MERITSTORE

NEET FULL PORTION **TEST 2**

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

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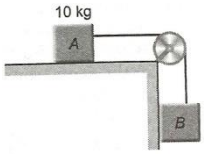
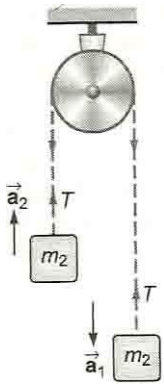
1. Wavelength of ray of light is 0.00006 m. It is equal to
   a) 6 $micron$ b) 60 $micron$
   c) 600 $micron$ d) 0.6 $micron$
2. The value of universal gas constant is $R = 8.3$ J/K-mol. The value of R in atmosphere litre per Kelvin mol
   a) 8.12 b) 0.00812 c) 81.2 d) 0.0812
3. A stone thrown vertically upward files past a window one second after it was thrown upward and after three second on its way downward. The height of the window above the ground is (Take g $= 10\text{ms}^{-2}$)
   a) 20 m b) 15 m
   c) 10 m d) 5 m
4. An aeroplane is flying horizontally with a constant velocity of 100 kmh^{-1} at a height of 1 km from the ground level. At $t = 0$, it starts dropping packets at constant time intervals of T_0. If R represents the separation between two consecutive points of impact on the ground, then for the first three packets, R_1/R_2 is
   a) 1 b) >1
   c) <1 d) Sufficient data is not given
5. An electric fan has blades of length 30 cm as measured from the axis of rotation. If the fan is rotating at 1200 $r.p.m$.The acceleration of a point on the tip of the blade is about
   a) 1600 $m/\sec^2$ b) 4740 $m/\sec^2$
   c) 2370 $m/\sec^2$ d) 5055 $m/\sec^2$
6. A ball of mass m moves with speed v and it strikes normally with a wall and reflected back normally, if its time of contact with wall is t then find force exerted by ball on wall
   a) $\frac{2mv}{t}$ b) $\frac{mv}{l}$ c) mvt d) $\frac{mv}{2t}$
7. If the mass of $A = 10$ kg, coefficient of static friction $= 0.22$, coefficient of kinetic friction $= 0.2$, then minimum mass of B to start motion is



   a) 2 kg b) 2.2 kg c) 4.8 kg d) 3.4 kg
8. **Statement I**Twoparticles moving in the same direction do not lose all their energy in a completely inelasticcollision.
   Statement II Principle of conservationof momentum holds true for all kinds of collisions.
   a) Statement I is true, statement II is true, statement II is the correct explanation of statement I.
   b) Statement I is true Statement II is true, Statement II is not correct explanation of statement I.
   c) Statement I is false, Statement II is true.
   d) Statement I is true, Statement II is false.
9. When a sphere of moment of inertia I about its centre of gravity and mass $'m'$ rolls from rest down an inclined plane without slipping, its kinetic energy is
   a) $\frac{1}{2}I\omega^2$ b) $\frac{1}{2}mv^2$
   c) $I\omega + mv$ d) $\frac{1}{2}I\omega^2 + \frac{1}{2}mv^2$
10. The two bodies of mass m_1 and $m_2 (m_1 > m_2)$ respectively are tied to the ends of a massless string, which passes over a light and frictionless pulley. The masses are initially at rest and the released. Then acceleration of the centre of mass of the system is



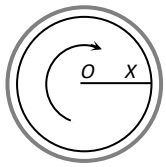
   a) $\left[\frac{m_1 - m_2}{m_1 + m_2}\right]^2$ g b) $\left[\frac{m_1 - m_2}{m_1 + m_2}\right]^2$
   c) g d) zero
11. The value of g decreases inside the surface of earth because
   a) A force of upward attraction is applied by

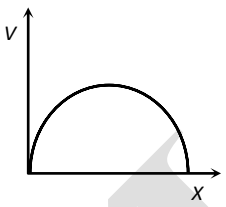
the shell of earth above
b) The shell of earth above exerts no net force
c) The distance from the centre of the earth decreases
d) The density of the material at the centre of the earth is very small

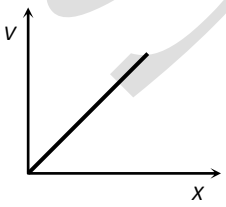
12. Which one of the following statements is wrong
a) Young's modulus for a perfectly rigid body is zero
b) Bulk modulus is relevant for solids, liquids and gases
c) Rubber is less elastic than steel
d) The Young's modulus and shear modulus are relevant for solids

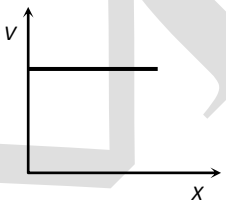
13. A sphere of radius R is gently dropped into liquid of viscosity η in a vertical uniform tube. It attains a terminal velocity v. Another sphere of radius $2R$ when dropped into the same liquid, will attains its terminal velocity
a) v b) $2v$ c) $4v$ d) $9v$

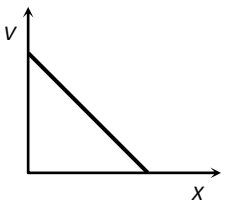
14. The diagram shows a cup of tea seen from above. The tea has been stirred and is now rotating without turbulence. A graph showing the speed v with which the liquid is crossing points at a distance X from O along a radius XO would look like



a) 

b) 

c) 

d) 

15. 1 g of steam at 100°C and equal mass of ice at 0°C are mixed. The temperature of the mixture in steady state will be (latent heat of steam=540calg^{-1}, latent heat of ice=80calg^{-1})
a) 50°C b) 100°C c) 67°C d) 33°C

16. A Carnot engine whose sink is at 300 K has an efficiency of 40%. By how much should the temperature of source be increased so as to increase its efficiency by 50% of original efficiency?
a) 280 K b) 275 K c) 325 K d) 250 K

17. Ten moles of an ideal gas at constant temperature 500 K is compressed from 50 L to 5 L. Work done in the process is (Given, $R = 8.31\ \text{J} - \text{mol}^{-1} - \text{K}^{-1}$)
a) -1.2×10^4J b) -2.4×10^4 J
c) -4.8×10^4 J d) -9.6×10^4J

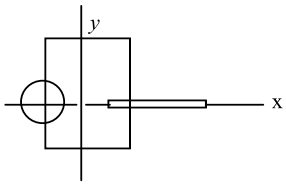
18. A steel ball of mass 0.1 kg falls freely from a height of 10 m of 10 m and bounces to a height of 5.4 m from the ground. If the dissipated energy in this process is absorbed by the ball, the rise in its temperature is
a) 0.01°C b) 0.1°C c) 1.1°C d) 1°C

19. A simple pendulum performs simple harmonic motion about $X = 0$ with an amplitude A and time period T. The speed of the pendulum at $X = \frac{A}{2}$ will be
a) $\frac{\pi A\sqrt{3}}{T}$ b) $\frac{\pi A}{T}$ c) $\frac{\pi A\sqrt{3}}{2T}$ d) $\frac{3\pi^2 A}{T}$

20. The equation of a damped simple harmonic motion is $m\frac{d^2x}{dt^2} + b\frac{dx}{dt} + kx = 0$. Then the angular frequency of oscillation is
a) $\omega = \left(\frac{k}{m} - \frac{b^2}{4m^2}\right)^{1/2}$ b) $\omega = \left(\frac{k}{m} - \frac{b}{4m}\right)^{1/2}$
c) $\omega = \left(\frac{k}{m} - \frac{b^2}{4m}\right)^{1/2}$ d) $\omega = \left(\frac{k}{m} - \frac{b^2}{4m^2}\right)$

21. A siren emitting sound of frequency 800 Hz is going away from a static listener with a speed of 30 m/s, frequency of the sound to be heard by the listener is (take velocity of sound as 330 m/s)
a) 733.3 Hzb) 644.8 Hzc) 481.2 Hzd) 286.5 Hz

22. A disc of radius $\frac{a}{4}$having a uniformly distributed charge 6C is placed in the $x - y$ plane with its centre at $\left(\frac{-a}{2}, 0,0\right)$. A rod of length a carrying a uniformly distributed charge 8 C is placed on the x-axis form $x = \frac{a}{4}$ to $x = \frac{5a}{4}$. Two point charges -7C and 3C are placed at $\left(\frac{a}{4}, \frac{-a}{4}, 0\right)$ and $\left(\frac{-3a}{4}, \frac{3a}{4}, 0\right)$ respectively. Consider a cubical surface formed by six surfaces $x = \pm\frac{a}{2}, y = \pm\frac{a}{2}, z = \pm\frac{a}{2}$. The electric flux through this cubical surface is



a) $\frac{-2C}{\varepsilon_0}$ b) $\frac{2C}{\varepsilon_0}$ c) $\frac{10C}{\varepsilon_0}$ d) $\frac{12C}{\varepsilon_0}$

23. A capacitor is charged to 200 *volt* it has 0.1 *coulomb* charge. When it is discharged, energy will be
a) 1 J b) 4 J c) 10 J d) 20 J

24. Two positive point charges of 12μC and 5μC are placed 10 cm apart in air. The work needed to bring them 4 cm closer is
a) 2.4 J b) 3.6 J c) 1.6 J d) 6.0 J

25. Current provided by a battery is maximum when
a) Internal resistance equal to external resistance
b) Internal resistance is greater than external resistance
c) Internal resistance is less than external resistance
d) None of these

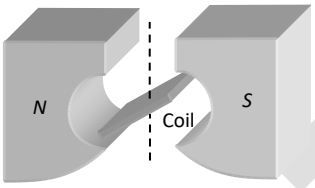
26. A voltmeter has a resistance of G ohm and range V volt. The value of resistance used in series to convert it into a voltmeter of range ${}_nV$ volt is
a) nG b) $\frac{G}{n}$
c) $(n-1)G$ d) $\frac{G}{n-1}$

27. To get the maximum current from a parallel combination of n identical cells each of internal resistance r and external resistance R, when
a) $R \gg r$ b) $R \ll r$
c) $R = r$ d) None of these

28. A small coil of N turns has an effective area A and carries a current I. It is suspended in a horizontal magnetic field $\vec{B}$ such that its plane is perpendicular to $\vec{B}$. The work done in rotating it by 180° about the vertical axis is
a) $NAIB$ b) $2NAIB$
c) $2\pi NAIB$ d) $4\pi NAIB$

29. Two identical magnetic dipoles of magnetic moment 2 Am^2 are placed at a separation of 2 m with their axis perpendicular to each other in air. The resultant magnetic field at a mid-point between the dipoles is
a) $4\sqrt{5} \times 10^{-5}$T b) $2\sqrt{5} \times 10^{-5}$T
c) $4\sqrt{5} \times 10^{-7}$T d) $2\sqrt{5} \times 10^{-7}$T

30. The figure below shows the north and south poles of a permanent magnet in which n turn coil of area of cross-section A is resting, such that for a current i passed through the coil, the plane of the coil makes an angle θ with respect to the direction of magnetic field B. If the plane of the magnetic field and the coil are horizontal and vertical respectively, the torque on the coil will be



a) $\tau = niAB\cos\theta$
b) $\tau = niAB\sin\theta$
c) $\tau = niAB$
d) None of the above, since the magnetic field is radial

31. The energy stored in an inductor of self inductance L henry carrying a current of 1 A is
a) L^2I b) $-LI^2$ c) $\frac{1}{2}LI^2$ d) $\frac{1}{2}L^2I$

