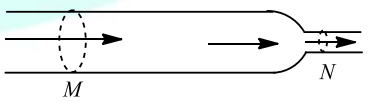
Meritstore

NEET

TEST code: 02

Time : 03:00:00 **Marks :** 720

1. Electron $volt$ is a unit of
   a) Charge b) Potential difference
   c) Momentum d) Energy
2. If C be the capacitance and V be the electric potential, then the dimensional formula of CV^2 is
   a) $[ML^{-3}TA]$ b) $[K^0LT^{-2}A^0]$
   c) $[ML^1T^{-2}A^{-1}]$ d) $[ML^2T^{-2}A^0]$
3. Two bodies being a free fall from rest, from the same height 2s apart. How long after the first body begins to fall the two bodies will be 40m apart? (Take $g = 10ms^{-2}$)
   a) 1 s b) 2 s c) 3 s d) 4 s
4. If retardation produced by air resistance of projectile is one-tenth of acceleration due to gravity, the time to reach maximum height
   a) Decreases by 11 percent
   b) Increases by 11 percent
   c) Decreases by 9 percent
   d) Increases by 9 percent
5. A particle rests on the top of a hemisphere of radius R. Find the smallest horizontal velocity that must be imparted to the particle if it is to leave the hemisphere without sliding down it
   a) $\sqrt{g\,R}$ b) $\sqrt{2g\,R}$ c) $\sqrt{3g\,R}$ d) $\sqrt{5g\,R}$
6. Force of 4 N is applied on a body of mass 20 kg. The work done in 3rd second is
   a) 2 J b) 4 J c) 16 J d) 1.2 J
7. A stationary bomb explodes into three pieces. One piece of 2 kg mass moves with a velocity of 8 ms^{-1}at right angles to the other pieces of mass 1 kg moving with a velocity of 12 ms^{-1}. If the mass of the third piece is 0.5 kg, then its velocity is
   a) 10 ms^{-1} b) 20 ms^{-1} c) 30 ms^{-1} d) 40 ms^{-1}
8. A ball of mass m moving with velocity V, makes a head on elastic collision with a ball of the same mass moving with velocity $2V$ towards it. Taking direction of V as positive velocities of the two balls after collision are
   a) $-V$ and $2V$ b) $2V$ and $-V$
   c) V and $-2V$ d) $-2V$ and V
9. If the angular momentum of a rotating body about a fixed axis is increased by 10%. Its kinetic energy will be increased by
   a) 10% b) 20% c) 21% d) 5%
10. A shell is fired from a cannon with a velocity v at an angle θ with the horizontal direction. At the highest point in its path, it explodes into two pieces, one retraces its path to the cannon and the speed of the other piece immediately after the explosion is
    a) $3v\ cos\ cos\ \theta$ b) $2v\ cos\ cos\ \theta$
    c) $\left(\frac{3}{2}\right)v\ cos\ cos\ \theta$ d) $\left(\frac{\sqrt{3}}{2}\right)v\ cos\ cos\ \theta$
11. When earth moves around the sun, the quantity which remains constant is
    a) Angular velocity b) Kinetic energy
    c) Potential energy d) Areal velocity
12. A wire of length 50 cm and cross sectional area of 1 $sq.mm$ is extended by 1 mm. The required work will be ($Y = 2 \times 10^{10} Nm^{-2}$)
    a) $6 \times 10^{-2}\ J$ b) $4 \times 10^{-2}\ J$
    c) $2 \times 10^{-2}\ J$ d) $1 \times 10^{-2}\ J$
13. Horizontal tube of non-uniform cross-section has radii of 0.1 m and 0.05 m respectively at M and N. For a streamline flow of liquid the rate of liquid flow is

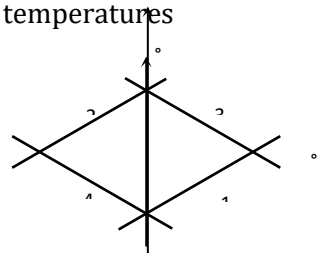


    a) Changing continuously with time
    b) Greater at M than N
    c) Greater at N than at M
    d) Same at M and N
14. A vessel contains oil (density0.8 gcc^{-1}) over mercury (density13.6 gcc^{-1}). A homogeneous sphere floats with half its volume immersed in

mercury and the other half in oil. The density of the material of the sphere in gcc^{-1} is

a) 3 b) 6.4 c) 7.2 d) 12.8

15. Which of the curves in figure represents the relation between Celsius and Fahrenheit temperatures



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

16. When two moles of oxygen is heated from $0°C - 10°C$ at constant volume, its internal energy changes by 420 J. What is the molar specific heat of oxygen at constant volume?

a) $5.75\ JK^{-1}mol^{-1}$ b) $10.5\ JK^{-1}mol^{-1}$

c) $21\ JK^{-1}\ mol^{-1}$ d) $42\ JK^{-1}mol^{-1}$

17. A system performs work ΔW when an amount of heat is ΔQ added to the system, the corresponding change in the internal energy is ΔU. A unique function of the initial and final states (irrespective of the mode of change) is

a) ΔQ b) ΔW

c) ΔU and ΔQ d) ΔU

18. A liquid is filled in a container which is kept in a room whose temperature is 20°C. When temperature of liquid is 80°C it emits heat at the rate of 45 $cals^{-1}$. When temperature liquid falls to 40°C, its rate of heat loose will be

a) 15 $cals^{-1}$ b) 30 $cals^{-1}$ c) 45 $cals^{-1}$ d) 60 $cals^{-1}$

19. The displacement y of a particle executing periodic motion is given by $y = 4(t/2)\ sin\ sin\ (1000t)$. This expression may be considered to be a result of the superposition of…..... independent harmonic motions

a) Two b) Three c) Four d) Five

20. A girl swings on cradle in a sitting position. If she stands what happens to the time period of girl and cradle?

a) Time period decreases
b) Time period increases
c) Remains constant
d) First increases and then remains constant

21. A source of sound of frequency 256 Hz is moving towards a wall with a velocity of $5ms^{-1}$. Velocity of sound is$330ms^{-1}$.The number of beats s^{-1} heard by an observer standing between the source and the wall is nearly

a) $\frac{256 \times 330}{325} - \frac{256 \times 330}{325}$

b) $256 - \frac{256 \times 330}{325}$

c) $\frac{256 \times 330}{325} \times \frac{256 \times 330}{335}$

d) $\frac{256 \times 330}{325} - 256$

22. Consider a neutral conducting sphere. A positive point charge is placed outside the sphere. The net charge on the sphere is then

a) Negative and distributed uniformly over the surface of the sphere
b) Negative and appears only at the point on the sphere closest to the point charge
c) Negative and distributed non-uniformly over the entire surface of the sphere
d) Zero

23. When a lamp is connected in series with capacitor, then

a) Lamp will not glow
b) Lamp will burst out
c) Lamp will glow normally
d) None of these

24. When two conductors of charges and potentials $C_1, V_1 and C_2, V_2$ respectively are joined, the common potential will be

a) $\frac{C_1V_1 + C_2V_2}{V_1 + V_2}$ b) $\frac{C_1V_1^2 + C_2V_2^2}{V_1^2 + V_2^2}$

c) $C_1 + C_2$ d) $\frac{C_1V_1 + C_2V_2}{C_1 + C_2}$

25. Which of the following statement is correct

a) Electric field is zero on the surface of current carrying wire
b) Electric field is non-zero on the axis of hollow current carrying wire
c) Surface integral of magnetic field for any closed surface is equal to μ_0 times of total algebraic sum of current which are crossing through the closed surface
d) None

26. A storage cell is charged by 5 amp D.C. for 18 $hours$. Its strength after charging will be
a) 18 AH b) 5 AH c) 90 AH d) 15 AH

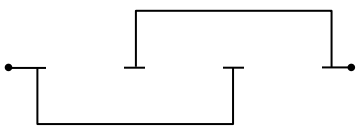
27. The temperature at which thermoemf is zero, is
a) Temperature of inversion
b) Temperature of cold junction
c) Neutral temperature
d) None of the above

28. If same current I passing through two parallel wires separated by a distance b, then force per unit length will be
a) $\frac{\mu_0}{4\pi}\frac{2I^2}{b}$ b) $\frac{\mu_0 I}{4\pi b^2}$ c) $\frac{\mu_0 I^2}{4\pi b^2}$ d) $\frac{\mu_0 I^2}{4\pi b}$

29. The value of the horizontal component of the earth's magnetic field and angle of dip are $1.8 \times 10^{-5} weber/m^2$ and 30° respectively at some place. The total intensity of earth's magnetic field at that place will be
a) $2.08 \times 10^{-5} weber/m^2$
b) $3.67 \times 10^{-5} weber/m^2$
c) $3.18 \times 10^{-5} weber/m^2$
d) $5.0 \times 10^{-5} weber/m^2$

30. Two identical short bar magnets, each having magnetic moment of 10 Am^2, are arranged such that their axial lines are perpendicular to each other and their centres be along the same straight line in a horizontal plane. If the distance between their centres is 0.2 m, the resultant magnetic induction at a point midway between them is
$(\mu_0 = 4\pi \times 10^{-7} Hm^{-1})$
a) $\sqrt{2} \times 10^{-7} tesla$ b) $\sqrt{5} \times 10^{-7} tesla$
c) $\sqrt{2} \times 10^{-3} tesla$ d) $\sqrt{5} \times 10^{-3} tesla$

31. Pure inductance of 3.0 H is connected as shown below. The equivalent inductance of the circuit is



a) 1 H b) 2 H c) 3 H d) 9 H

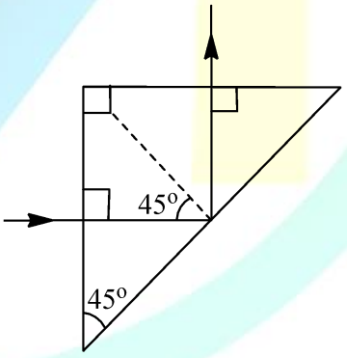
32. In ac circuit of capacitance the current from potential is
a) Forward
b) Backward
c) Both are in the same phase
d) None of these

