A

166 **(a)**
Wine and beer are produced without distillation of fermented broth
Whisky, brandy and rum are produced by distillation of the fermented broth

167 **(a)**
A-Acid; B-Milk protein.
Lactic Acid Bacteria (LAB) like *Lactobacillus* are added to milk. It converts lactose sugar of milk into lactic acid. Lactic acid causes coagulation and partial conversion of milk protein casein to cal paracaesinate. Milk is changed into curd, yoghurt and cheese

168 **(a)**
DNA polymerase which is stable at high temperature (>90°C) is required to carry out the synthesis of new DNA. The DNA polymerase like *Taq* polymerase is generally used in PCR reactions which is isolated from a bacterium *Thermus aquaticus*

169 **(c)**
The first restriction endonuclease type II was isolated by Smith, Wilcox and Kelley from *Haemophilus influenza* bacterium. It was formed to cut DNA molecules at a particular point of recognizing a specific sequence of six base pairs, known as the recognition sequence

170 **(b)**
In recombinant DNA technology, a probe is allowed to hybridise to its complementary DNA in the clone of cells. The cells are then detected by autoradiography. The cells with mutated genes will not be observed on the photographic film because the probe was not complementary to the mutated genes

171 **(d)**
Golden rice is developed of Swiss Federal Institute of Technology. The rice grains are golden yellow in colour due to the presence of β-carotene. It contains 'beta carotene' gene from daffodil plants and also genes from some bacteria. Golden rice will prevents child blindness caused due to deficiency of vitamin-A

172 **(b)**
ELISA is based on the principle of antigen-antibody interactions. It can detect very small amount of proteins (antibody or antigen) with the help of enzymes (*e*. *g*., peroxidase or alkaline phosphatase)

173 **(b)**
Mangrove plants are capable to minimize water loss and facilitate aeration to underground parts.

174 **(d)**
The science dealing with study of soil is called edaphology or Paedology or Pedology

175 **(d)**
Decomposers are saprotrophs, which decompose the organic remains. These are saprophytic fungi and bacteria.

176 **(a)**

Ecosystem	Shape of Pyramid
Pyramid of number	
Grassland	Upright
Forest (tree)	Inverted
Aquatic (pond)	Upright
Pyramid of biomass	
Grassland	Upright
Forest	Upright
Aquatic (lake)	Inverted
Pyramid of energy	
All ecosystems	Upright

177 **(d)**
There are various hypothesis for higher diversity in tropical areas

(i) Speciation is a function of time. Temperate areas have undergone frequent glaciation in the past. It killed most of the species. No such disturbance occurred in tropics where species continued to flourish and evolved undisturbed for millions of years

(ii) There are no unfavourable seasons in tropics. Continued favourable environment has helped tropical organisms to gain more niche spec ialisation and increased diversity

(iii) More solar energy is available in tropics. This promotes higher productivity and increased biodiversity

(iv) Resource availability is higher in tropics

(v) There is reduced competition in tropics due to favourable environment

(vi) Rate of extinction is low in tropics

178 **(c)**

Conservation of biodiversity is the protection, uplift and scientific management of biodiversity so as to maintain it at its optimum level and derive sustainable benefits for the present as well as future generations. Sustainable use is the ability to use natural resources in a way that helps people and protects the ecosystem

179 **(b)**

The materials and poison such as aluminium ions, mercurial salts and DDT that either do not degrade or degrade only extremely slowly in the natural environment are called **non-biodegradable pollutants.**

180 **(d)**

Biomagnification or **biological amplification** is the passing of non-degradable pollutants like pesticides (DDT), etc, into the food chain and increase in amount per unit weight of organisms with the rise in trophic level due to accumulation in the body.