32. An alternating *e*.m.f. of angular frequency ω is applied across an inductance. The instantaneous power developed in the circuit has an angular frequency
a) $\omega/4$ b) $\omega/2$ c) ω d) 2ω

33. An alternating *e*.m.f. is applied to purely capacitive circuit. The phase relation between *e*.m.f. and current flowing in the circuit is **or** In a circuit containing capacitance only
a) *e*.m.f. is ahead of current by $\pi/2$
b) Current is ahead of *e*.m.f. by $\pi/2$
c) Current lags behind *e*.m.f. by π
d) Current is ahead of *e*.m.f. by π

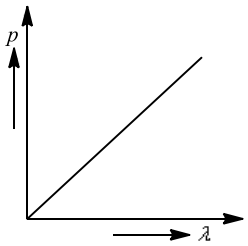
34. The phase velocity (v_p) of travelling wave is
a) $v_p = \frac{\omega}{k}$ b) $v_p = \frac{d\omega}{dk}$ c) $v_p = c$ d) $v_p = \frac{c}{v_g}$

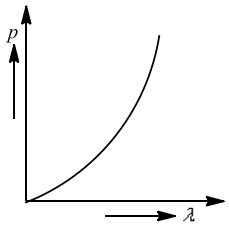
35. Let the $x-z$ plane be the boundary between two transparent media. Medium 1 in $z \geq 0$ has a refractive index of $\sqrt{2}$ and medium 2 with $z < 0$ has a refractive index of $\sqrt{3}$. A ray of light in medium 1 given by the vector $\mathbf{A} = 6\sqrt{3}\hat{\imath} + 8\sqrt{3}\hat{\jmath} - 10\,\hat{\boldsymbol{k}}$ is incident on the plane of separation. The angle of refraction in medium 2 is
a) 45° b) 60° c) 75° d) 30°

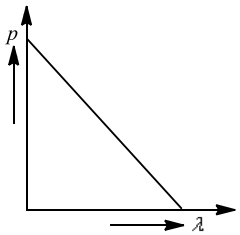
36. Optical fibres are related with
a) Communication b) Light
c) Computer d) None of these

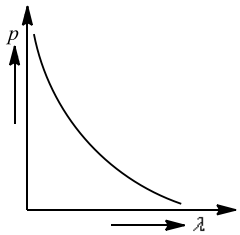
37. Which if the following phenomena is not common to sound and light waves?
a) Interfere nce b) Diffracti on c) Coheren ce d) Polarisat ion

38. Which of the following figures represents the variation of particle momentum and associated de-Broglie wavelength?

a) 

b) 

c) 

d) 

39. The uncertainty in the position of a particle is equal to the de-Broglie wavelength. The uncertainty in its momentum will be
a) h/λ b) $2h/3\lambda$ c) λ/h d) $3\lambda/2h$

40. Energy required for the electron excitation in Li^{2+} from the first to the third Bohr orbit is
a) 36.3 eV b) 108.8 eV c) 122.4 eV d) 12.1eV

41. The ratio of the energies of the hydrogen atom in its first to second excited state is
a) 1/4 b) 4/9 c) 9/4 d) 4

42. The half life period of radium is 1600 *years*. The fraction of a sample of radium that would remain after 6400 *years* is
a) 1/4 b) 1/2 c) 1/8 d) 1/16

43. A p-type material is electrically …….
a) Positive
b) Negative
c) Neutral
d) Depends on the concentration of p impurities

44. A step index fibre has a relative refractive index of 0.88%. What is the critical angle at the corecladding interface
a) 60° b) 75°
c) 45° d) None of these

45. In the above question, if oscillator output is modulated by audio frequencies upto 10 kHz, the frequency range occupied by the side bonds will be
a) 711.9 kHz to 712.1 kHz
b) 692 kHz to 732 kHz
c) 702 kHz to 722 kHz
d) 71.2 kHz to 70.2 kHz

46. One atom of an element weights 1.8×10^{-22}g. its atomic mass is
a) 29.9 b) 18 c) 108.36 d) 154

47. Out of 1.0 g dioxygen, 1.0 g (atomic) oxygen and 1.0 g ozone, the maximum number of molecules are contained in
a) 1.0 g of atomic oxygen
b) 1.0 g of ozone
c) 1.0 g of oxygen gas
d) All contain same number of atoms

48. Which of the following is the correct form of Schrodinger wave equation?
a) $\frac{\partial^2\Psi}{\partial^2 x}+\frac{\partial^2\Psi}{\partial^2 y}+\frac{\partial^2\Psi}{\partial^2 z}+\frac{8\pi^2 m}{h^2}(E-V)\Psi=0$
b) $\frac{\partial^2\Psi}{\partial x^2}+\frac{\partial^2\Psi}{\partial y^2}+\frac{\partial^2\Psi}{\partial z^2}+\frac{8\pi^2 \mathrm{m}}{h^2}(E-V)\Psi=0$
c) $\frac{\partial\Psi^2}{\partial x^2}+\frac{\partial\Psi^2}{\partial y^2}+\frac{\partial\Psi^2}{\partial z^2}+\frac{8\pi^2 \mathrm{m}}{h^2}(E-V)\Psi=0$
d) $\frac{\partial^2\Psi}{\mathrm{d}x^2}+\frac{\partial^2\Psi}{\partial y^2}+\frac{\partial^2\Psi}{\partial z^2}+\frac{8\pi^2 \mathrm{m}^2}{h^2}(E-V)\Psi=0$

49. Heisenberg's uncertainty principle has no significance for a moving
a) Proton b) Neutron
c) Electron d) Cricket ball

50. The outermost configuration of the least reactive element is
a) ns^2p^3 b) ns^2p^4 c) ns^2p^5 d) ns^2p^6

51. The hybridisation of carbon atom in benzene is?
a) sp
b) sp^2
c) sp^3
d) dsp^2

52. Which molecule has hydrogen bonding
a) CH_4 b) CH_3COOH
c) GeH_4 d) H_2Te

53. In the equation of state of an ideal gas $pV = nRT$, the value of the universal gas constant would depend only on
a) The nature of the gas
b) The pressure of the gas
c) The units of the measurement
d) None of the above

54. Which of the following is always negative for exothermic reaction?
a) ΔH b) ΔS
c) ΔG d) None of these

55. Which of the following would be expected to have the largest entropy per mole?
a) $SO_2Cl_2(s)$ b) $SO_2(g)$
c) $SO_2Cl_2(g)$ d) $SO_2Cl_2(l)$

56. For a reaction and equilibrium which of the following is correct?
a) Concentration of reactant=concentration of product
b) Concentration of reactant is always greater than product
c) Rate of forward reaction=rate of backward reaction
d) $Q_c = k$

57. In the reaction, $H_2O_2 + Na_2CO_3 \rightarrow Na_2O_2 + CO_2 + H_2O$ the substance undergoing oxidation is
a) H_2O_2 b) Na_2CO_3
c) Na_2O_2 d) None of these

58. Sulphur in +3 oxidation state is present in
a) Sulphurous acid b) Pyrosulphuric acid
c) Dithionous acid d) Thiosulphuric acid

59. The normality of 30 volume H_2O_2 is
a) 2.678 N b) 5.336 N c) 8.034 N d) 6.685 N

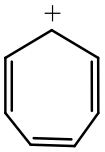
60. Which one of the following is the highest melting halide?
a) NaCl b) NaI c) NaBr d) NaF

61. Boron nitride has the structure of the type
a) Graphite type
b) Diamond type
c) Both diamond and graphite type
d) NaCl type

62. Which of the following statement is correct with respect to the property of elements in the carbon family with an increase in the atomic number? Their
a) Atomic size decreases
b) Stability of +2 oxidation state increases
c) Metallic character decreases
d) Ionization energy increases

63. The number of isomers of the compound with molecular formula $C_2H_2Br_2$is
a) 4 b) 3 c) 5 d) 2

64. Cyclobutadiene is said to be
a) aromatic b) aliphatic
c) non-aromatic d) None of these

65. Pick out the wrong statement.
a) Toluene shows resonance
b)  is non-aromatic.
c) The hybrid state of carbon in carbonyl group is sp^2.
d) The hyperconjugative effect is known as no bond resonance.

66. An important product in the ozone depletion by chloroflurocarbons is
a) Cl_2 b) OCl c) OF_2 d) O_2F_2

67. In which of the following crystals alternate tetrahedral voids are occupied?
a) NaCl b) Zns c) CaF_2 d) Na_2O

68. A metal has bcc structure and the edge length of its unit cell is 3.04 Å. The volume of the unit cell in cm^3 will be
a) 1.6×10^{-21} cm^3 b) 2.81×10^{-23} cm^3
c) 6.02×10^{-23} cm^3 d) 6.6×10^{-24} cm^3

69. A 0.025 M solution of monobasic acid had a freezing point of -0.060°C. The pK_a for the acid is
a) 1.2 b) 2 c) 2.5 d) 5.7

70. When 25 g of a non-volatile solute is dissolved in 100 g of water, the vapour pressure is lowered by 2.25×10^{-1}mm. If the vapour pressure of water at 20°C is 17.5 mm, what is the molecular weight of the solute?
a) 206 b) 302 c) 350 d) 276

71. Resistance of 0.2 M solution of an electrolyte is 50 Ω . The specific conductance of the solution is 1.3 S m^{-1}. If resistance of the 0.4M solution of the same electrolyte is 260Ω , its molar conductivity is
a) 6250 Sm^2 mol^{-1}
b) 6.25×10^{-4} Sm^2 mol^{-1}
c) 625×10^{-4} Sm^2 mol^{-1}
d) 62.5 Sm^2 mol^{-1}

72. The temperature dependence of rate constant (k) of a chemical reaction is written in terms of Arrhenius equation, $k = Ae^{-E*RT}$. Activation energy (E^*) of the reaction can be calculated by plotting
a) $\log k \; vs \frac{1}{T}$ b) $\log k \; vs \frac{1}{\log T}$
c) $k \; vs \; T$ d) $k \; vs \frac{1}{\log T}$

73. If the half-time for a particular reaction is found to be constant and independent of the

initial concentration of the reactants, then the ratio is of

a) First order b) Zero order
c) Second order d) None of these

74. Formation of ammonia from H_2 and N_2 by Haber's process using Fe is an example of
a) Heterogeneous catalysis
b) Homogeneous catalysis
c) Enzyme catalysis
d) Non-catalytic process

75. Cryolite is
a) Sodium borofluride
b) Magnesium silicate
c) Aluminium
d) Sodium aluminium fluoride

76. Chile salt petre is an ore of
a) Magnesium b) Bromine
c) Sodium d) Iodine

77. Which one is the anhydride of $HClO_4$?
a) ClO_2 b) Cl_2O_7 c) Cl_2O d) Cl_2O_6

78. Consider the following statements.
(I) $La(OH)_3$ is the least basic among hydroxides of lanthanides
(II) Zr^{4+} and Hf^{4+} possess almost the same ionic radii
(III) Ce^{4+} can act as an oxidizing agent
Which of the above is/are true?
a) (I) and (III) b) (II) and (III)
c) (II) only d) (I) and (II)

79. For d-block elements the first ionisation potential is of the order
a) Zn $> Fe > Cu > Cr$
b) Sc $=$ Ti $< V = Cr$
c) Zn $< Cu < Ni < Co$
d) V $> Cr > Mn > Fe$