33. The phase difference between the alternating current and emfis $\pi/2$. Which of the following cannot be the constituent of the circuit?
a) Calone b) R,L c) L,C d) L alone

34. The electric field of plane electromagnetic wave in vacuum is represented by $\vec{E}_x = 0; \vec{E}_y = 0.5\ cos\ cos\ [2\pi \times 10^8 (t - x/c)]: \vec{E}_z = 0$
What is the direction of propagation of electromagnetic waves?
a) Along $x - z$ direction
b) Along y-direction
c) Along x-direction
d) A long $y - z$ direction

35. A point object is placed at a distance of 30 cm from a convex mirror of a focal length 30 cm. The image will form at
a) Infinity
b) Pole
c) 15 cm behind the mirror
d) No image will be formed

36. A light ray is incident perpendicular to one face of a 90° prism and is totally internally reflected at the glass-air interface. If the angle of reflection is 45°, we conclude that the refractive index n



a) $n < \frac{1}{\sqrt{2}}$ b) $n > \sqrt{2}$ c) $n > \frac{1}{\sqrt{2}}$ d) $n < \sqrt{2}$

37. A light source approaches the observer with velocity 0.8 c. The Doppler shift for the light of wavelength 5500Å is
a) 4400 Å b) 1833 Å c) 3167 Å d) 7333 Å

38. The speed of an electron having a wavelength of $10^{-10} m$ is
a) $7.25 \times 10^6 m/s$ b) $6.26 \times 10^6 m/s$

c) $5.25 \times 10^6 m/s$ d) $4.24 \times 10^6 m/s$

39. According to Mosely's law, the frequency of a spectral line in X-ray spectrum varies as
a) Atomic number of the element
b) Square of the atomic number of the element
c) Square ropot of the atomic number of the element
d) Fourth power of the atomic number of the element

40. Which of the following lines of the H-atom spectrum belongs to the Balmer series?
a) 1025 Å b) 1218 Å
c) 4861 Å d) 18751 Å

41. The nuclear reactor at Kaiga is a
a) Research reactor b) Fusion reactor
c) Breeder reactor d) Power reactor

42. A nucleus decays by β^+-emission followed by a$\gamma - emission$. If the atomic and mass numbers of the parent nucleus are Z and A respectively, the corresponding numbers for the daughter nucleus are respectively
a) $Z-1$ and $A-1$ b) $Z+1$ and A
c) $Z-1$ and A d) $Z+1$ and $A-1$

43. Following is the relation between current and charge $I = AT^2 e^{q/V_L}$, then value of V_L will be
a) $\frac{V}{kt}$ b) $\frac{kV}{T}$ c) $\frac{kT}{V}$ d) $\frac{VT}{k}$

44. An antenna is a device
a) That convert electromagnetic energy into radio frequency signal
b) That converts radio frequency signal into electromagnetic energy
c) That converts guided electromagnetic waves into free space electromagnetic waves and vice-versa
d) None of these

45. Which fibers are less expensive and simple to construct?
a) Single-mode step index fiber
b) Multi-mode step index fiber
c) Multi graded index fiber
d) All are equally expensive

46. Weight of an atom of an element is $6.644 \times 10^{-23}\ g$. What will be the number of g atom of that element in 40 kg?
a) 10^3 b) 10^6
c) 1.5×10^3 d) None of these

47. 80 g of oxygen contains as many atoms as in
a) 80 g of hydrogen b) 1 g of hydrogen
c) 10 g of hydrogen d) 5 g of hydrogen

48. Choose the incorrect relation on the basis of Bohr's theory
a) Velocity of electron $\propto \frac{1}{n}$
b) Frequency of revolution $\propto \frac{1}{n^2}$
c) Radius of orbit $\propto n^2 Z$
d) Force on electron $\propto \frac{1}{n^4}$

49. The lightest particle is
a) -particle b) Positron
c) Proton d) Neutron

50. Which of the following oxides is most basic?
a) Na_2O b) SiO_2
c) SO_2 d) All are equally basic

51. From elementary molecular orbital theory we can give the electronic configuration of the singly positive nitrogen molecular ion N_2^+ as
a) $l\sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \pi 2p^4, \sigma 2p^1$
b) $\sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \sigma 2p^2, \pi 2p^3$
c) $\sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \sigma 2p^3, \pi 2p^2$
d) $\sigma 1s^2, \sigma^* 1s^2, \sigma 2s^2, \sigma^* 2s^2, \sigma 2p^2, \pi 2p^4$

52. The number of π- bonds present in propyne is
a) 4 b) 1
c) 3 d) 2

53. Identify the pair of gases that have equal rates of diffusion
a) CO, NO b) N_2O, CO
c) N_2O, CO_2 d) CO_2, NO_2

54. The enthalpy of combustion of H_2, cyclohexane (C_6H_{10}) and cyclohexane (C_6H_{12}) are $-241, -3800$ and -3920 kJ per mol respectively. Heat of hydrogenation of cyclohexane is
a) 121 kJ/mol b) -121 kJ/mol
c) $+242$ kJ/mol d) -242 kJ/mol

55. A gas can expand from 100 mL to 250 mL under a constant pressure of 2 atm. The work done by gas is
a) 30.38 J b) 25 J c) 5 kg J d) 16 J

56. In the reaction, $N_2O_4 \rightleftharpoons 2NO_2$, α is that part of N_2O_4 which dissociates, then the number of moles at equilibrium will be
a) 1 b) 3
c) $(1+\alpha)$ d) $(1-\alpha)^2$

57. The oxidation state of two sulphur atoms in $H_2S_2O_8$
a) -6 b) -2 c) $+6$ d) -4

58. In the conversion of Br_2 to BrO_3^-, the oxidation number of Br changes from
a) Zero to $+5$ b) $+1$ to $+5$
c) Zero to -3 d) $+2$ to $+5$

59. On shaking H_2O_2 with acidified potassium dichromate and ether, ethereal layer becomes
a) Green b) Red c) Blue d) Brown

60. The most electropositive element in alkali metals, is
a) Na b) K c) Rb d) Cs

61. Buckminster fullerene is
a) Pure graphite b) C-60
c) Diamond d) C-90

62. Aluminium vessels should not be washed with materials containing washing soda since
a) Washing soda reacts with aluminium to form soluble aluminate
b) Washing soda reacts with aluminium to form insoluble aluminium oxide
c) Washing soda is expensive
d) Washing soda is easily decomposed

63. A molecule having three different chiral carbon atoms, how many stereoisomers it will have?
a) 8
b) 3
c) 9
d) 6

64. In the sequence of reactions,
$C_2H_4\ HBr \rightarrow X\ AgCN \rightarrow Y\ (H) \rightarrow {}_{H_2/Ni}Z$,
Compound Z is
a) N-methyl ethanamine
b) N-propylamine
c) N, N-dimethylamine
d) Ethyl cyanide

65. $CH_3 - CH_2 - C \equiv CH \quad HgSO_4 \rightarrow {}_{H_2SO_4} A$

The compound A is
a) $CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - CH_3$
b) $CH_3 - CH_2 - CH_2 - CHO$
c) $CH_3 - CH_2 - CH_2 - COOH$
d) None of the above

66. Which of the following statements is not true?
a) Ammonia acts as sink for NO_x
b) Limestone acts as sink for SO_x
c) The average residence time of NO is one month
d) SO_x can be removed from flue gases by passing through a solution of citrate ions

67. Which is not the correct statement for ionic solids in which positive and negative ions are held by strong electrostatic attractive forces?
a) The radius r^+/r^- increases as coordination number increases
b) As the difference in size of ions increases, coordination number increases
c) When coordination number is eight, the r^+/r^- ratio lies between 0.225 to 0.414
d) In ionic solid of the type $AX(ZnS, Wurtzite)$, the coordination number of Zn^{2+} and S^{2-} respectively are 4 and 4

68. The ionic radii of Rb^+ and I^- are1.46 Å and 2.16 Å. The most probable type of structure exhibited by it is
a) $CsCl$ type b) ZnS type
c) $NaCl$ type d) CaF_2 type

69. The relative lowering of vapour pressure of a dilute aqueous solution containing non-volatile solute is 0.0125. The molality of the solution is about
a) 0.70 b) 0.50 c) 0.90 d) 0.80

70. If sodium sulphate is considered to be completely dissociated into cations and anions in aqueous solution, the change in freezing point of water (ΔT_f), when 0.01 mole of sodium sulphate is dissolved in 1 kg of water, is ($k_f = 1.86\ Kkg\ mol^{-1}$)
a) 0.0372 K b) 0.0558 K
c) 0.0744 L d) 0.0186 K

71. On passing 0.1 F of electricity through aluminium metal deposited at cathode is (Al = 27)
a) 0.3 g b) 0.6 g c) 0.9 g d) 1.2 g

72. The half-life period for a first order reaction is 693 s. The rate constant of this reaction would be

a) $0.1\ s^{-1}$ b) $0.01\ s^{-1}$

c) $0.001\ s^{-1}$ d) $0.0001\ s^{-1}$

73. For the reaction system $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$ if the volume of the reaction vessel is reduced to one-third of its original volume, what will be the order of the reaction?

a) Diminished to one fourth of its initial value
b) Diminished to one twenty seven of its initial value
c) Increase to twenty seven times of its initial value
d) Increase to four times of its initial value

74. A catalyst

a) Lowers the activation energy
b) Changes the rate constant
c) Changes the product
d) Itself destroys in the reaction

75. Which of the following is correct?

a) Tin stone is magnetic in nature
b) Wolframite is non-magnetic in nature
c) Wolframeite is $FeWO_4$
d) Cassiterite and rutile are sulphides ore

76. Naturally occurring substances from which a metal can be profitably (or economically) extracted are called

a) Ores b) Mineral
c) Salts d) Gangue

77. Which one of the following statements regarding helium is incorrect?

a) Is is used to fill gas balloons instead of hydrogen because it is lighter and non-inflammable
b) It is used as a cryogenic agent for carrying out experiments at low temperatures.
c) It is used to produce and sustain powerful superconducting magnets
d) It is used in gas cooled nuclear reactors.