80. The IUPAC name of $K_2[PtCl_6]$ is
a) Hexachloroplatinate potassium
b) Potassium hexachloroplatinate (IV)
c) Potassium hexachloroplatinate
d) Potassium hexachloroplatinum(IV)

81. Tertiary butyl alcohol gives tertiary butyl chloride on treatment with
a) Conc. HCl /anhy. $ZnCl_2$ b) KCN
c) NaOCl d) Cl_2

82. Ethyl chloride is converted into diethyl ether by
a) Perkins reaction
b) Grignard reagent
c) Wurtz reaction
d) Williamson's synthesis

83. Ether in contact with air for a long time form peroxides. The presence of peroxide in either can be tested by adding Fe^{2+} ion and then adding
a) KCN b) $SnCl_2$ c) $HgCl_2$ d) KCNS

84. Which of the following has the most acidic hydrogen?
a) 3-hexanone b) 2,4-hexanedione
c) 2,5-hexanedione d) 2,3-hexanedione

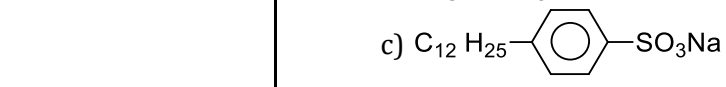
85. Which of the following compound does not undergoes Schotten-Baumann reaction?
a) Phenol b) Primary amine
c) Secondary amine d) Tertiary amine

86. High basicity of Me_2NH relative to Me_3N is attributed to
a) Effect f solvent b) Inductive effect of Me
c) Shape of Me_2NH d) Shape of Me_3N

87. Which of the following is non-reducing sugar?
a) Ribose b) Lactose
c) Sucrose d) Maltose

88. Which of the following is not a biopolymer?
a) Proteins b) Rubber
c) Cellulose d) RNA

89. Which one of the following is a chain growth polymer?
a) Starch b) Nucleic acid
c) Polystyrene d) Protein

90. Which of the following represents a synthetic detergent?
a) $C_{15}H_{31}COOK$
b) $CH_3(CH_2)_6COONa$
c) 

d) All of the above

91. True regeneration is found in
a) *Amoeba* b) *Hydra*
c) *Planaria* d) Bacteria

92. Which one of the following is the feature of phylum-Chordata is also exhibited by adult tunicate?
a) Possession of visceral slits
b) Possession of a ventral chord
c) Possession of closed vascular system
d) Possession of ventral tubular nervous system

93. 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

94. Gene regulation in bacteria is shown by
a) Jacob and Monod b) Beadle and Tatum
c) Temin and Baltimore d) Kornberg

95. Which mushroom contains muscarine?
a) Agaricus bisporus b) Volverie lla volvacea c) Pleurotus sojar d) Amanita virosa

96. From which of the following algae, agar-agar is commercially extracted?
I. *Gracilaria* II. *Fucus*
III. *Sargassum* IV. *Gelidium*
V. *Turbinaria*
a) III and V
b) II and III
c) IV and V
d) I and IV

97. In angiospermic plant pollen grain reaches to embryo sac after its germination on ...A... and through ...B... . Here A and B refer to
a) A-anther; B-micropyle
b) A-stigma; B-pollen tube
c) A-stigma; B-micropyle
d) A-anther; B-pollen tube

98. Cysticercus stage is found in
a) *Taenia* b) *Plasmodium*
c) *Leishmania* d) *Wuchereria*

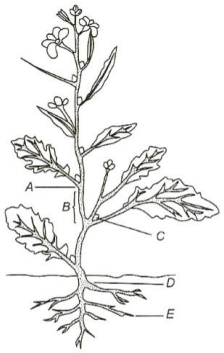
99. If *Hydra* is cut transversely in three equal parts, then
a) All three parts will die
b) Regeneration will occur in all the three parts
c) Regeneration will occur only in anterior part
d) Regeneration occur only in middle part

100. Animals of class-Mammalia have
a) Seven cervical vertebrae
b) Seven cranial nerve
c) Single ventricular chamber
d) Fourteen cervical vertebrae

101. The monocotyledon seeds consist of one large and shield-shaped cotyledon known as
a) Aleurone layer b) Scutellum
c) Coleoptiles d) Hilum

102. A fruit in which seed coat and fruit wall is fused known as caryopsis present in
a) Wheat b) Sunflower
c) Mango d) Tomato

103. Identify *A* to *E* in the given diagram



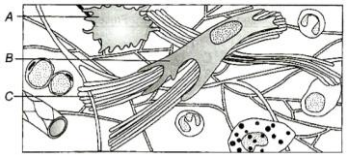
a) A-Node, B-Internode, C-Accessory bud, D-Primary root, E-Secondary root
b) A-Node, B-Internode, C-Bud, D-Primary root, E-Secondary root
c) A-Internode, B-Node, C-Bud, D-Primary root, E-Secondary root
d) A-Internode, B-Node, C-Callus, D-Primary root, E-Secondary root

104. Which one of the following conditions is seen in the roots of a plant having submerged assimilatory roots and spongy petioles?
a) Triarch b) Monarch
c) Tetrarch d) Diarch

105. Tyloses an outgrowth from ray or axial parenchyma cell into the lumen of a vessel, which partially or completely blocks the cavity are present in
a) Periderm b) Heartwood
c) Sapwood d) Secondary cortex

106. Two cross-sections of stem and root appear simple, when viewed by naked eye. But under microscope, they can be differentiated by
a) Exarch condition of root and stem
b) Endarch condition of stem and root
c) Endarch condition of root and exarch condition of stem
d) Endarch condition of stem and exarch condition of root

107. Identify *A* to *C* in the given diagram of areolar tissue



a) A-Macrophage, B-Fibroblast, C-Collagen fibres
b) A-Mast cells, B-Collagen fibres, C-Plasma membrane
c) A-Chondrocyte, B-Fat storage area, C-Plasma membrane
d) A-fibroblast, B-Macrophages, C-Mast cells

108. Which of the following nephridia in earthworm remain attached to the lining of the body wall of segment 3 to the last?
a) Integumentary
b) Pharyngeal
c) Septal
d) Dorsal

109. Which of the following statement is correct about the cell wall of prokaryotic cell?
I. Cell wall, if present, possesses muramic acid
II. Cell wall, if presents, possesses acitic acid
III. Cell wall is always absent
The correct options is
a) Only I
b) Only II
c) I, II and III
d) Only III

110. Assembly of two subunits 40 S and 60 S of the ribosome is
a) 100 S b) 80 S c) 70 S d) 50 S

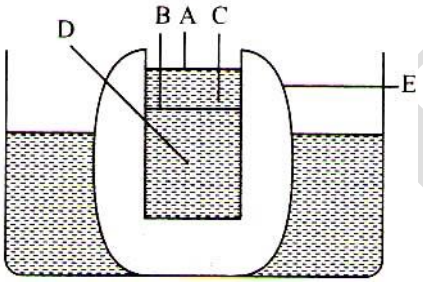
111. Pepsin is an ……enzyme
a) Intracellular
b) Extracellular
c) Both (a) and (b)
d) None of these

112. The bond present between two carbohydrate molecules is
a) Amide b) Hydrogen
c) Glycosidic d) phosphodiester

113. Choose the correct answer for the statements given below
I. Protein involved in the shortening and thickening of chromosome fibres
II. The name of early prophase when elongated chromosomes occur in overlapped condition like a ball of wool without their ends being visible
III. Each group of astral rays along with its centriole pair
IV. Name the narrow point which is responsible for attaching two sister chromatids to each other
a) I-Codensins, II-Aster, III-Spirme stage, IV-Kinetochore
b) I-Codensins, II-Aster, III-Spirme stage, IV-Centromere
c) I-Codensins, II-Spirme stage, III-Aster, IV-Centromere
d) I-Tubulins, II-Spirme stage, III-Amphiaster, IV-Kinetochore

114. During the G_1-phase of cell division
a) RNA and proteins are synthesized
b) DNA and proteins are synthesized
c) Cell prepares for M-phase
d) Cell undergoes duplication

115. Choose the correct combination of labeling of the potato osmoscope experiement.



a) A-Final level B-Dotpin C-Initial level D-Sugar solution E-Potato tuber
b) A-Initial level B-Dotpin C-Final level D-Water E-Potato tuber
c) A-Final level B-Dotpin C-Initial level D-Water E-Potato tuber
d) A-Final level B-Dotpin C-Initial level D-Water E-Container

116. Who coined the term diffusion pressure deficit?
a) Slatyer b) Taylor c) Meyer d) Slatyer and Taylor

117. Root hair absorb water from the soil on account of
a) Turgor pressure b) Osmotic pressure
c) Suction pressure d) Root pressure

118. Which form of nitrogen enters in the plants
a) Free form b) Fixed form
c) Reduced form d) Oxidised form

119. $N_2 + 8e^- + 8H^+ + 16ATP \rightarrow 2NH_3 + 2H^+ + 16ADP + 16Pi$
The above equation refers to
a) Ammonification
b) Nitrification
c) Nitrogen fixation
d) Denitrification

120. Carboxylation (C_3-cycle) is catalysed by
a) Carboxylase b) RuBP carboxylase
c) RuBP oxygenase d) Both (b) and (c)

121. In bundle, sheath cells are the large cells around the
a) Vascular bundles of C_4-plants
b) Vascular bundles C_3-plants
c) Vascular bundles of C_2-plants
d) All of the above

122. Which of the following reaction does not take place in the cell organelle, that is referred to as 'Power house of the cell'?
a) Glycine Decarboxylation
b) Glyceraldehyde 3-phosphate dehydrogenation
c) Fumaric acid hydration
d) Cytochrome oxidation

123. In citric acid cycle first step is
a) Acetyl Co-A combines with oxalo acetic acid
b) Acetyl Co-A combines with citric acid
c) Citric acid combines with oxaloacetic acid
d) Citric acid combines with malic acid

124. Identify the pair of physiological effects of two phytohormones, which are synthesized from different amino acids?
1. Formation of perennating buds in *Lemna*.
2. Simultaneous flowering in pineapple.
3. Bolting in cabbage.
4. Apical dominance in *Polyalthia*.
a) II and IV b) I and IV c) II and III d) I and II

125. The natural plant hormone isolated from corn kernels and coconut milk is
a) Florigen b) GA_3
c) Free auxins d) Zeatin

126. The hormone involved in metabolism of food material in cereal grains during germination is
a) Auxin b) Cytokinin
c) Gibberellin d) None of these

127. Which is the correct sequence of 4 layers of alimentary canal from periphery to centre?
a) Muscularis → Serosa → Mucosa → Submucosa
b) Serosa → Mucosa → Muscularis → Submucosa
c) Serosa → Muscularis → Submucosa → Mucosa
d) Serosa → Mucosa → Submucosa → Muscularis

128. During prolonged hunger strike, what is the correct chronological sequence of ending the food stuff?
a) Protein-fat-carbohydrate
b) Carbohydrate-protein-fat
c) Fat-proteins-carbohydrate
d) Carbohydrate-fat-proteins

129. Dissociation curve of haemoglobin is
a) Sigmoid b) Parabolic
c) Straight line d) Hyperbolic

130. Almost same $\wp O_2$ in humans is found in
a) Alveoli and tissues
b) Oxygenated blood and deoxygenated blood
c) Alveoli and oxygenated blood
d) Alveoli and deoxygenated blood