78. The magnetic moment (in BM) of Zn^{2+}ion according to spin-only formula is

a) Zero b) 1.73 c) 2.84 d) 3.87

79. Which of the following compounds volatilises on heating?

a) $MgCl_2$ b) $HgCl_2$ c) $CaCl_2$ d) $FeCl_3$

80. Two isomers X and Y with the formula $Cr(H_2O)_5ClBr_2$ were taken for experiment on depression in freezing point. It was found that one mole of X gave depression corresponding to 2 moles of particles and one mole of Y gave depression due to 3 moles of particles. The structural formula of X and Y respectively, are

a) $[Cr(H_2O)_5Cl]Br_2; [Cr(H_2O)_4Br_2]Cl.H_2O$

b) $[Cr(H_2O)_5Cl]Br_2; [Cr(H_2O)_3ClBr_2].2H_2O]$

c) $[Cr(H_2O)_5Br]BrCl; [Cr(H_2O)_4ClBr]Br.H_2O$

d) $[Cr(H_2O)_4Br_2]ClH_2O; [Cr(H_2O)_5Cl]Br_2$

81. Chloroform gives a trichloro derivative of an alcohol on reaction with

a) conc. nitric acid
b) aq. alkali
c) acetone and alkali
d) a primary amine and an alkali

82. Phenol, p-methylphenol, m-nitrophenol and p-nitrophenol follows order of increasing strength as

a) Phenol, p-methylphenol, p-nitrophenol, m-nitrophenol
b) p-methylphenol, pheol,m-nitrophenol,p-nitrophenol
c) p-methylphenol,m-nitrophenol, phenol, p-nitrophenol
d) m-nitrophenol, p-nitrophenol, phenol, p-methylphenol

83. In the reaction,

$$CH_3-\underset{\displaystyle OH}{\overset{\displaystyle CH_3}{\overset{|}{C}}}-\underset{\displaystyle OH}{\overset{\displaystyle CH_2}{\overset{|}{C}}} \quad Conc.H_2SO_4 \rightarrow A$$

the product A is

a) $CH_3-C=CH_2$ b) $CH_3-C=C-CH_3$

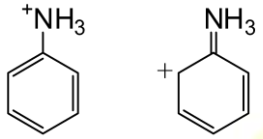
c) $CH_3-CH_2-C=O$ d) $CH_3-CH-CHO$

84. $CH_3CH{=}CH_2 + CO + H_2O \xrightarrow[675\ K]{H_3PO_4} CH_3{-}\underset{\displaystyle CH_3}{\underset{|}{CH}}{-}COOH$

This reaction is called

a) The Stevens reaction
b) The carbonylationreactionc
c) The Koch reaction
d) Oxidation

85. Examine the following two structures for the anilinium ion and choose the correct statement from the ones given below



(I) (II)

a) II is not acceptable as canonical structure because carbonium ions are less stable than ammonium ions
b) II is not an acceptable canonical structure because it is non-aromatic
c) II is not an acceptable canonical structure because in it N has 10 valence electrons
d) II is an acceptable as canonical structure

86. Amino group is *ortho/para*-directing for aromatic electrophilic substitution. On nitration of aniline, a good amount of *m*-nitroaniline is obtained. This is due to

a) In nitration mixture, *ortho, para*-activity of NH_2 group is completely lost
b) $-NH_2$ because – NH_3^+, which is m-directing
c) $-NH_2$ becomes – $NH^+SO_4^-$, which is *m*-directing
d) $-NH_2$ becomes – $NH^-NO_2^+$, which is *m*-directing

87. A distinctive and characteristics functional group of fats is

a) A peptide group b) An ester group
c) An alcoholic group d) A ketonic group

88. In which of the following polymers, empirical formula resembles with monomer?

a) Bakelite b) Teflon
c) Nylon-6,6 d) Dacron

89. Which of the following has been used in the manufacture of non-inflammable photographic films?

a) Cellulose nitrate
b) Cellulose xanthate
c) Cellulose perchlorate
d) Cellulose acetate

90. Which one of the following types of drugs reduces fever?

a) Tranquiliser b) Antibiotic
c) Antipyretic d) Analgesic

91. 'Ordines Anomali' of Bentham and Hooker includes

a) Seed plants showing abnormal forms of growth and development
b) Plants represented only in fossil state
c) Plants described in the literature but which Bentham and Hooker did not see in original
d) A few orders which could not be placed satisfactorily in the classification

92. Species are consider as

a) Artificial concept of human mind which cannot be defined in absolute terms
b) Real units of classification devised by taxonomists
c) Real basic units of classification
d) The lowest units of classification

93. The concept of genus was proposed by

a) John Ray b) Tourne Fort
c) Hooker d) Bessey

94. On the basis of their shape, bacteria are grouped under…categories

a) Three b) Four c) Five d) Six

95. ds RNA is found in

a) Reovirus b) TMV
c) $\phi \times 174$ d) None of these

96. The bryophytes are divided into

a) Mosses and liverworts b) Ferns and liverworts
c) Mosses and horse tails d) Ferns and horse tails

97. Kingdom-Plantae includes

a) Algae, bryophytes and pteridophytes b) Algae, bryophytes, pteridophytes, gymnosperms and angiosperms
c) Algae, fungi, peteridophytes, gymnosperms and angiosperms d) Algae, pteridophytes, gymnosperms and angiosperms

98. Skeletal system in echinoderms is

a) Formed by the distension of the water vascular system b) Calcareous exoskeleton
c) Siliceous endoskeleton d) None of the above

99. The function of clitellum in *Pheretima* is

a) Formation of cocoon

b) Secretion of hormone
c) Nutrition of sperm
d) Respiration

100. Which of the following statements are true (T) and which are false (F)? Choose the correct option
I. Amphibians have metanephric kidneys
II. The skull of mammals is dicondylic
III. Aves copulate by cloacal apposition
IV. Voice is produced in Aves by a syrinx
V. Lepus is gregarious in nature
a) II, IV and V are true, I and III are false
b) II, III and IV are true, I and V are false
c) II and V are true, I, II and V are false
d) I, II and V are true, III and IV are false

101. The triploid number of chromosomes of the first taxon in 10 times more than the haploid number of chromosomes of the second taxon, while the diploid number of the third taxon is six time more than the haploid number of the fourth taxon. Which one of the following shows the ascending order of the number of chromosomes in their respective endosperm?
a) Oryza-Allium-Saccharum-Nicotiana
b) Allium-Oryza-Nicotiana-Saccharum
c) Nicotiana-Saccharum-Oryza-Allium
d) Saccharum-Oryza-Nicotiana-Allium

102. Green leaf-like modified aerial stems/branches with a single internode are called
a) Phylloclades
b) Phyllodes
c) Bulbils
d) Cladodes

103. Match the following pairs.

1.	Polysiphonous Pollen plate	– Floral bectaries	-Simple sieve
2.	Angular collocyte Synandry	-Monosiphonous Pollen	-
3.	Inserted stamens	-Simple leaves	-Spines
4.	Exerted stamens	-Reticulate divergent venation	-Pepo

select the correct pair of answers, in which the former in the pair shows the set of characters presents in *Cucurbita* and the latter in the pair shows the set of character absent in Acacia.
a) I and III
b) I and II
c) II and III
d) III and IV

104. Triticale is a hybrid formed from the members belonging to the following families
a) Brassicaceae and Poaceae
b) Poaceae and Poaceae
c) Poaceae and Fabaceae
d) Alismaceae and Poaceae

105. The roots of angiosperms show exarch xylem and their stems have endarch bundles. These are continuous throughout the change occurs in
a) Epicotyl region
b) Hypocotyl region
c) Upper part of root
d) Lower part of stem

106. The merismatic tissue responsible for the cutting of vascular tissue (xylem and phloem) is called
a) Cork cambium
b) Vascular cambium
c) Lateral meristem
d) Endodermis

107. Which of the following tissue forms the epidermis of the skin in land vertebrates?
a) None-keratinised stratified squamous epithelium
b) Keratinised stratified squamous epithelium
c) Stratified ciliated columnar epithelium
d) Stratified cuboidal epithelium

108. The …… is a straight tube which runs between the first to last segment of the earthworm's body
a) Pharynx
b) Intestine
c) Stomach
d) Alimentary canal

109. Within the nucleus DNA is organised along with proteins into material called
a) Nuclear lamina
b) Chromatin
c) Chromosome
d) Chromatid

110. The process of removal of introns and joining of exons in called
a) Capping
b) Tailing
c) Termination
d) Splicing

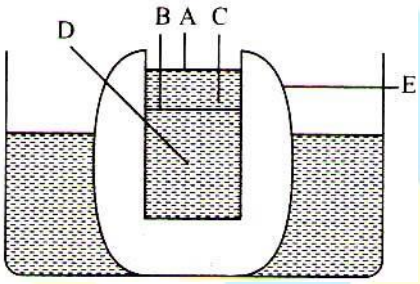
111. Cellulose is made up of
a) Branched chain of glucose molecule linked by $\alpha - 1, 4$ glycosidic bond in straight chain and $\beta - 1, 6$ glycosidic bond at the site of branching
b) Branched chain of glucose molecule linked by $\alpha - 1, 6$ glycosidic bond in straight chain and β-1, 4 glycosidic bond at the site of branching
c) Unbranched chain of glucose molecule linked by β-1, 4 glycosidic bond
d) Unbranched chain of glucose molecule linked by α-1, 6 glycosidic bond

112. An enzyme extract when subjected to electric field, separates into two fractions each catalyzing the same reaction. These fractions are
a) Allosteric enzymes b) Isoenzymes
c) Inducible enzymes d) Coenzymes

113. At which stage of cell cycle colchicine arrests the spindle?
a) Anaphase
b) Prophase
c) Telophase
d) Interphase

114. Recombination is involved in the process of
a) Cytokinesis
b) Spindle formation
c) Crossing over
d) Chromosome duplication