131. Which of the statement is correct?
I. The closing and opening of the heart is through the valves during each heart beat
II. The movement of the impulse passes from the SA node to all the regions of the heart wall
III. The number of the times the heart beats in one minute is 60
IV. Change in the blood volume in all the chambers of the heart occurs during the cardiac cycle
The option with correct statements is
a) I, II and III b) II, III and IV
c) I, II and IV d) I, III and IV

132. The second step in the coagulation of blood is catalyzed by
a) Thrombin b) Factor-XIII
c) Factor-XII d) Heparin

133. Consider the following statements
I. Flame cells are excretory structures in flatworms.
II. Green glands are excretory organs in annelids.
III. Columns of Bertini are the conical projections of renal pelvis into renal medulla between the renal pyramids.
a) I and II correct b) II and III incorrect
c) I and III correct d) I, II and III correct

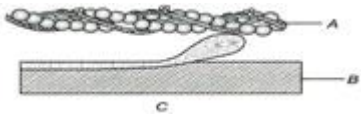
134. Select the right option
a) Nitrogenous excretory products are synthesised in kidney and eliminated in liver
b) Nitrogenous excretory products are synthesised in kidney, and eliminated also
c) Nitrogenous excretory products are synthesised in liver, and eliminated via bile juice
d) Nitrogenous excretory products are synthesised in liver eliminated by kidney

135. Renin is secreted from

a) Juxtaglomerular cells
b) Podocytes
c) Nephridia
d) Stomach

136. Select the correct statements with reference to muscles
I. Cardiac muscles are non-striated
II. All non-striated muscles are involuntary
III. All movements leads to locomotion
IV. Micro filaments all involved in amoeboid movements
Correct option with all wrong statements is-
a) I and III b) I and II c) III and IV d) II and IV

137. Identify A, B and C in the given diagram. Choose the correct option



a) A-Actin filament, B-Myosin filament, C-Breaking of cross bridge
b) A-Myosin filament, B-Myosin filament, C-Breaking of cross bridge
c) A-Myosin filament, B-Actin filament, C-Breaking of cross bridge
d) A-Actin filament, B-G-actin filament, C-Breaking of cross bridge

138. Humerus fits into glenoid cavity is example of
a) Ball and socket joint b) Pivot joint
c) Peg and socket joint d) Condyloid joint

139. Brain controls the
a) Voluntary movements
b) Balance of the body
c) Functioning of vital involuntary organs
d) All of the above

140. Read the following statements.
I. Preganglionic nerve fibres of III, VII, IX and X cranial nerves are a part of the parasympathetic nervous system
II. V,VII, IX and X cranial nerves are mixed nerves.
III. Trochlear nerves are the largest cranial nerves.
IV. Abducens nerves are motor nerves and originate from the Gasserian ganglia.
Which of the above statements are correct?
a) I and IV
b) I and II
c) II and III
d) I and III

141. Gland responsible for calcium metabolism is
a) Thymus b) Thyroid
c) Parathyroid d) Adrenal

142. Some hormone need the secondary messenger, because
a) They need activator
b) They can't cross cells membrane
c) They can cross cells membrane
d) They need a prosthetic group

143. Man is:
a) Unisexual b) Bisexual
c) Hermaphroditic d) Protogynous

144. The living organisms can be unexceptionally distinguished from the non-living things on the basis of their ability for:
a) Interaction with environment and progressive evolution
b) Reproduction
c) Growth and movement
d) Responsive to touch

145. The ovule attached to the placenta of ovary wall by
a) Raphae b) Micropyle
c) Funicle d) Hilum

146. For a gene if AA = male plant, BB = female plant. Find out the genotype of endosperm and embryo
a) AAB, BBA b) AAB, AB c) ABB, AB d) BBA, AAB

147. Wind pollination is common in grassess. This statement is
a) True b) False
c) Sometimes (a) and sometimes (b) d) Neither (a) nor (b)

148. Fertilization of ovum by the sperm takes place in
a) Ampulla of oviduct b) Isthmus of oviduct
c) Fimbriae of oviduct d) None of the above

149. Ovulation takes place in a month between
a) 11-14 days b) 14-16 days
c) 15-28 days d) 21-26 days

150. Oviducts are also called
a) Fallopian tubes b) Uterus
c) Vagina d) Ovary

151. Progesterone is needed for the maintenance
a) Of ovary b) Of ovum c) Of endometrium wall d) Of ootid

152. ICSI stands for
a) Inter Cytoplasmic Semen Injection
b) Intra Cytoplasmic Semen Injection
c) Inter Cytoplasmic Semen Injection
d) In Cytoplasmic Semen Injection

153. Amniocentesis is a technique to:
a) Estimate essential amino acids in the body
b) Detect chromosomal anomalies in the foetus
c) Reverse sex of the foetus
d) Correct genetic disorders of the foetus

154. Gynaecomastia is a common feature seen in
a) Down's syndrome
b) Turner's syndrome
c) PKU
d) Cystic fibrosis

155. I. Short statured with small round head
II. Furrowed tongue and partially opened mouth
III. Palm is broad with characteristic palm crease
IV. Slow physical, psycomotor and mental development
These are the characters of
a) Down's syndrome
b) Turner's syndrome
c) Klinefelter's syndrome
d) Edward syndrome

156. When a segment of a chromosome breaks and later rejoins after 180°rotation,it is known as
a) Deletion
b) Duplication
c) Inversion
d) Interstitial translocation

157. *m*RNA ready for translation contains only
a) Exon
b) Intron
c) Both (a) and (b)
d) Exon, intron and non-coding region

158. The term 'genetic RNA' refers to
a) Genetic material of RNA viruses
b) The RNA that carries genetic massage
c) The RNA that helps gene regulation in Lac operon
d) The RNA present in mitochondria

159. 'PP' is a type of selection that favours both small sized and large-sized individual. 'PP' eliminates most of the members with mean expression, so as to produce two peak in the distribution of the tract that many lead to the development of two different populations. Identify 'PP'
a) Disruptive selection
b) Opposite of stabilizing selection
c) Diversifying sekection
d) All of these

160. Resistant varieties evolved in much lesser time because of
a) Natural selection
b) Faster rate of mutation
c) Anthropogenic (human) activities
d) Random selection

161. Which of the following birth control measure can be considered as the safest?
a) The rhythm method
b) The use of physical barriers
c) Termination of unwanted pregnancy
d) Sterilization techniques

162. Blood circulation was discovered by
a) William Harvey
b) Hippocrates
c) Karl Landsteiner
d) Paul Ehrlich

163. Give the name of two helminthes, which causes ascariasis and filariasis respectively
a) *Ascaris* and *Wuchereria*
b) *Wuchereria* and *Ascaris*
c) Roundworm and Flatworm
d) *Plasmodium* and *Wuchereria*

164. Cryopreservation is:
a) Preservation of living being in chemicals
b) Preservation of very low temperature
c) Preservation through exposure to irradiation
d) Preservation at high temperature

165. Which one of the following is a disease of poultry?
a) Foot and mouth disease
b) Pebrine disease
c) Anthrax
d) Ranikhet disease

166. *Triticum aestivum,* the common bread wheat is
a) Triploid with 21 chromosomes
b) Hexaploid with 42 chromosomes
c) Tetraploid with 30 chromosomes
d) Diploid with 14 chromosomes

167. Producer gas differs from biogas in having
a) Methane
b) Carbon monoxide
c) Carbon dioxide
d) Formed by fermentation

168. I. *Ori* also controls the copy numbers of the linked DNA
II. If a foreign DNA ligates at the *Bam* HI site of tetracycline resistance gene in the vector pBR322, the recombinant plasmid loses the tetracycline resistance due to insertion of foreign DNA
Choose regarding the above statements
a) I is true, II is false
b) II is true, I is false

c) Both are true d) Both are false

169. Petroleum-lysing bacteria are being engineering for the removal of oil spills. What is the most realistic danger of these bacteria to the environment?
   a) Mutations leading to the production of a strain pathogenic to humans
   b) Extinction of natural microbes due to the competitive advantage of the "petro-bacterium"
   c) Destruction of natural oil deposits
   d) Poisoning of the food chain

170. Alec Jeffreys developed the DNA fingerprinting technique. The probe he used was
   a) Ribozyme b) Sex chromosomes
   c) SNP d) VNTR

171. The bacterium, *Bacillus thuringiensis* is widely used in contemporary biology as
   a) Insecticide b) Agent for the production of dairy products
   c) Source of industrial enzyme d) Indicator of water pollution

172. Nucleic acid segment tagged wit5h a radioactive molecule is called
   a) Clone b) Probe c) Plasmid d) Vector

173. r value for human population in 1981. In India was
   a) 0.205 b) 0.0205 c) 0.00205 d) 2.05

174. Small fish get stuck near the bottom of a shark and derives its nutrition from it. This kind of association is called as
   a) Antibiosis b) Commensalism
   c) Predation d) parasitism

175. The ecological niche of population is a
   a) Geographical area that it covers
   b) Place where it lives
   c) Set of conditions and resource it uses
   d) None of the above

176. Primary productivity is affected by
   I. temperature
   II. sunlight
   III. moisture
   IV. availability of nutrients
   a) I and II b) I, II and III
   c) II, III and IV d) I, II, III and IV

177. Lime is added to the soil which is too
   a) Sandy b) Salty c) Alkaline d) Acidic

178. Gir sanctuary is mainly for
   a) Rhino b) Tiger c) Lion d) Elephant

179. Which of the following gases are the contributor to the greenhouse effect?
   I. Carbon dioxide
   II. Methane gas
   III. Nitrous oxide
   IV. Chlorofluorocarbon
   a) I, II and III b) II, III and IV
   c) I, III and IV d) I, II, III and IV

180. Most hazardous metal pollutant of automobile exhaust is
   a) Cadmium b) Lead
   c) Mercury d) Copper

MERITSTORE

Date : **NEET FULL PORTION** **TEST ID: 32**

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

: ANSWER KEY :

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

: HINTS AND SOLUTIONS :

1 **(b)**

$6 \times 10^{-5} = 60 \times 10^{-6} = 60\ microns$

2 **(d)**

R=8.3 J/K-mol

$n_1u_1 = n_2u_2$

$\therefore\ n_2 = \dfrac{n_1u_1}{u_2}$

$= \dfrac{8.3\text{J/K} - \text{mol}}{\text{atm L/K} - \text{mol}}$

$= \dfrac{8.3\text{J/K} - \text{mol}}{(1.013 \times 10^5\text{N/m}^2)(10^{-3}\text{m}^3)/\text{K} - \text{mol}}$

$= \dfrac{8.12}{10^2} = 0.0812$

$\therefore$ 8.3 J/K-mol=0.0812 atm L/K-mol

3 **(b)**

$h = vt - \frac{1}{2}gt^2$ or $\frac{1}{2}gt^2 - vt + h = 0$

or $gt^2 - 2vt + 2h = 0 \Rightarrow t_1t_2 = \frac{2h}{g}$

$1 \times 3 = \frac{2h}{10}$ or $2h$ =30m or $h = 15$m

5 **(b)**

$\omega^2R = 4\pi^2n^2r = 4\pi^2\left(\dfrac{1200}{60}\right)^2 \times 30 \times 10^{-2}$

$= 4732\ m/s^2$

6 **(a)**

Force exerted by ball on wall

= rate of change in momentum of ball

$= \dfrac{mv - (-mv)}{t} = \dfrac{2mv}{t}$

7 **(b)**

Let the minimum mass of B is M_B.
Force applied by it $F = M_B g$
Friction force on block A
$f = \mu M_A g$
For motion to start
$M_B g = \mu M_A g$
$M_B = 0.22 \times 10$
$= 2.2$ kg

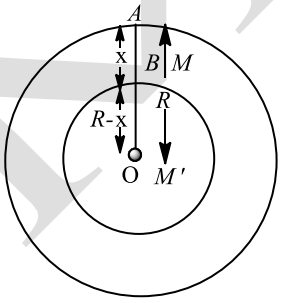
8 **(d)**
If it is a completely inelastic collision then
$m_1 v_1 + m_2 v_2 = m_1 v + m_2 v$
$v = \frac{m_1 v_1 + m_2 v_2}{m_1 + m_2}$ $\quad \underset{v_1}{\overset{m_1}{\rightarrow}}$ $\quad \underset{v_2}{\overset{m_2}{\rightarrow}}$

$\mathrm{KE} = \frac{\mathrm{p}_1^2}{2\mathrm{m}_1} + \frac{p_2^2}{2m_2}$
As p_1 *and* p_2 both simultaneously cannot be zero therefore total KE cannot lost.

9 **(d)**
Sphere possesses both translational and rotational kinetic energy

10 **(a)**
In the pulley arrangement $|\vec{a}_1| = |\vec{a}_2| = a = \left(\frac{m_1 - m_2}{m_1 + m_2}\right)\mathrm{g}$
But $\vec{a}_1$ is in downward direction and in the upward direction *ie*, $\vec{a}_2 = -\vec{a}_1$
∴ Acceleration of centre of mass
$\vec{a}_{\mathrm{CM}} = \frac{m_1 \vec{a}_1 + m_2 \vec{a}_2}{m_1 + m_2}$
$= \frac{m_1 \left[\frac{m_1 - m_2}{m_1 + m_2}\right]\mathrm{g} - m_2 \left[\frac{m_1 - m_2}{m_1 + m_2}\right]\mathrm{g}}{(m_1 + m_2)}$
$= \left[\frac{m_1 - m_2}{m_1 + m_2}\right]^2 \mathrm{g}$

11 **(b)**
Consider that the earth is sphere of radius R and mass M. Then, value of acceleration due to gravity at the point A on the surface of earth is given by



$g = \frac{GM}{R^2}$
If ρ is density of the material of earth, then
$M = \frac{4}{3}\pi R^3 \rho$
$\therefore \quad g = \frac{G \times \frac{4}{3}\pi R^3 \rho}{R^2}$
or $\quad g = \frac{4}{3}\pi G R \rho$
Let g'' be acceleration due to gravity at the point B at a depth x below the surface of earth. A body at point B will experience force only due to the portion of the earth of radius $OB(= R - x)$. The outer spherical shell, whose thickness is x, will not exert any force on body at point B.

13 **(c)**
Terminal velocity
$v \propto r^2$
$\therefore \quad \frac{v'}{v} = \frac{(2R)^2}{(R)^2}$
or $v' = 4v$

14 **(d)**
When we move from centre to circumference, the velocity of liquid goes on decreasing and finally becomes zero

15 **(b)**
Heat taken by ice to raise its temperature to 100°C
$Q_1 = 1 \times 80 + 1 \times 1 \times 100 = 180$ cal
Heat given by steam when condensed
$Q_2 = m_2 L_2 = 1 \times 540 = 540$ cal
As $Q_2 > Q_1$, hence, temperature of mixture will remain 100°C.

16 **(d)**
$\frac{T_2}{T_1} = 1 - \eta = 1 - \frac{40}{100} = \frac{3}{5}$
$\therefore \quad T_1 = \frac{5}{3}T_2 = \frac{5}{3} \times 300 = 500\mathrm{K}$
Increase in efficiency = 50% of 40% = 20%
∴ New efficiency $\eta' = 40 + 20 = 60\%$
$\therefore \quad \frac{T_2}{T'_1} = 1 - \eta' = 1 - \frac{60}{100} = \frac{2}{5}$
$T'_1 = \frac{5}{2} \times 300 = 750$ K
Increase in temperature of source $= T'_1 - T_1$
$= 750 - 500 = 250$ K

17 **(d)**
Work done at constant temperature (*ie*, isothermal process),
$W = 2.3nRT \log_{10}\left(\frac{V_2}{V_1}\right)$
$= 2.3 \times 10 \times 8.31 \times 500 \times \log_{10}\left(\frac{5}{50}\right)$
$= -9.6 \times 10^4 \mathrm{J}$

18 **(b)**

Here , $m = 0.1$ kg, $h_1 = 10$m, $h_2 = 5.4$ m

$c = 460$ J-kg^{-1}°C^{-1}, g $= 10$ms^{-2}, θ =?

Energy dissipated, $Q = mg(h_1 - h_2)$

$= 0.1 \times 10(10 - 5.4) = 4.6j$ J

From $Q = c\, m\, \theta$

$$\theta = \frac{Q}{cm} = \frac{4.6}{460 \times 0.1} = 0.1°C$$

19 **(a)**

Velocity of a particle executing S.H.M. is given by

$$v = \omega\sqrt{a^2 - x^2} = \frac{2\pi}{T}\sqrt{A^2 - \frac{A^2}{4}} = \frac{2\pi}{T}\sqrt{\frac{3A^2}{4}}$$

$$= \frac{\pi A\sqrt{3}}{T}$$

21 **(a)**

$$n' = n\left(\frac{v}{v + v_S}\right) = 800\left(\frac{330}{330 + 30}\right) = 733.33\ Hz$$

22 **(a)**

Total enclosed charge as already shown in

$$q_{\text{net}} = \frac{6C}{2} + \frac{8C}{4} - 7C$$

$$= -2C$$

From Gauss-theorem, net flux,

$$\phi_{\text{net}} = \frac{q_{\text{net}}}{\varepsilon_0} = \frac{-2C}{\varepsilon_0}$$

23 **(c)**

Given $\Rightarrow V = 200\ volt, Q = 0.1\ C$

As energy $U = \frac{QV}{2}, U = \frac{0.1 \times 200}{2} = 10\ Joule$

24 **(b)**

Potential energy of charges q_1 and q_2, r distance apart

$$U = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r}$$

For $r = 0.1$m,

$$U_1 = \frac{1}{4\pi\varepsilon_0}\frac{12 \times 10^{-6} \times 5 \times 10^{-6}}{0.1}$$

$$= \frac{9 \times 10^9 \times 60 \times 10^{-12}}{0.1} = 5.4 \text{ J}$$

For $r = 0.06$m,

$$U_2 = \frac{9 \times 10^9 \times 60 \times 10^{-12}}{0.06} = 9 \text{ J}$$

∴ Work done = (9 – 5.4) J = 3.6 J

26 **(c)**

Voltmeter is an instrument which measure the potential difference between two points. A high resistance is connected in series with coil of the galvanometer to convert it into voltmeter. This resistance is either 2000Ω or more than that.

Resistance connected in series is given by

$$R = \frac{V}{I_g} - G \quad ..(i)$$

Eq. (i) is the value of the resistance required to convert the galvanometer to voltmeter of range 0 to V.

From the relation

$$R = \frac{V}{I_g} - G$$

$$R = \frac{nV}{\left(\frac{V}{G}\right)} - G$$

or $R = nG - G = G(n - 1)$

Hence, $R = (n - 1)\, G$

27 **(b)**

Cells are joined in parallel when internal resistance is higher than external resistance. [$R << r$]

$$i = \frac{E}{R + \frac{r}{n}}$$

28 **(b)**

$W = MB(\cos\theta_1 - \cos\theta_2)$

$= (NiA)B(\cos 0° - \cos 180°) = 2NAIB$

29 **(d)**

$$R = \sqrt{P^2 + Q^2}$$

$$B = \left[\left\{\frac{2P}{(d/2)^3}\right\}^2 + \left\{\frac{P}{(d/2)^3}\right\}\right]^{1/2} \times 10^{-7}$$

$$= \sqrt{(4^2 + 4)} \times 10^{-7}$$

$$= \sqrt{20} \times 10^{-7} = 2\sqrt{5} \times 10^{-7} \text{ T}$$

30 **(a)**

Plane of coil is having angle θ with the magnetic field

$\therefore \tau = MB\sin(90 - \theta)$ or $\tau = niAB\cos\theta$ [As $M = niA$]

31 **(c)**

The energy stored in an inductor

$$U = \frac{1}{2}LI^2$$

32 **(d)**

The instantaneous values of emf and current in inductive circuit are given by $E = E_0\sin\omega t$ and $i = i_0\sin\left(\omega t - \frac{\pi}{2}\right)$ respectively

So, $P_{\text{inst}} = Ei = E_0\sin\omega t \times i_0\sin\left(\omega t - \frac{\pi}{2}\right)$

$= E_0 i_0\sin\omega t\left(\sin\omega t\cos\frac{\pi}{2} - \cos\omega t\sin\frac{\pi}{2}\right)$

$= E_0 i_0\sin\omega t\cos\omega t$

$= \frac{1}{2} E_0 i_0 \sin 2\omega t \ (\sin 2\omega t = 2 \sin \omega t \cos \omega t)$

Hence, angular frequency of instantaneous power is 2ω

33 **(b)**

For purely capacitive circuit $e = e_0 \sin \omega t$

$i = i_0 \sin\left(\omega t + \frac{\pi}{2}\right)$, *i. e.*, current is ahead of emf by $\frac{\pi}{2}$

34 **(a)**

The phase velocity of a wave is rate at which the phase of the wave propagates in space. This is the speed at which the phase of any one frequency component of the wave travels. For such a component, any given phase of the wave will appear to travel at the phase velocity. It is given in terms of wave's angular velocity ω and wave number k by $v_p = \frac{\omega}{k}$.

35 **(a)**

As refractive index for $z > 0$ and $z \leq 0$ is different $X - Y$ plane should be boundary between two media

Angle of incidence,

$$\cos i = \left| \frac{A_z}{\sqrt{A_x^2 + A_y^2 + A_z^2}} \right| = \frac{1}{2}$$

$\therefore i = 60°$

From Snell's law

$\frac{\sin i}{\sin r} = \frac{\sqrt{3}}{2}$

$\Rightarrow r = 45°$

36 **(a)**

Optical fibres are used to send signals from one place to another

37 **(d)**

Sound waves cannot be polarised as they are longitudinal. Light waves can be polarised as they are transverse.

38 **(d)**

$$\because \quad \lambda = \frac{h}{p} \Rightarrow \lambda \propto \frac{1}{p}$$

ie, when λ increases, p decreases.

39 **(a)**

$\delta p = \frac{\hbar}{\Delta x} = \frac{\hbar}{\lambda}$

40 **(b)**

$$\Delta E = 13.6 Z^2 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$$

$$= 13.6 \ (3)^2 \left[\frac{1}{1^2} - \frac{1}{3^2} \right]$$

$= 108.8 \ e\text{V}$

41 **(c)**

First excited state *i. e.*, second orbit $(n = 2)$

Second excited state *i. e.*, third orbit $(n = 3)$

$\because E = -\frac{13.6}{n^2} \Rightarrow \frac{E_2}{E_3} = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$

42 **(d)**

Fraction $= \frac{N}{N_0} = \left(\frac{1}{2}\right)^{\frac{6400}{1600}} = \left(\frac{1}{2}\right)^4 = \frac{1}{16}$

43 **(c)**

A p-type material is electrically neutral.