115. Choose the correct combination of labeling of the potato osmoscopeexperiement.



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. Graham's law is correlated with
a) Diffusion b) Osmoregupation
c) Osmosis d) Absorption

117. Some cells are placed in a solution of glucose to measure the rate of diffusion. As the concentration of glucose solution is being increased, the diffusion rate increases simultaneously. However, when the concentration of glucose solution reaches above 10 m, the diffusion rate no longer increases
Which statement best define the mechanism of glucoses transport in the cells?
a) Transport of hydrophilic substances along the concentration gradient through fixed membrane transport protein without the involvement of energy expenditure
b) Transport of hydrophilic substances along and against the concentration gradient *via* carrier proteins
c) Active transport *via* transporter proteins
d) Facilitated diffusion without carrier proteins

118. Mg^{2+} is an activator of
I. alcohol dehydrogenase
II. nitrogenase
III. ribulose bisphosphate carboxylase oxygenase
IV. phosphoenol pyruvate carboxylase
Choose the correct option
a) Only III b) Only I
c) Only IV d) III and IV

119. Premature leaf fall is due to deficiency of
a) Phosphorus b) Nitrogen
c) Calcium d) Potassium

120. What is the effect of high CO_2 concentration and higher values of ATP/ADP ratio?
a) Rate of Calvin cycle increased
b) Rate of Kreb cycle decreased
c) Rate of glycolate cycle decreased
d) All of the above

121. Oxygen which is liberated during photosynthesis, comes from
a) Carbon cells b) Spongy cells
c) Palisade cells d) Bundle sheath cells

122. How many times ATP is utilised in glycolysis?
a) 2 b) 3 c) 4 d) 5

123. The similarity between NAD^+ and $NADP^+$ is that
a) Take up electron at a time
b) Take up two protons at a time
c) Take up two electrons at a time
d) Give up one protons at a time

124. Which pigment involves in photoperiodic change in plants?

a) Phytochrome b) Cytochrome
c) Chlorophyll d) Anthocyanin

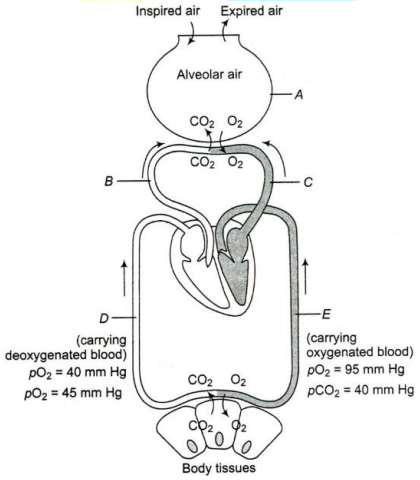
125. Which is used as weedicide?
a) 2,4-D b) IBA c) IAA d) ABA

126. Abscission and dormancy are caused by
a) ABA b) $CH_2 - CH_2$
c) IAA d) IBA

127. What do you mean by the process of digestion?
a) Conversion of complex substances into simpler form
b) Absorption of monomers by the body
c) Conversion of monomers into polymers
d) Absorption of water and food

128. In horses, rabbits, hares, the cellulose gets digested in the
a) Caecum b) Stomach
c) Appendix d) Rumen

129. Identify A to E in the given diagram and choose the correct option accordingly



a) A-Alveolus, B-Pulmonary artery, C-Pulmonary vein, D-Systemic vein, E-Systemic arteries
b) A-Alveolus, B-Pulmonary vein, C-Pulmonary artery, D-Systemic vein, E-Systemic arteries
c) A-Alveolus, B-Pulmonary vein, C-Pulmonary artery, D-Systemic arteries, E-Systemic vein
d) A-Alveolus, B-Pulmonary vein, C-Pulmonary artery, D-Systemic arteries, E-Portal vein

130. Site of aerobic respiration in higher organisms is/are
a) Golgi apparatus b) Mitochondria
c) Both (a) and (b) d) Lungs

131. Tricuspid valve is present in
a) Right atria and right ventricle
b) Left atria and left ventricle
c) Wall of atrium
d) Wall of ventricles

132. Which nodal fibres lies along the right and left ventricles (interventricular septum)?
a) Bundle of His b) Purkinje fibre
c) Neural tissue fibre d) Cardiac tissue fibre

133. Which is not correct with respect to human kidney?
a) The peripheral region is called cortex and central medulla
b) Malpighian capsule are present in the cortex region
c) Blood enters glomerulus through efferent arterioles
d) The concave part of kidney is called hilus

134. Which substance is in higher concentration in blood than in glomerular filtrate?
a) Water b) Glucose
c) Urea d) Plasma proteins

135. In human, excretory system consists of
I. pair of kidneys II. one pair of ureters
III. urinary bladder III. Urethra
V. skin VI. Lungs
VII. liver
a) I, II, III and II
b) I, II, III and IV
c) I, II, III and IV
d) I, II, III, IV, V, IV and VII

136. Volkmann's canal occurs in
a) Bone b) Cartilage
c) liver d) internal ear

137. Which one of the following item gives its correct total number?
a) Floating ribs in humans-4
b) Amino acids found in proteins-16
c) Types of diabetes-3
d) Cervical vertebrae in humans-8

138. Synovial fluid is present in
a) Fibrous joints b) Cartilaginous joints
c) Freely movable joints d) Intervertebral joints

139. During the transmission of nerve impulse through a nerve fibre, the potential on the inner side of the plasma membrane has which type of electric charge?
a) First negative, then positive and again back to negative
b) First positive, then negative and continue to be negative
c) First negative, then positive and continue to be positive

d) First positive, then negative and again back to positive

140. Photoreceptor cells that contains the light sensitive proteins are called
a) Rhodopigments b) Photopigments
c) Conopigments d) None of these

141. The estrogen is synthesised and secreted mainly by growing …A… . After ovulation the ruptured follicle is converted to a structure called …B… which secretes …C… . Choose the correct option for A, B and C
a) A-corpus luteum, B-corpus callosum, C-progesterone
b) A-Graafian follicle, B-corpus luteum, C-progesterone
c) A-corpus callosum, B-corpus luteum, C-estrogen
d) A-Graafian follicle, B-corpus luteum, C-estrogen

142. Hormones released by the neurosecretory cells in hypothalamus regulate the …A… gland. Mainly the neurosecretory hormones are of B… type
Here A and B refers to
a) A-pineal; B-two b) A-pituitary; B-three
c) A-pineal; B-three d) A-pituitary; B-two

143. Pollination is
a) Transfer of gametes on stigma
b) Transfer of male gametes on stigma
c) Transfer of female gametes on stigma
d) Fusion of male and female gametes

144. Bamboo species flower only in
a) 50-100 yrs
b) 25-50 yrs
c) 75-100 yrs
d) 60-80 yrs

145. Micropyle helps in
a) Germination of pollen grain
b) Growth of pollen tube
c) Coming out of pollen tube from pollen grain
d) Allowing entry of pollen tube

146. Function of aleurone layer is to
a) Prepare amylase b) Prepare proteinase c) Prepare peptidase d) Prepare food

147. Microspore develops into ova. This sentence is
a) True b) False c) Sometimes (a) and (b) d) Neither (a) nor (b)

148. Wall of each seminiferous tubules is formed of a single layer called
a) Germinal epithelium
b) Germ cell
c) Spermatogonia
d) Spermatozoa

149. Cryptorchidism is a condition in which
a) Testis does not descend into scrotal sac
b) Sperm is not found
c) Male hormones are not reactive
d) Ovaries are removed

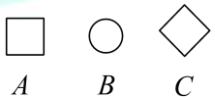
150. Neoteny refers to
a) Development of gonads
b) Pre-adult animal
c) Metamorphosis
d) Retention of larval or embryonic trait in the adult body

151. The type of connective tissue that is associated with the umbilical cord is
a) Areolar connective tissue
b) Jelly-like connective tissue
c) adipose connective tissue
d) Reticular connective tissue

152. 'Hum Do Hamare Do' slogan for encourages
a) Family planning
b) Immunisation
c) Electric growth
d) Patriotism

153. Artificial insemination mean:
a) Transfer of sperms of husband to a test tube containing ova
b) Artificial introduction of sperms of a healthy donor into the vagina
c) Introduction of sperms of a healthy donor directly into the ovary
d) Transfer of sperms of a healthy donor to a test tube containing ova

154. Identify the symbols given below and the correct option with respect to A, B and C



a) A-Male, B-Female, C-Sex unspecified
b) A-Male, B-Female, C-Sterile
c) A-Male, B-Female, C-Fertile
d) A-Female, B-Male, C-Sex unspecified

155. Mendel obtained recessive character in F_2 by …A… the …B… plants. Here A and B refers to
a) A-self-pollinating; B—F_1

b) A-self-pollinating; B$-F_2$
c) A-cross-pollinating; B$-F_1$
d) A-cross-pollinating; B$-F_2$

156. I. Myotonic dystrophy is an autosomal dominant trait
II. Sickle-cell anaemia is an autosomal recessive trait
III. Failure of segregation of alleles results in chromosomal loss
IV. Failure of segregation of allele result in chromosomal gain
V. Cystic fibrosis is a Mendelian disorder
Correct statements are
a) I, II, III and IV
b) I, III, IV and V
c) I, II, IV and V
d) All of these

157. Intron is a
I. coding sequences
II. non-coding sequences
III. character of prokaryotic
IV. character of eukaryotic
Which of the statements given above are correct about intron?
a) I, II, III and IV b) II and IV
c) II, III and IV d) I, II and III

158. The one aspect which is not a salient feature of genetic code, is its being
a) Degenerate b) Ambiguous
c) Universal d) Specific

159. Which of the following is an example of an ancestral homology?
a) Almost all modern reptiles, birds and mammals have forelimbs, a trait they also share with contemporary amphibians
b) The first birds and all their descendant species have feathers, a trait that is unknown in any other group
c) Humans and many insect species have eyes
d) All of the above