44 **(d)**

Here $\frac{\mu_1 - \mu_2}{\mu_1} = \frac{0.88}{100} \Rightarrow \frac{\mu_2}{\mu_1} = 0.9912$

$\therefore$ Critical angle $\theta_c = \sin^{-1}\left(\frac{\mu_2}{\mu_1}\right) =$

$\sin^{-1}(0.9912) = 82°24'$

45 **(c)**

Here, $f_m = 10 \ kHz$

$\therefore f_{SB} = f_c \pm f_m = (712 \pm 10) =$ kHz

$= 702$ kHz and 722 kHz

46 **(c)**

Mass of 1 atom $= 1.8 \times 10^{-22}$g

Mass of 6.02×10^{23} atoms

$= 6.02 \times 10^{23} \times 1.8 \times 10^{-22}$g

$= 6.02 \times 1.8 \times 10$g

$= 108.36$g

$\therefore$ Atomic mass of element $= 108.36$

47 **(a)**

Number of molecules $= \frac{mass \times N_A}{molar \ mass}$

48 **(b)**

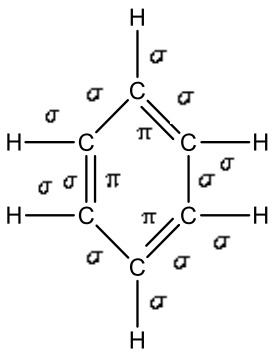
Schrodinger wave equation is

$$\frac{\partial^2 \Psi}{\partial x^2} + \frac{\partial^2 \Psi}{\partial y^2} + \frac{\partial^2 \Psi}{\partial z^2} + \frac{8\pi^2 m}{h^2}(E - V)\Psi = 0$$

51 **(b)**

5. The first bond between any two atoms is σ and rest are π bonds.

6. π bond is formed by sideways overlapping of unhybridised p-orbital.

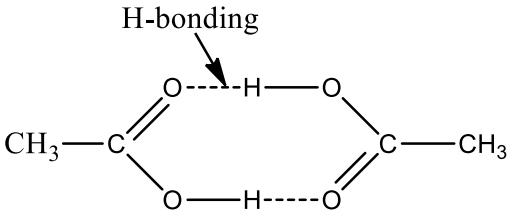


Each carbon has 3σ and 1 π-bond.

∴ All carbon atoms of C_6H_6 are sp^2 hybridised.

52 **(b)**

CH_3COOH dimerises in gaseous state due to H-bonding.



53 **(c)**

In ideal gas equation the value of universal gas constant depends on the units of the measurement.

Numerical values of R,

(a) 0.0821 L atm $K^{-1}mol^{-1}$

(b) 8.314 J $K^{-1}mol^{-1}$

(c)8.314×10^7 erg $K^{-1}mol^{-1}$

55 **(b)**

Entropy is the measure of randomness of a system. Gaseous state has highest randomness of molecules, thus

$S_{gas} > S_{liquid} > S_{solid}$

When two systems are in same state, then the one which has low molecular mass, has higher entropy. Hence, entropy is highest for SO_2 among the given compounds.

56 **(c)**

At chemical equilibrium, rate of forward reaction is equal to the rate of backward reaction.

57 **(d)**

$$\overset{-1}{H_2}\overset{}{O_2} + \overset{+1}{Na_2}\overset{+4}{C}\overset{-2}{O_3} \longrightarrow \overset{+1\ -1}{Na_2O_2} + \overset{+4\ -2}{CO_2} + \overset{-2}{H_2O}$$

None of the elements changes its oxidation number

58 **(c)**

1. Sulphurous acid H_2SO_3

$$2 + x + (-2 \times 3) = 0$$

$$x - 4 = 0$$

$$\therefore \quad x = 4$$

2. Pyrosulphuric acid ($H_2S_2O_7$)

$$2 + 2x + (-2 \times 7) = 0$$

$$\text{or } 2x = 12$$

$$\therefore = 6$$

3. Thiosulphuric acid ($H_2S_2O_3$)

$$2 + 2x + (-2 \times 3) = 0$$

$$\text{or} 2x = 4$$

$$x = 2$$

4. Dithionous acid ($H_2S_2O_4$)

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

$$2x = 6$$

$$\therefore \ x = 3$$

59 **(b)**

Volume strength = 5.6 × normality

$$30 = 5.6 \times N$$

$$\Rightarrow \qquad N = \frac{30}{5.6} = 5.3$$

60 **(d)**

Because of the smaller size of F-ions, NaF has the highest lattice energy and hence, the highest melting point

62 **(b)**

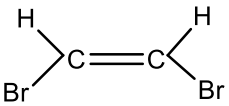
In carbon family stability of +2 oxidation state increases on moving down the group in the Periodic Table with an increase in atomic number due to screening effect

63 **(b)**

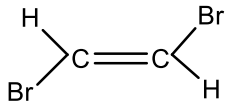
The structure of isomers from $C_2H_2Br_2$ are $CH_2 = CBr_2$;

$CH_2{=}{=}CBr$;

I



cis-isomer II

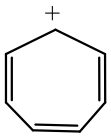


trans-isomer III

64 **(c)**

Cyclobutadiene have (4π) conjugated or delocalized electrons, thus it is *anti*-aromatic

65 **(b)**



is aromatic

is aromatic.

It contains 3 double bonds (6π electrons). According to Huckel rule $(4n+2)\pi = 6\pi$ electrons where, $n = 1$

66 **(b)**

We know that,

$O_3 + CCl_2F_2 \rightarrow 2OCl + F_2O$. Thus, in this reaction OCl is produced.

67 **(b)**

In ZnS structure, sulphide ions occupy all (fcc) lattice points while Zn^{2+} ions are present in alternate tetrahedral sites.

Therefore, there is one Zn^{2+} ion for every S^{2-} ion.

68 **(b)**

Edge length $a = 3.04$ Å

$= 3.04 \times 10^{-8}$ cm

Volume of bcc (cubic) cell $= a^3$

$= (3.04 \times 10^{-8})^3$

$= 2.81 \times 10^{-23}\text{cm}^3$

69 **(c)**

$m = \dfrac{\Delta T}{k_b} = \dfrac{-0.060}{-1.86} = 3.2 \times 10^{-2} = 0.032$

ie, 0.032 = total particle

∴ The number of $H^+ = (0.032 - 0.025)m =$ 0.007 MH^+

$HA \rightleftharpoons H^+ + A^-$

$[H^+] = [A^-] = 0.007$ M

$HA = 0.018$

$\therefore K_a = \dfrac{(0.007)^2}{0.018} = 3 \times 10^{-3}$

$pK_a = 2.5$

70 **(c)**

Given,

Weight of non-volatile solute,

w= 25 g

Weight of solvent, W=100 g

Lowering of vapour pressure,

$p^\circ - p_s = 0.225$ mm

Vapour pressure of pure solvent,

$p^\circ = 17.5$ mm

Molecular weight of solvent (H_2O), M=18 g

Molecular weight of solute, m=?

According to Raoult's law

$\dfrac{p^\circ - p_s}{p^\circ} = \dfrac{w \times M}{m \times W}$

$\dfrac{0.225}{17.5} = \dfrac{25 \times 18}{m \times 100}$

$m = \dfrac{25 \times 18 \times 17.5}{22.5}$

$= 350\ g$

71 **(b)**

Specific conductance = conductance × cell constant

$1.3\ \text{Sm}^{-1} = \dfrac{1}{50}\ \text{S} \times$ cell constant

∴ Cell constant

$= 1.3 \times 50\ \text{m}^{-1} = 65\ \text{m}^{-1} = (65/100)\text{cm}^{-1}$

Molar conductivity $= \dfrac{1000 \times \text{conductance} \times \text{cell constant}}{\text{molarity}}$

$= \dfrac{1000}{0.4} \times \dfrac{1}{260} \times \dfrac{65}{100} = 6.25\ \text{Scm}^2\text{mol}^{-1}$

$= 6.25 \times 10^{-4}\text{Sm}^2\text{mol}^{-1}$

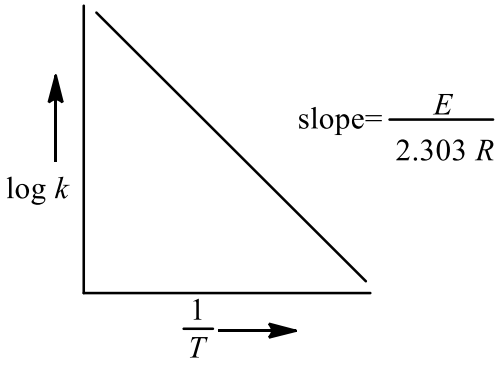
72 **(a)**

Arrhenius equation $k = Ae^{-\frac{E}{RT}}$

$\ln k = \ln A - \frac{E}{RT}$

or $\log k = \log A - \dfrac{E}{2.303\ RT}$

Hence, E is calculated with the help of slope of following.



73 **(a)**

For first order reaction the half-life period is

independent of the initial concentration of the reactants.

$t_{1/2} = \frac{0.693}{k}$

74 **(a)**

In heterogeneous catalysis the reactants and the catalyst are in different phases.

$$N_2(g) + 3H_2(g) \xrightleftharpoons{Fe\,(S),\ Mo} 2NH_3(g)$$

In the Haber's process the reactants are in gaseous phase while catalyst (Fe) in solid phase. Hence, it is an example of heterogeneous catalysis.

76 **(c)**

Chile salt petre ($NaNO_3$) is the nitrate ore of sodium

77 **(b)**

$2HClO_4 \rightarrow H_2O + Cl_2O_7$

78 **(d)**

The basic character of hydroxides decreases from $La(OH)_3$ to $Lu(OH)_3$. Due to smaller size of Lu, the Lu— OH bond attains more covalent character.

79 **(a)**

The ionisation energies increase with increasing atomic number. The trend is irregular among *d*-block elements.

Element	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
IE (kJ/mol^{-1})	631	656	650	652	717	762	758	736	745	905

$\therefore$ $Zn > Fe > Cu > Cr$ is correct order.

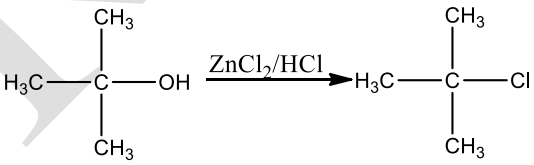
80 **(b)**

$K_2[PtCl_6]$

Potassium hexachloroplatinate (IV).

81 **(a)**

Tertiary alcohols readily react with Lucas reagent ($ZnCl_2$/conc. HCl) to give white turbidity due to the formation of halide.



82 **(d)**

By Williamson's synthesis, alkyl halide on reaction with sodium alkoxide gives ether.

C_2H_5Cl + C_2H_5ONa ⟶ $C_2H_5OC_2H_5$ + NaCl

ethyl chloride; sodium ethoxide; diethyl ether; sodium chloride

83 **(d)**

Peroxide will oxidise Fe^{2+} to Fe^{3+}which gives a blood red colour with KCNS.

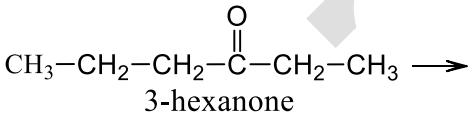
$O_2^{2-} + 2Fe^{2+} + 4H^+ \rightarrow 2Fe^{3+} + 2H_2O$

$Fe^{3+} + 3KCNS \rightarrow Fe(CNS)_3 + 3K^+$

(blood red colour)

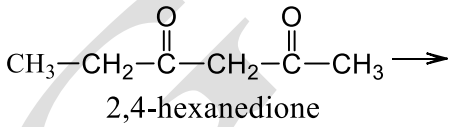
84 **(b)**

A compound that contains a $-CH_2-$ or $-CH-$group flanked by two electron-withdrawing group such as $>C=O$ group, becomes acidic compound and hydrogen atoms are called acidic hydrogen



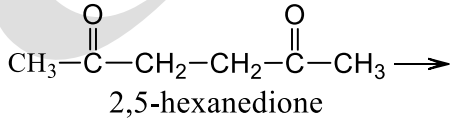
3-hexanone

contains no acidic hydrogen



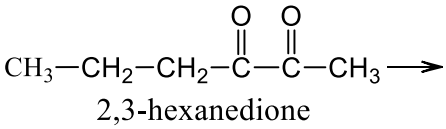
2,4-hexanedione

contains 2 acidic hydrogen



2,5-hexanedione

contains no acidic hydrogen

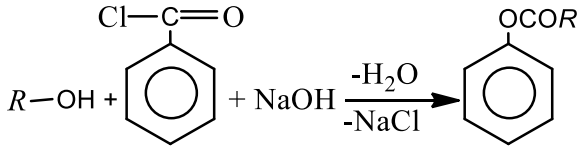


2,3-hexanedione

contains no acidic hydrogen

85 **(d)**

Compounds having active hydrogen such as, phenols, alcohols, primary or secondary amines and amides show Schotten-Baumann reaction. But tertiary amines do not have active hydrogen, hence, do not undergo Schotten-Baumann reaction.



86 **(a)**

Electrons donors are bases. Greater the stabilisation of cation formed by loss of electron more will be basicity of amine.

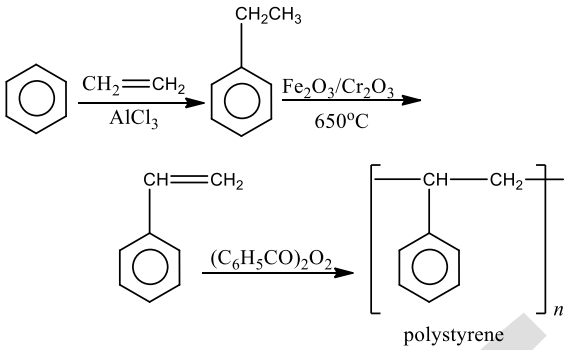
2° amine is more basic than 3° amine because 2° amine is stabilized by hydrogen bonding with solvent molecule.

87 **(c)**

Sucrose is the only naturally occurring disaccharide which is non-reducing

88 **(b)**
Since proteins, cellulose and RNA control various activities of plants and animals, they are called biopolymers.

89 **(c)**
Chain growth polymerization requires an initiator (such as organic peroxides) to produce a free radical to which the monomers are added in a chain fashion. Initiators are added in a very small quantities and are decomposed by heat, light or oxidation-reduction reaction to produce reactive species.*e,g.*, free radical.
Polystyrene is an example of chain growth polymer because in it styrene molecules are associated in the form of monomer.



91 **(c)**
Regeneration is a process in which a lost part of the body is recreated by the organism to became a new organism. It can be best observed in flatworm *Planaria*

92 **(a)**
Presence of visceral slits is exhibited by both Chordata and adult Tunicata members

93 **(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

94 **(a)**
Two French scientist **Jacob** and **Monod** (1961) proposed operon model for gene regulation in prokaryotes.

95 **(d)**
Muscarine poisoning is caused by *Amanita* varieties. Early symptoms after injection of this chemical, within two hours include increased respiration, salvation, nausea, vomiting, abnormal pair, thirst and mucous.

96 **(d)**
Agar-agar is obtained from *Gelidium* and *Gracilaria*. Agar-agar is used in solidifying laboratory culture media and is added as stabiliser or thickener in the preparation of jellies, puddings, creams, cheese, bakery, etc.

97 **(b)**
In angiospermic plant pollen grain reaches to embryo sac after its germination on stigma and through pollen tube

98 **(a)**
Cysticercus is the larval form of a tapeworm (*Taenia*), which grows into the adult when eaten by the primary host and consists of a scolex inverted into a larger bladder.

99 **(b)**
If a living *Hydra* is cut into two, three or more very small pieces, every piece develops into a new individual.

100 **(a)**
The number of cervical vertebrae are seven in almost all mammals including human beings.

102 **(a)**
Caryopsis is very small, dry and one-seeded fruit, which develops from a superior monocarpellary ovary. Here, the pericarp is closely fused with seed coat. It is characteristic of family-Gramineae, *e.g.*, wheat, rice, maize.

104 **(b)**
Trapa natans is a hydrophyte. It has **monarch** (one xylem strand) condition in slender root and spongy petioles.

105 **(b)**
Tyloses are found in heartwood. Sometimes, the xylem parenchyma develops balloon-like structure to which penetrates into the adjacent xylem. Vessels, which are called tyloses, blocks the lumen of the xylem.

106 **(d)**
Characteristic feature of stem is **endarch** condition of xylem tissue. In endarch, protoxylem is present towards the centre of stem, while metaxylem towards the pericycle. Characteristic feature of root is **exarch** condition of xylem tissue. In exarch condition, protoxylem is present towards the pericycle and metaxylem towards the center of the root.

107 **(a)**
A-Macrophages
B-Fibroblasts

C-Collagen fibres

108 **(a)**
In excretory system of the earthworm, integumentary nephridia, is attached to the lining of the body wall of segment 3 to the last that opens on the body surface. They discharge body waste to the exterior by nephridiopores

109 **(a)**
In prokaryotes, cell wall is present in bacteria and cyanobacteria. A cell wall is absent in mycoplasma or PPLO. Cell wall, if present, possesses muramic acid

110 **(b)**
The actual values of sedimentation coefficients of eukaryotic ribosomes are 79-80 S in fungi and 80 S in mammals. The sedimentation coefficients of two subunits is 40S (small) and 60S (large).

111 **(b)**
Pepsin is an extracellular enzyme

112 **(c)**
The covalent bond by which monosaccharide molecules link in polymerization is called a **glycosidic bond**. In a glycosidic linkage, the **aldehyde** or **ketone** part of one monosaccharide molecule condenses with an **alcoholic group** of another monosaccharide molecule, releasing a molecule of water.

113 **(c)**
I. The shortening and thickening of chromosome fibres occurs due to the two reason
Coming together of axial proteins and coiling or spiralisation of chromatin fibres. This is assisted by the proteins, called condensins
II. Sometimes, overlapping is shown by the elongated chromosome. Their ends are not visible. Therefore, the chromosomes appears like a ball of wool and this stage is called sprime stage
III. Animal cells generally have two centrosome or centriole pairs lying close together. These two centrides begins to move towards the opposite sides of the microtubules, surrounding each pair of centrioles (diplosome). It look like a star-shaped body called aster
IV. Shortening of chromosome during prophase is must for their equal distribution during anaphase. Each chromosome appears to have two longitudinal threads called chromatids or sister chromatids, attached to each other by means of a narrow point called centromere

114 **(a)**
G_1 is the longest period, which involves preparation for RNA and protein synthesis.

115 **(a)**
A-Final level B-Dotpin
C-Initial level D-Sugar solution
E-Potato tuber

116 **(c)**
Term DPD (Diffusion Pressure Deficit) was coined by Meyer

117 **(c)**
The net force with which water is drawn into cell or root hair is equal to difference of OP and TP and known as **diffusion pressure deficit** or **suction pressure**, i.e.,
SP or DPD=OP-TP.

118 **(d)**
Oxidised form.
Nitrogen is mainly absorbed in the form of nitrate from soil

119 **(c)**
Nitrogen fixation is the conversion of inert atmospheric nitrogen or dinitrogen (N_2) into utilizable compounds of nitrogen like nitrate, ammonia, amino acids, etc.

120 **(b)**
RuBP carboxylase oxygenase

121 **(a)**
The vertical section of leaves of C_3 and C_4 show differences. The C_4 leaves have particularly large cells around the vascular bundles of C_4 pathway plants called bundle sheath cells and the leaves which have such kind of anatomy are said to have 'Kranz-anatomy'. 'Kranz' means wreath and is reflection of arrangement of cells

122 **(b)**
Mitochondria are known as power house of cell. Glyceraldehyde-3-phosphate dehydrogenation reaction is found in cytoplasm during glycolysis, other three reactions take place in mitochondria.

123 **(a)**
In the first reaction of citric acid cycle one molecule of acetyl Co-A combines with 4-carbon Oxalo Acetic Acid (OAA) to form 6 carbon citric acid and Co-A is released

124 **(c)**
Auxin is synthesized in shoot apices, leaf primordia from amino acid tryptophan and cause apical dominance. NAA and 2, 4- D (both auxins) are employed for inducing flowering in litchi and

pineapple. Buds develop when cytokinins are in excess.

125 **(d)**
This first natural cytokinin was obtained from unripe maize **grains** or **kernels** by **Lenthanet al**. it is known as **zeatin** (6-hydroxy 3-methyl trans2-butenyl amino –purine). It also occurs in **coconunt milk.**

126 **(c)**
Germination of seeds especially in cereals is triggered by soaking the seeds in water. After imbibition of water, the embryo seretes **gibberellin** which diffuses into aleurone layer and stimulates synthesis of amylase, protease, and lipase enzyme. The enzymes solubilize the reserve food of the seed.

127 **(c)**
The wall of human gut consists of four basic layers. From periphery (outer) to centre (towards the lumen) they are, serosa or visceral peritonium → muscularis or muscular coat → submucosa → mucous membrane or mucosa

128 **(d)**
During prolonged hunger strike or starvation of food the reserve food (carbohydrates) is used up first by the body. Fats are used as second source of energy after carbohydrates. At last, when both carbohydrates and fats are used completely, proteins are used as a source of energy. Proteins are used at last because they are the main structural components of body

129 **(a)**
Dissociation curve of **haemoglobin** shows oxygen tension and % saturation of haemoglobin with oxygen. Normally dissociation curve is **sigmoid** or S-shaped.

130 **(c)**
Partial pressure of O_2 in alveoli and oxygenated blood are almost same. Alveoli has 104 mm of Hg, whereas oxygenated blood has 95 mm of Hg.

Percentage of gases in different parts of body

Air	Oxygen%	Carbon dioxide %	Nitrogen %	Water vapou
Inhaled Air	20.84	0.03-0.04	79	Varial
Alveolar Air	13.1	5.3	79	Satura
Exhaled Air	15.7	4.0	79.7	Satura

131 **(b)**
II, III, IV

132 **(a)**
In second step of blood coagulation, active thrombin changes fibrinogen to fibrin, which forms a meshwork of clot.

133 **(b)**
Green glands are excretory organs in **Arthropoda**. The **renal columns of Bertini** is the part of cortex continued inside medulla between pyramids.

134 **(d)**
In humans, the principal nitrogenous excretory compound (urea) is synthesised in liver by ornithine cycle. Urea is eliminated mostly through kidney as excretory product

135 **(a)**
Rennin is an enzyme which is released by Juxtaglomerular cells of kidneys when blood pressure becomes low. It plays an important role in reabsorption of sodium.