160. Maximum cranial capacity is of
a) Neanderthal man b) Cro –magnon man
c) Modern man d) Java man

161. Removal or absence of thymus in early life shall bring about
a) Lack of laymphocytes
b) Lack of antibodies
c) Lack of lymph nodes
d) All of these

162. Benign tumours
I. remain confined to their original location and do not spread to other parts
II. cause little damage
Which of the statements given above is/are correct?
a) Only I b) Only II
c) I and II d) None of the above

163. Diphtheria is caused by
a) Poisons released by living bacterial cells into the host tissues
b) Poisons released from dead bacterial cells into the host tissues
c) Poisons released by virus into host tissues
d) Excessive immune response by the host's body

164. In 1960 to 2000 wheat production increased from …A… tonnes to …B… tonnes while rice production was from …C… tonnes to …D… tonnes
Here A to D refers to
a) A-11 million, B-75 million, C-35 million, D-89.5 million
b) A-14 million, B-80 million, C-40 million, D-92.5 million
c) A-10 million, B-71 million, C-35 million, D-89.5 million
d) A-15 million, B-70 million, C-40 million, D-90 million

165. Rinderpest is the disease of:
a) Cattle b) Poultry c) Fish d) Camel

166. In poultry birds, nasal and eye discharges with foul smell, acute respiratory problem and inflamed and swollen eyes are the symptoms of
a) Chronic respiratory disease
b) Infectious coryza disease
c) Brooder pneumonia disease
d) Marck's disease

167. Which one of the following is used as biological insecticide?
a) Tiger beetle b) Caterpillar
c) Silkmoth d) Mazrapoka

168. Abnormal gene is replaced by normal gene through:
a) Gene therapy b) Medicines
c) Cloning d) Radiation

169. Plasmid is
a) An autonomously replicating circular extrachromosomal DNA
b) An autonomously replicating circular extrachromosomal RNA

c) An circular protein molecules
d) An autonomously replicating chromosomal DNA

170. Solution of polyethylene glycol (PEG) or a very brief high voltage electric current is used in fusion of
a) Protoplasms b) Protoplasts
c) Somatic cells d) Germinal cells

171. C-peptide of human insulin is
a) A part of mature insulin molecule
b) Responsible for the formation of disulphide bridges
c) Removed during the maturation of pro-insulin to insulin
d) Responsible for its biological activity

172. Automated DNA sequencers, work on the principle of the method developed by
a) Erwin Chargaff b) Maurice Wilkins
c) Frederick Sanger d) Francis Crick

173. Population of any species is
a) A static phenomena
b) A dynamic phenomena
c) Neither (a) nor (b)
d) Both (a) and (b)

174. Association of animals belonging to different species, where both partners are benefitted, is called
a) Commensalism b) Mutualism
c) Colony d) sympathy

175. A community that starts the process of succession in a barren habitat is called
a) Emotional community
b) Climax community
c) Seral community
d) Pioneer community

176. Organisms are classified into trophic levels according to
a) Their habitat
b) The source of their nutrients
c) How much they weight
d) All of the above

177. According to the IUCN 2004, the total number of plant and animal species described so far is over
a) 2.5 million b) 2 million
c) 1.5 million d) 1 million

178. Rajaji national park is situated in
a) Tamil Nadu b) Karnataka
c) Uttarakhand d) Rajasthan

179. Eutrophication is often seen in
a) Fresh water lakes b) Ocean
c) Mountains d) Deserts

180. One of the main reasons of soil erosion in India is
a) Jhum cultivation b) Deforestation
c) Drought conditions d) Temperature

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Time : 03:00:00 **PCB** **Marks** : 720 **TEST ID: 02**

: ANSWER KEY :

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

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TEST ID: 02

Time : 03:00:00 **Marks** : 720

: HINTS AND SOLUTIONS :

Single Correct Answer Type

2 **(d)**

$$CV^2 = Energy$$

The dimensional formula is $[ML^2T^{-2}]$.

3 **(c)**

$$\frac{1}{2}gt^2 - \frac{1}{2}g(t-2)^2 = 40$$

or $\frac{1}{2} \times 10(2t-2)(2) = 40$ or $2t - 2 = 4$ or $t = 3s$

4 **(c)**

Suppose t_0 be the time to reach maximum height in the absence of air resistance, then from the relation

$t_0 = \frac{usinsin\,\alpha}{g}$ ...(i)

When a is retardation caused by air resistance, then total retardation will be $g + a$

$t_1 = \frac{usinsin\,\alpha}{g+a} = \frac{usinsin\,\alpha}{g+\left(\frac{1}{10}\right)g} = \frac{10usinsin\,\alpha}{11g}$...(ii)

Now from equations (i) and (ii), we have

$$\therefore t_1 = \frac{10}{11}t_0 \Rightarrow t_0 - t_1 = t_0 - \frac{10}{11}t_0 = \frac{1}{11}t_0$$

$$= 0.09\,t_0$$

$\therefore$ Time will decrease by 9%

5 **(a)**

The velocity should be such that the centripetal acceleration is equal to the acceleration due to gravity $ie, v^2/R = g$ or $v = \sqrt{gR}$

6 **(a)**

Acceleration

$$a = \frac{F}{m} = \frac{4}{20} = \frac{1}{5}ms^{-2}$$

Distance covered by body in 3rd second

$$= \frac{1}{2} \times \frac{1}{5} \times (2 \times 3 - 1) = \frac{5}{10} = \frac{1}{2}m$$

$$\therefore\ W = 4 \times \frac{1}{2} = 2J$$

7 **(d)**

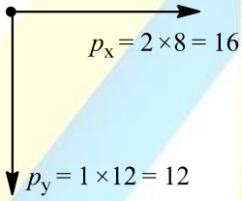
Momentum of the piece

$$p = \sqrt{p_x^2 + p_y^2}$$

$$= \sqrt{(16)^2 + (12)^2}$$

$$= 20$$

$$v = \frac{p}{m} = \frac{20}{0.5} = 40\ m/s$$



8 **(d)**

Due to elastic collision of bodies having equal mass, their velocities get interchanged

9 **(c)**

$$K = \frac{L^2}{2I} = \frac{K_1}{K_2} = \frac{L_1^2}{L_2^2} \Rightarrow \frac{K_1}{K_2} = \left(\frac{100}{110}\right)^2 = \frac{100}{121}$$

$$\Rightarrow \frac{100}{K^2} = \frac{100}{121} \Rightarrow K_2 = 121 = 100 + 21$$

Increase in kinetic energy = 21%

10 **(a)**

As we know that at the highest point, the shell has only the horizontal component of velocity which is $v\ cos\ cos\ \theta$. If u be he velocity of second exploded piece, then applying conservation of linear momentum along x-axis

$$\therefore\ 2mv\ cos\ cos\ \theta = -mv\ cos\ cos\ \theta + mu$$

Or $u = 3v\ cos\ cos\ \theta$

11 **(d)**

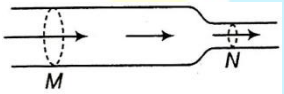
When earth moves round the sun then according to Kepler's second law, the radius vector drawn from the sun to earth, sweeps out equal areas in equal time, *ie*, its areal velocity (or the area swept out by it per unit time) is constant. While in such motion, angular velocity, kinetic energy and potential energy change.

12 **(c)**

$$W = \frac{YAl^2}{2L} = \frac{2 \times 10^{10} \times 10^{-6} \times (10^{-3})^2}{2 \times 50 \times 10^{-2}}$$
$$= 2 \times 10^{-2} J$$

13 **(c)**

The velocity of flow will increases if cross-section decreases and $vice - versa$



$$ie,\ A_1 v_1 = A_2 v_2$$

$$or\quad A_v = constant$$

Therefore, the rate of liquid flow will be greater at Nthan at *M.*

14 **(c)**

If V is the volume of sphere and ρ is its density then

$$V\rho = (V/2) \times 0.8 + (V/2) \times 13.6$$

$$= 7.2\ V$$

Or $\rho = 7.2\ gcc^{-1}$

15 **(a)**

$\frac{C}{5} = \frac{F-32}{9} \Rightarrow C = \left(\frac{5}{9}\right)F - \frac{20}{3}$. Hence graph between °C and °F will be a straight line with positive slope and negative intercept

16 **(c)**

For isochoric process, internal energy

$$\Delta U = nC_V \Delta T = 420J$$

Molar specific heat $C_V = \frac{\Delta U}{n\Delta T}$

$$= \frac{420}{2 \times 10} = 21\ JK^{-1}mol^{-1}$$

17 **(d)**

Change in internal energy (ΔU) depends upon initial and final state of the function while ΔQ and ΔW are path dependent

18 **(a)**

According to Newton's law of cooling, rate of heat loss Temperature difference

$$\therefore \frac{R_2}{R_1} = \frac{40-20}{80-20} = \frac{1}{3}$$

$$R_2 = \frac{R_1}{3} = \frac{45}{3} = 15\ cals^{-1}$$

19 **(b)**

$$y = 4\left(\frac{t}{2}\right) sin\ sin\ 1000\ t$$

$$\Rightarrow y = 2(1 + cos\ cos\ t\ )\ sin\ sin\ 1000\ t$$

$$\Rightarrow y = 2\ sin\ sin\ 1000\ t\ + 2\ cos\ cos\ t\ sin\ sin\ 1000\ t$$

$$\Rightarrow y = 2\ sin\ sin\ 1000\ t\ + sin\ sin\ 999\ t + sin\ sin\ 1001\ t$$

It is a sum of three S.H.M.

20 **(a)**

As the girl stands up, the effective length of pendulum decreases due to the reason that the centre of gravity rises up. Hence, according to

$$T = 2\pi\sqrt{\frac{l}{g}}$$

Twill decrease.

21 **(a)**

No beat is heard, because frequency received by listener directly from the source and that received on reflection from the wall is same

$$= \frac{256 \times 330}{330 - 5} Hz$$

23 **(a)**

When a lamp is connected to D.C. line with a capacitor. If will form an open circuit. Hence, the lamp will not glow

24 **(d)**

When two conductors of capacities $C_1 and\ C_2$ and potentials $V_1 and\ V_2$ are connected by a conducting wire, charge redistributes in these

conductors till potential of both the conductors become equal, known as common potential.

Common potential $= \frac{net\ charge}{total\ capacity}$

$$ie \qquad V = \frac{q_1 + q_2}{C_1 + C_2}$$

or $$V = \frac{C_1V_1 + C_2V_2}{C_1 + C_2}$$

26 **(c)**

Strength$= 5 \times 18 = 90AH$

29 **(a)**

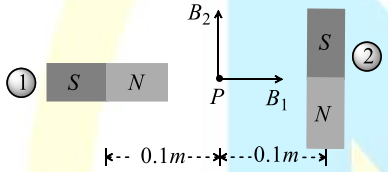
Horizontal component $B_H = B\ cos\ cos\ \phi$

Total intensity of earth's magnetic field $B = \frac{B_H}{coscos\ \phi}$

$$= \frac{1.8 \times 10^{-5}}{cos\ cos\ 30°} = \frac{1.8 \times 10^{-5}}{\sqrt{3}/2}$$

$$= 2.08 \times 10^{-5} Wb/m^2$$

30 **(d)**



From figure $B_{net} = \sqrt{{B_a}^2 + {B_e}^2}$

$$= \sqrt{\left(\frac{\mu_0}{4\pi}.\frac{2M}{d^3}\right)^2 + \left(\frac{\mu_0}{4\pi}.\frac{M}{d^3}\right)^2}$$

$$= \sqrt{5}.\frac{\mu_0}{4\pi}.\frac{M}{d^3} = \sqrt{5} \times 10^{-7} \times \frac{10}{(0.1)^3}$$

$$= \sqrt{5} \times 10^{-3} tesla$$

31 **(a)**

The inductances are in parallel $\Rightarrow L_{eq} = \frac{L}{3} = \frac{3}{3} = 1\ H$

33 **(c)**

(i) In a circuit having C alone, the voltage lags the current by $\frac{\pi}{2}$.

(ii) In a circuit containing R and L, the voltage leads the current by $\frac{\pi}{2}$.

(iii) In $L - C$ circuit, the phase difference between current and voltage can have any value between 0 to $\frac{\pi}{2}$ depending on the values of L and C.

(iv) In a circuit containing L alone, the voltage leads the current by $\frac{\pi}{2}$.

34 **(c)**

Equation second shows that the electromagnetic wave travels along the positive x-axis

35 **(c)**

$$\frac{1}{-30} + \frac{1}{v} = \frac{1}{30}$$

Or $\frac{1}{v} = \frac{2}{30} = \frac{1}{15}$

Or $v = 15\ cm$

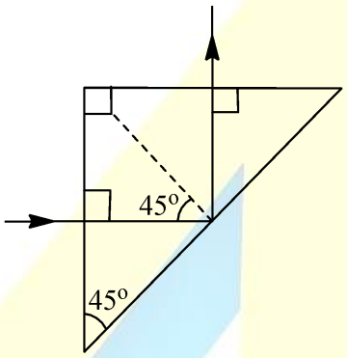
36 **(b)**

For total internal reflection from glass-air interface, critical angle C must be less than angle of incidence.

$$ie \quad C < i$$

$$or\ C < 45° \qquad (\because \angle i = 45°)$$

$$but \quad n = \frac{1}{sin\ sin\ C} \Rightarrow C = \left(\frac{1}{n}\right)$$



$$\therefore \left(\frac{1}{n}\right) < 45°$$

$$\Rightarrow \frac{1}{n} < sin\ sin\ 45°$$

$$\Rightarrow n > \frac{1}{sin\ sin\ 45°}$$

$$\Rightarrow n > \frac{1}{\left(\frac{1}{\sqrt{2}}\right)}$$

$$\Rightarrow n > \sqrt{2}$$

37 **(c)**

According to Doppler's principle $\lambda' = \lambda\sqrt{\frac{1-v/c}{1+v/c}}$ for $v = c$

$$\lambda' = 5500\sqrt{\frac{(1-0.8)}{1+0.8}} = 1833.3$$

$\therefore$ Shift $= 5500 - 1833.3 = -3666.7$

38 **(a)**

By using $\lambda_{electron} = \frac{h}{m_e v} \Rightarrow v = \frac{h}{m_e \lambda_e}$

$$= \frac{6.6 \times 10^{-34}}{9.1 \times 10^{-31} \times 10^{-10}} = 7.25 \times 10^{6} m/s$$

40 **(c)**

The wavelength of different members of Balmer series are given by

$\frac{1}{\lambda} = R_H \left[\frac{1}{2^2} - \frac{1}{n_i^2}\right]$, where n_i= 3,4,5,....

The first member of Balmer series (H_α) corresponds to n_i=3.It has maximum energy and hence the longest wavelength. Therefore ,wavelength of H_α line (or longest wavelength)

$$\frac{1}{\lambda_1} = R_H \left[\frac{1}{2^2} - \frac{1}{3^2}\right]$$

$$= 1.097 \times 10^{7} \left(\frac{5}{36}\right)$$

or$\lambda_1 = \frac{36}{5 \times 1.097 \times 10^7} = 6.563 \times 10^{-7} m$

$$n = 6563 \text{ Å}$$

The wavelength of the Balmer series limit corresponds to $n_i = \infty$ and has got shortest wavelength.

Therefore , wavelength of Balmer series limit is given by

$\frac{1}{\lambda_\infty} = R_H \left[\frac{1}{2^2} - \frac{1}{\infty^2}\right] = 1.097 \times 10^7 \times \frac{1}{4}$

or$\lambda_\infty = \frac{4}{1.097 \times 10^7} = 3.646 \times 10^{-7} m$

$$= 3646 \text{Å}$$

Only 4861 Å is between the first and last line of the Balmer series.

42 **(c)**

When there is an excess of protons in the nucleus and it is not energetically possible to emit an$\alpha -$ particle, β^+ decay occurs.

Resulting in reducing atomic numbers by 1. New atomic number = $Z - 1$, mass number= A.

Gamma ray emission occurs withβ^+emission.

Since, gamma rays have no charge or mass their emission does not change the chemical composition of the atom.

Hence atomic number= $Z - 1$,

mass number = A

43 **(c)**

Comparing the given equation with standard equation

$$i = AT^2 e^{qv/kT} \Rightarrow V_L = \frac{kT}{V}$$

44 **(c)**

An antenna is a metallic structure used to radiate or receive EM waves

45 **(b)**

Multi-mode step index fibers are less expensive and easy to construct

46 **(a)**

Number of atoms in 40 kg= $\frac{40 \times 10^3 g}{6.644 \times 10^{-23} g}$

(∵ Weight of an atom=6.644×10^{-23}g)

$$= 6.02 \times 10^{26}$$

∴ Number of gram atoms of element in 40 kg

$$= \frac{6.02 \times 10^{26}}{6.02 \times 10^{23}} = 10^3$$

47 **(d)**

Number of moles of oxygen =$\frac{80}{16}$

Number of atoms of oxygen = $\frac{80}{16} \times N_0 \times 2$

$$= 5 \times N_0 \times 2$$

Number of moles in 5 g of hydrogen = $\frac{5}{1}$

Number of atoms in 5 g of hydrogen =$5 \times N_0 \times 2$

Hence, the number of atoms in 80 g of oxygen is equal to the number of atoms in5 g of hydrogen.

49 **(b)**

Positron is as heavy as an electron.

50 **(a)**

In a period, from left to right basic character of oxides decreases, thus Na_2O is most basic

52 **(d)**

In propyne there are 2 $\pi - bonds$ and six sigma bonds.

$$CH_3C \equiv CH$$

53 **(c)**

Rate of diffusion depends upon the molecular masses of gases. Therefore, the gases which have equal molecular mass, have equal rates of diffusion.

$$\frac{r_1}{r_2} = \sqrt{\frac{M_2}{M_1}}$$

Molecular mass of $N_2O = 28 + 16 = 44$

Molecular mass of $CO_2 = 12 + 32 = 44$

$$\because \frac{r_{N_2O}}{r_{CO_2}} = 1$$

$$\therefore \quad r_{N_2O} = r_{CO_2}$$

54 **(b)**

Given: (i)$H_2 + \frac{1}{2}O_2 \rightarrow H_2O;\ \Delta H = -241$ kJ

(ii)$C_6H_{10} + \frac{17}{2}O_2 \rightarrow 6CO_2 + 5H_2O;\ \Delta H = -3800$ kJ

(iii)$C_6H_{12} + 9O_2 \rightarrow 6CO_2 + 6H_2O;\ \Delta H = -3920$ kJ for the reaction

$$C_6H_{10} + H_2 \rightarrow C_6H_{12}$$

[It is infact Eq.(i)+Eq.(ii)−Eq.(iii)]

Thus, $\Delta H = -241 - 3800 - (-3920) = -121$ kJ

55 **(a)**

$V_1 = 100$ mL

$V_2 = 250$ mL

Pressure $p = 2\ atm\ or\ 2 \times 1.01 \times 10^5\ Nm^{-2}$

Work done by the gas

$$W = p\Delta V\ or\ p(V_2 - V_1)$$

Put the value in given formula

$$W = 2 \times 1.01 \times 10^5 (0.250 \times 10^{-3} - 0.100 \times 10^{-3})$$

$$= 2 \times 1.01 \times 10^5 \times 0.15 \times 10^{-3}$$

$$= 30.30\ \text{J}$$

56 **(c)**

$$N_2O_4 \rightleftharpoons 2NO_2$$

1 0 initially

$(1-\alpha)$ 2α at equilibrium

Total moles at equilibrium $= (1-\alpha) + 2\alpha$

$$= 1 + \alpha$$

57 **(c)**

The chemical structure of $H_2S_2O_8$ is as follows

$$H - \overset{\overset{O}{||}}{o} - S - \overset{\overset{O}{||}}{o} - \overset{\overset{O}{||}}{o} - S - \overset{\overset{O}{||}}{o} - H$$

$$2 \times (+1) + 2 \times x + 6 \times (-2) + 2 \times (-1) = 0$$

for H: $+1$; for S: x; for O: -2; for O—O: -1

$$+2 + 2x - 12 - 2 = 0$$

$$2x = +12$$

$$x = +6$$

58 **(a)**

Bromine has zero oxidation state because it is in free state.

$$\overset{0}{Br_2} \longrightarrow BrO_3^-$$

Let the oxidation number of Br in BrO_3^- is x.

$$x + (-2 \times 3) = -1$$

$$x + (-6) = -1$$

$$x = +6 - 1$$

$$x = +5$$

So, oxidation number changes from 0 to +5.