138 **(a)**
Ball and socket joint is a synovial joint (*i. e.*,movable joint) which is found in humerus in glenoid cavity and femur in acetabulum.

139 **(d)**
Brain acts as the command and control system and it controls the voluntary movements, balance of the body, functioning of vital involuntary organs (*e. g.*,lungs, heart, kidneys, etc.), thermoregulation, hunger and thrist, circadian (24-hours) rhythms of our body, activities of several endocrine glands and human behavior. It is the site for processing of vision, hearing, speech, memory, intelligence, emotions and thoughts

140 **(b)**
Preganglionic nerve fibres of III (oculomotor), VII (facial), IX (glossopharyngeal) and X (vagus) cranial nerves are a part of parasympathetic nervous system. V, VII, IX and X cranial nerves are mixed nerves.

141 **(c)**
Parathyroid gland is responsible for calcium metabolism. Its secretion regulates the amount of calcium and phosphate in ECF (extra cellular fluid).

142 **(b)**
The hormones which are proteinaceous in nature generally can't pass through the cell membrane. So, they generate the secondary messenger like (Ca^{2+}, IP_3) which regulate the further changes in

target cell

145 **(c)**
Ovule is the integumented indehiscent megasporangium, which develops as a small outgrowth from the tissue of placenta. It attached to placenta by a stalk called **funiculus**.

146 **(c)**
Endosperm Genotype Endosperm is formed by fusion of male gamet and polar nuclei so, the genotype of endosperm is ABB
Embryo Genotype Embryo is formed by fusion gametes ($1n$) of male and female. So, the embryo genotype is AB

147 **(a)**
True. Because huge pollen mass and feathery structure is the mark of wind pollinated pollen. These features are found in grass pollens

148 **(a)**
Oviduct has four regions, infundibulum, ampulla, isthmus, and uterine part. Ampulla is the long, wide, thin walled major part of the fallopian tube or oviduct. It lies next to the infundibulum and is a site for fertilization.

149 **(b)**
Ovulation is the release of the secondary oocyte from the ovary. In humans, ovulation occurs about 14 days before the onset of the next menstruation.

150 **(a)**
Oviducts are also called Fallopian tubes. These (two) terms are used interchangeability

151 **(c)**
Progesterone hormone is the main hormone, which maintains the endometrium wall.
Generally, menstrual cycle have four phases
(i) **Menstrual phase** (a) The soft tissue of endometrial lining of the uterus disintegrates causing bleeding.
(b) The unfertilized egg and soft tissue are discharged.
(c) It lasts 3-5 days.
(ii) **Follicular Phase/Proliferative Phase** (a) The primary follicles in the ovary grow and become a fully mature Graafian follicle.
(b) The endometrium of the uterus is regenerated due to the secretion of LH and FSH from anterior pituitary and ovarian hormone, estrogen.
(c) It least for about 10-14 days.
(iii) **Ovulatory Phase** (a) Rapid secretion of LH (LH surge) induces rupture of Graafian follicle, thereby leading to ovulation (release of ovum).
(b) It lasts for only about 48 hr.
(iv) **Luteal Phase/Secretor Phase** (a) In this phase the ruptured follicle changes into corpus luteum in the ovary and it begins to secrete the hormone progesterone.
(b) The endometrium thickens further and their glands secrete a fluid into the uterus.
c) If ovum is not fertilized, the corpus luteum undergoes degeneration and this causes disintegration of the endometrium leading to menstruation

152 **(b)**
ICCI - Intra Cytoplasmic Semen Injection

154 **(d)**
The persons suffering from Klinefelter's syndrome have normal external genitelia but internally testes are absent or reduced. Sparse body hair and gynecomastia (female like breast development) is also seen.

155 **(a)**
Some Examples of Aneuploidy
(i) **Down's syndrome**-21 trisomy
Symptoms
(a) Short statured with small round head
(b) Partially open mouth with protruding furrowed tongue
(c) Palm is broad with characteristic palm crease
(d) Slow mental development
(ii) **Turner's syndrome**
Cause Absence of one of the X-chromosomes, resulting in the karyotype 44+XO
Symptoms
(a) Sterile female with rudimentary ovaries
(b) Shield-shaped thorax
(c) Webbed neck
(d) Poor development of breasts
(e) Short stature, small uterus, puffy fingers
(iii) **Klinefelter's syndrome**
Cause Presence of an additional copy of X-chromosome resulting in the karyotype 44+XXY
Symptoms
(a) Sex of the individual is masculine but possess feminine characters
(b) Gynaecomastia, *i.e.*, development of breasts
(c) Poor beard growth and often sterile
(d) Feminine pitched voice

156 **(c)**
Inversions occur when there are two breaks in a chromosome and the intercalary segment

reunites in a reverse order by rotating at 180°.

157 **(a)**

*m*RNA ready for translation is free of introns because mature *m*RNA is free of introns due to splicing (removal of introns and joining of exons). Splicing is the distinguish character of eukaryotes

158 **(a)**

RNA is of two types

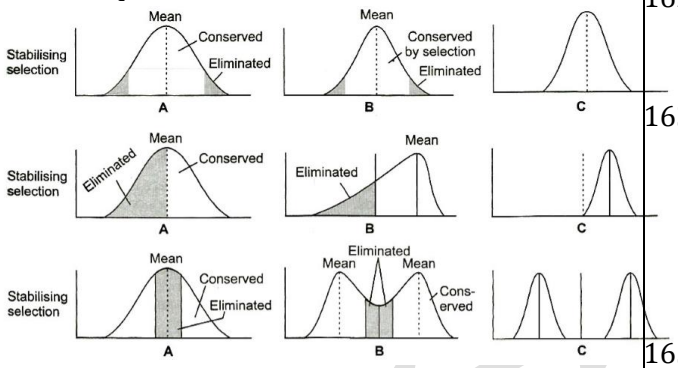
5. **Genetic RNA** It involved in transmission of characters through generation, *e.g.*, RNA virus.

6. **Non genetic RNA** It helps in protein synthesis called translation. These are of three type, *i.e.*, *t*RNA, *m*RNA and *r*RNA

159 **(c)**

Both (a) and (b).

Selection process in natural selection are



(i) **Stabilizing Selection** (Balancing selections)
This type of selection favours average sized individuals, while eliminates small sized individuals. It reduces variation and hence, do not promote evolutionary changes. It maintains the mean value from generation to generation. If we draw a graphical curve of population, it is bell-shaped

(ii) **Directional Selection** (Progressive Selection)
In this selection, the population changes towards one particular direction. It means this type of selection favours small or large-sized individuals and more individuals of that type will be present in new generation. The mean size of the population changes

(iii) **Disruptive Selection** (Diversifying selection)
This type of selection favours both small-sized and large-sized individuals. It eliminates most of the members with mean expression, so as to produce two peaks in the distribution of the trait that may lead to the development of two different populations. This kind of selection is opposite of stabilizing selection and is rare nature but is very important in bringing about evolutionary changes

160 **(c)**

Although evolutionary changes within most species is thought to occur slowly, recent studies have identified the cases where evolutionary change has apparently occurred over a few generations. Anthropogenically altered environments appears particularly open to the rapid evolutionary changes over comparatively short time scales. Here, we consider a Pacific salmon population that may have experienced life-history evolution, in response to habitat alteration, within a few generations

161 **(d)**

Sterilization techniques of birth control are considered safest as these protect from infection also.

162 **(a)**

The circulation of the blood in the body was discovered by **William Harvey**

163 **(a)**

Ascariasis is caused by an intestinal endoparasite or human. '*Ascaris lumbricoides*', commonly called roundworm.

Filariasis is caused by filarial worms, *Wuchereria bancrofti* and *Wuchereria malayi*

165 **(d)**

Ranikhet disease is a common viral disease in poultry. Foot and mouth disease is a common viral disease in cattles. Anthrax is also found in cattles. Pebrine is a protozoan disease of silkworms

166 **(b)**

Triticum aestivum is hexaploid with $2n = 42$.

167 **(b)**

Biogas is methane rich fuel gas produced through anaerobic breakdown and fermentation of biomass. It contains 50-70% CH_4, 30-40% CO_2 and trace of H_2, H_2S andN_2. Whereas producer gas mainly contains CO, H_2, andN_2.

168 **(c)**

Both are true, *Ori* also controls the copy numbers of the linked DNA

If a foreign DNA ligates at the *Bam* HI site tetracycline resistance gene in the vector pBR322, the recombinant plasmid loses the tetracycline

170 **(d)**

The technique of fingerprinting was initially developed by **Alec Jeffreys**. He used a satellite

DNA as probe that shows very high degree of polymorphisms. It was called as Variable Number of Tandem Repeats (VNTR).

171 **(a)**
The bacterium *Bacillus thuringiensis* is widely used in contemporary biology as insecticide

172 **(b)**
Probe are 15-30 bases long radioactively labelled oligonucleotieds (RNA or DNA) used to detect complementary nucleotide sequences, used for disease diagnosis, etc.

173 **(b)**
In 1981, the r value for human population in India was 0.0205. To find out the value of r we need to know the birth and death rates

174 **(b)**
In **commensalism,** association between members of different species is made in the way that one is benefitted and neither is harmed, e. g., small fish (sucker fish) gets stuck near the bottom of a shark with the help of its holdfast (modified dorsal fin) vand is dispersed to distant areas. It also gets protection (due to association with shark) and derives its nutrition also. However, the shark does not get any benefit or harm from the sucker fish.

176 **(d)**
Factor affecting primary productivity are as follows
(i) Plant species inhabiting a particular area
(ii) Environmental factors

7. **Sunlight** The sunlight directly regulates the primary productivity because the plants perform photosynthesis with the of sunlight. As trophic region receives maximum sunlight, so it exhibits higher productivity

8. **Temperature** Temperature regulates the activity of enzyme. So, optimum temperature is required for proper functioning of enzymes

9. **Moisture** Rain (humidity) is required for higher primary productivity. Deserts have the lowest primary productivity as the soil is deficient in moisture

10. **Availability of Nutrients** Greater nutrients ensures the greater primary productivity

11. Photosynthetic Efficiency Some plants have more efficiency to trap the sunlight (sugar cane), so they accumulate more primary productivity

177 **(d)**
Lime is used as a chemical fertilizer. It is quite alkaline hence, can be added to the soil which is too acidic.

178 **(d)**

Column I	Column II
Rhinoceros	Kaziranga
Tiger project in Karnataka	Bandipur
Assemblage protection	Bharatpur
Silent valley	Tropical evergreen forest

179 **(d)**
CFFs, CO_2, CH_4, NO_2 are greenhouse gases. The phenomenon of keeping the earth warm due to presence of these gases in the atmosphere is called greenhouse effect

180 **(b)**
Automobiles burn petroleum inefficiently causing 80% of air pollution and 75% of noise pollution. Automobile exhausts consists of hydrocarbon (13.7%), carbon monoxide (77.2%),nitrogen oxides (7.7%), sulphur oxides, ammonia, aldehydes and lead (90% of total lead poisoning). Lead is present in the form of Pb $(CH_3)_4$and $(C_2H_5)_4$as anti-knock agent in automobiles exhaust. It interferes with oxygen and glucose metabolism, haeme synthesis and damages the vital organs of body.