59 **(c)**

$$K_2Cr_2O_7 + H_2SO_4 \rightarrow K_2SO_4 + H_2Cr_2O_7$$

$$4[H_2O_2 \rightarrow H_2O + O]$$

$$H_2Cr_2O_7 + 4O \rightarrow 2CrO_5 + H_2O$$

$$K_2Cr_2O_7 + H_2SO_4 + 4H_2O_2 \rightarrow 2CrO_5 + K_2SO_4 + 5H_2O$$

Acidified $K_2Cr_2O_7$ is oxidised to blue peroxide of chromium (CrO_5) which is soluble in ether and produces blue coloured solution.

60 **(d)**

Electropositive character increases as we move down the group because of the increase in atomic size, atoms have more tendency to lose electrons. Hence, Cs is most electropositive element in alkali metals.

61 **(b)**

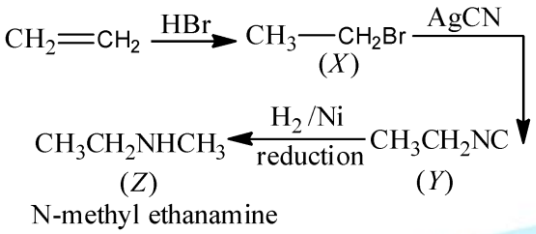
C-60 is called Buckminster fullerene. It is discovered in 1990 as a constituent of soot. Its shape is like a soccer ball.

63 **(a)**

The number of stereoisomers=2'

(Here, n =chiral carbon atom)
Thus, number of stereoisomers=2^3=8

64 **(a)**
The reaction is as follows



N-methyl ethanamine

66 **(c)**
The average residence time of NO is 4 days

67 **(c)**
When coordination number is eight, the radius ratio $\frac{r^+}{r^-}$ lies between 0.732 to 1.000.

68 **(c)**

Radius ratio	Coordination no	Example
0.155 – 0.225	3	B_2O_3
0.225 – 0.414	4	ZnS
0.414 – 0.732	6	$NaCl$
0.732 – 1	8	$CsCl$

In ionic solids the shape of crystal depends upon relative size of ions.
Given, $r_{c^+}(Rb^+) = 1.46$ Å

$$r_{a^-}(I^-) = 2.16 \text{ Å}$$

$$\therefore \quad \frac{r_{c^+}}{r_{a^-}} = \frac{1.46}{2.16} = 0.676$$

∴ It will have coordination number 6 and structure will be same as of NaCl.

69 **(a)**
Relative lowering of vapour pressure = mole fraction of solute (**Raoult's law**)

$$\frac{p - p_s}{p} = x_2$$

$$\frac{p - p_s}{p} = \frac{wM}{mW}$$

$$0.0125 = \frac{wM}{mW}$$

Or $$\frac{w}{mW} = \frac{0.0125}{18} = 0.00070$$

Hence, molality $= \frac{w}{mW} \times 1000$

$$= 0.0007 \times 1000 = 0.70$$

70 **(b)**

$$Na_2SO_4 \rightarrow 2Na^+ + SO_4^{2-}$$

van't Hoff factor for Na_2SO_4 =3

$$\Delta T_f = i \times k_f \times m$$

$$= 3 \times 1.86 \times 0.01 \quad \left[\because \quad m = \frac{0.01}{1} = 0.01\right]$$

$$= 0.0558 \text{ K}$$

71 **(c)**
At cathode,

$$Al^{3+} + 3e^- \rightarrow Al$$

$$E_{Al} = \frac{27}{3} = 9$$

$w_{Al} = E_{Al} \times$ no.of faradays

$$= 9 \times 0.1 = 0.9\ g$$

72 **(c)**

$$k = \frac{0.693}{t_{1/2}} = \frac{0.693}{693} = 0.001\ s^{-1}$$

73 **(c)**
The rate of reaction is

$$rate = k[NO]^2[O_2]$$

When the volume is reduced to $\frac{1}{3}$, the concentration of each reactant is increased by 3 times

$$rate' = k[3NO]^2[3O_2]$$

$$= 27k[NO]^2[O_2]$$

$$\frac{rate'}{rate} = \frac{27k[NO]^2[O_2]}{k[NO]^2[O_2]}$$

$$rate' = 27\ rate$$

74 **(b)**
A catalyst lowers the activation energy and increases the rate of reaction. It is not consumed during reaction.

75 **(c)**
Wolframite is ferrous tungstate ($FeWO_4$) which is magnetic in nature

77 **(c)**

Helium is not used to produce and sustain powerful superconducting magnets. All others are the uses of helium.

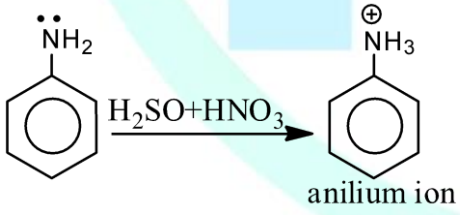
78 **(a)**
Zn^{2+} (Z=30):[Ar]$3d^{10}4s^0$; zero unpaired electron.
Hence, its magnetic moment is zero.
$\mu=\sqrt{n(n+2)}=\sqrt{0(0+2)}$
$\mu= 0$

79 **(b)**
$HgCl_2$compound is easily volatile. They are insoluble in water and soluble in acids.

80 **(d)**
One mole of Xgave depression corresponding to 2 moles of particles, *i.e.*, on ionisation$X$gives 2 moles of ions , thus it contains only 1 ion outside the coordination sphere and its structural formula is $[Cr(H_2O)_4Br_2]Cl.H_2O$ while Ygives 3 moles of ions, thus it contains two ions outside the coordination sphere and its structural formula is
$[Cr(H_2O)_5Cl]Br_2 2$

82 **(b)**
The order of increasing acidic strength is p-methyl phenol < phenol <m-nitrophenol <p-nitrophenol

86 **(a)**
On direct nitration of aniline, lone pair of electrons present at nitrogen atom will accept proton from the nitrating mixture to give anilium ion which is *meta* directing.



87 **(b)**
Fats are also known as triglycerides. These triglycerides are the trimesters of fatty acid with glycerol. So, the characteristics feature of fat is **ester group**.

88 **(b)**
In addition homopolymers such as Teflon, empirical formula resembles with monomer.

89 **(a)**
Cellulose acetate has been used in the manufacture of non inflammablepohotographic films.

90 **(c)**
Antipyretic drugs reduce fever. Analgesic relieves in pain, antibiotics act against bacterial infections while tranquilisers are used against mental disorders.

91 **(c)**
Bentham and Hooker did not know the affinities of the families placed under Ordines Anomali and these families were tentatively grouped together.

92 **(c)**
A species is a group of organisms that interbreed freely in their natural setting and do not interbreed with other population. In simple words, members of one species are reproductively isolated from members of other species. Species is the real basic unit for understanding taxonomy as well as evolution.

93 **(c)**
Hooker proposed the concept of genus.

94 **(b)**
Bacteria are grouped under four categories based on their shape. The spherical coccus, the rod-shaped bacillus, the comma-shaped vibrium and the spiral spirillum

95 **(a)**
AIDS virus also called reovirus has two single strands of RNA associated with the enzymes reverse transcriptase.

96 **(a)**
The bryophytes are divided into liverworts and mosses

97 **(b)**
The kingdom-Plantae includes algae, bryophytes pteridophytes, gymnosperms and flowering plants (angiosperms). They are common on land, on sea shore and in freshwater

98 **(d)**
The water vascular system in Echinoderms, helps in locomotion together with the tube feet. Echinoderms have an **endoskeleton** made of **calcareous plates** and spines

99 **(a)**

The function of clitellum in *Pheretima* is the formation of cocoon.

100 **(b)**
Amphibians have opisthonephric kidney. *Lepus* is the generic name for hare, it is a solitary animal

101 **(b)**
Allium, $2n=16$ then endosperm has 24 chromosomes.
Oryza, $2n=24$ then endosperm has 36 chromosomes.
Nicotiana, $2n=48$ then endosperm has 72 chromosomes.
Saccharum $2n=82$-124 (Indian cane) then endosperm has 123-186 chromosomes.

102 **(d)**
Only one internode long typical phylloclade (*i.e.*, green leaf-like modified stem) is called as cladode, *e.g.*, *Asparagus*.

103 **(a)**
Option (a) is correct.

104 **(b)**
Triticale is the first man made cereal. It is produced by artificial allopolyploidy between wheat (*Triticum* sp.) and rye (*Secalecerele*). Both belong to family-Poaceae.

105 **(b)**
Root stem transition occurs in hypocotyl region of axis.

106 **(b)**
Vascular Cambium
The meristematic layer that is responsible for cutting off vascular tissues (xylem and phloem) is called vascular cambium. In the young stem. It is present in patches as a single layer between the xylem and phloem. Later, it forms a complete ring

107 **(b)**
The keratinised stratified squamous epithelium forms the epidermis of the skin in land vertebrates. Its horny layer prevents the loss of water and mechanical injury

108 **(d)**
The alimentary canal is a straight tube and runs between the first to last segments of the body of earthworms

109 **(b)**
Within the nucleus, DNA is organised along with proteins into material called **chromatin** and thick condensed chromatin is called chromosome.

110 **(d)**
The process of removal of introns (non-coding genes) and joining of exons (coding genes) is called splicing.

111 **(c)**
Cellulose is made up of unbranched chain of glucose molecule linked by β-1, 4 glycosidic bond.

112 **(b)**
Isoenzymes are one of the several forms of an enzyme in an individual or population that catalyse the same reaction but differ from each other in such properties as substrate affinity and maximum rates of enzyme-substrate reaction.

113 **(a)**
Colchicine is an antimitotic drug (alkaloid) which is obtained from *Colchicum* (family-Lilliaceae). It binds to one tubulin molecule and prevents its polymerization. The depolymerisation of tubulin results in disappearance of mitotic spindle, blocking the cells mitotic chromosomal division of metaphase and anaphase

114 **(c)**
During pachytenesubstage of prophase-I of meiosis, the non-sister chromatids of homologues exchange segments between themselves. This exchange of chromatid segments is called **crossing over**, which involves proper breakage and then fusion of broken ends oppositely and hence, results in the recombination.

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

116 **(a)**
Graham's law of diffusion can be represented by the following formula

$$Rate\ of\ diffusion\ \propto \frac{1}{\sqrt{Density\ of\ particle}}$$

117 **(a)**
Diffusion is process in which uncharged molecules pass easily through a biological membrane. However, water soluble substance face difficulty to cross the membrane and the transport of these hydrophilic molecules are facilitated by carrier proteins, which are possessed by cell membrane. The overall process do not require energy and is referred to as facilitated diffusion

118 **(d)**
Mg^{2+} is an activator of ribulose bisphosphate carboxylase oxygenase and phosphoenol pyruvate carboxylase

119 **(a)**
Phosphorus is a constituent of nucleic acids, proteins, $NADP^+$, etc. its deficiency causes, poor growth, chlorosis (mottled), necrosis and premature falling of leaves and flowers.

120 **(d)**
Due to the higher value of CO_2 and ATP, the rate of Calvin cycle increases to form carbohydrate (starch). This leads to inhibition of photorespiration (glycolate cycle) and Kreb's cycle

121 **(b)**
Oxygen, which is liberated during photosynthesis comes from water.

$$4H_2O \rightleftharpoons 4H^+ + 4OH^-$$

$$4OH^-\ Mn^+, CI^- \rightarrow\ 2H_2O + O_2 \uparrow + 4e^-$$

122 **(a)**
ATP is utilised at two steps – First in the conversion of glucose into glucose – 6 phosphate and second in the conversion of fructose – 6 – phosphate to fructose 1, 6 biphosphate

123 **(c)**
NAD^+ and $NADP^+$ accepts two electrons and one proton to get reduced to NADH and NADPH respectively

124 **(a)**
Phytochrome is a pigment universally present in green flowering plants responsible for photomorphogenic changes and developmental processes.

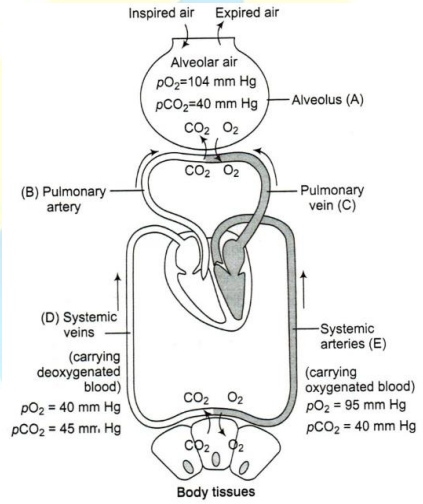
125 **(a)**
2, 4-D (2, 4-dichloro-phenoxy acetic acid) is a synthetic auxin. It is selective weedicide and kills broad-leaved dicot plants only.

126 **(a)**
ABA (Abscisic Acid) was discovered for its role in regulating abscission and dormancy. It acts as the general plant growth inhibitor and an inhibitor of plant metabolism. ABA inhibits seed germination

127 **(a)**
Digestion involves both mechanical and bio-chemical processing of food. Basically, it is the break down of complex organic substances of food like carbohydrates, proteins and fats (macronutrients) into simple, soluble inorganic substances. So, it can be defined as the conversion of insoluble polymer of food into their soluble monomers

128 **(a)**
Caecum is a small, pouch-like structure, which ends into a tubular structure called vermiform appendix. In rabbit, caecum is concerned with digestion of cellulose and conduction of food.

129 **(a)**



Diagrammatic representation of exchange of gases at the alveolus and the body tissues with blood and transport of oxygen and carbon dioxide

130 **(b)**
In higher organisms, the sites of aerobic respiration are
(i) **Cytoplasm** Where, glycolysis takes place
(ii) **Mitochondria** Where, Kreb's cycle takes place

131 **(a)**
In human heart, right auricle opens into right ventricle and the auriculo-ventricular aperture is guarded by a tricuspid valve. The opening of left

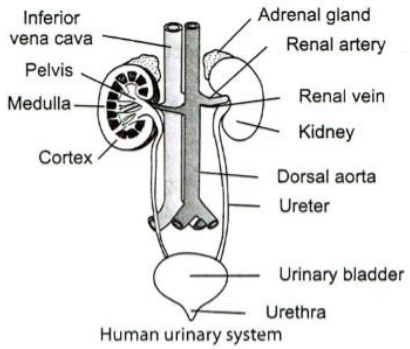
auricle into left ventricle is guarded by bicuspid or mitral valve.

132 **(a)**
Bundle of His.
Auto-Rhythmicity of Heart
Automatic rhythmicity of the heart is the ability to contract spontaneously. Mammalian heart is myogenic. It means heart beat results from a wave of electrical potential called cardiac impulse arising from sinoatrial node SA node and spreading over cardiac chambers.
SA-node lies in the wall of right atrium near opening of superior vena cava and contract about 72 times per minute. Form SA node cardiac impulse travels to atrioventricular node (lies between right atrium and ventricle)
Then pass to AV bundle (also called bundle to His) and its branches reaches to the Purkinje fibres in ventricles.
Bundle of His provides the only route for the transmission of wave of excitation from atria to ventricles. Purkinje fibres conducts the impulses five times more rapidly than surrounding cells. It forms a pathway for conduction of impulse that ensures that the heart muscle contracts in the most efficient manner

133 **(c)**
Blood enters in glomerulus through afferent arterioles and exits out through efferent arterioles.

134 **(d)**
The plasma fluid that filters out from glomerular capillaries into Bowman's capsule of nephrons is called glomerular filtrate. It is a non-colloidal part and possesses urea, water, glucose, amino acids, vitamins, fatty acid, uric acid, creatinine salts, etc. RBCs, WBCs platelets and plasma proteins are the colloidal parts of the blood and do not filtrated out from glomerulus. Thus, plasma proteins are higher in concentration in blood than in glomerular filtrate.

135 **(c)**
Human excretory system consists of
(i) a pair of kidney (ii) a pair of ureter
(iii) urinary bladder (iv) urethra



Human urinary system

136 **(a)**
Haversian canals are found in long bones of mammals. These canals are interconnected by transverse canals called Volkmann's canals.

137 **(a)**
There are 12 pairs of ribs in human, which from the bony lateral walls of the thoracic cage. The last two pair of ribs (total four) are called floating ribs because their anterior ends are not attached to either the sternum or the cartilage of another rib. The floating ribs protect the kidneys.

138 **(c)**
Synovial fluid is present in perfect movable joints. The synovial membrane secretes synovial fluid, which lubricates and provides nourishment to articular cartilage.

139 **(a)**
During the transmission of nerve impulse through a nerve fibre, the potential on the inner side of the plasma membrane has first negative charge, then positive and again negative by repolarisation.

140 **(b)**
There are two types of photoreceptor cells namely, rods and cones. These cells contains the light-sensitive proteins called the photopigments

141 **(b)**
A-Ovarian follicle,
B-Corpus luteum,
C-Progesterone

142 **(d)**
A-Pituitary; B-2

143 **(b)**
Transfer of male gametes (pollen) to the receptacle (stigma) of the female is called pollination
Generally, the pollination takes place by various means like air/ water / animals / insects, etc.

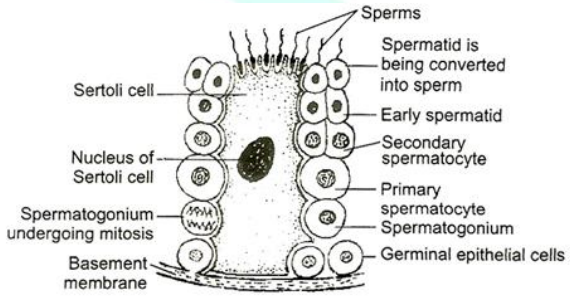
144 **(a)**
Bamboo is the monocarpic plant (which reproduce once in their life time). They reproduce once in 50-100 yrs after their birth and after flowering they die

145 **(d)**
Micropyle is the narrow or passage left by the integuments at one end of the ovule. It allows the entry of pollen tube into the ovule. This phenomenon is known as porogamy, *e.g.,* lily.

146 **(a)**
Aleurone layer prepare amylase (an enzyme), which acts on the starch and frees the glucose unit for developing embryo

147 **(b)**
Pollen grains.
Microsporogenesis During developmental phase of anther the cells of sporogenous tissue undergoes meiotic division to form microspore tetrad. The process of formation of microspore from pollen mother cell is called microsporogenesis. The microspores are formed and arranged in a group of four cells called microspore tetrad. Microspore develops into the pollen grain and represents the male gametophyte
Microspore mother cell and pollen mother cell are the same term and form male gametes (pollens) by the process called microsporogenesis

148 **(a)**
Wall of each seminiferous tubules is formed of single layered germinal epithelium. Majority of cells in this epithelium are cuboidal called male germ cells (also called spermatogonia). At certain places there present tall Sertoli or substentacular cells, which functions as nurse cells for differentiating spermatozoa



TS of a part of seminiferous tubule showing Sertoli cell and stages of spermatogenesis

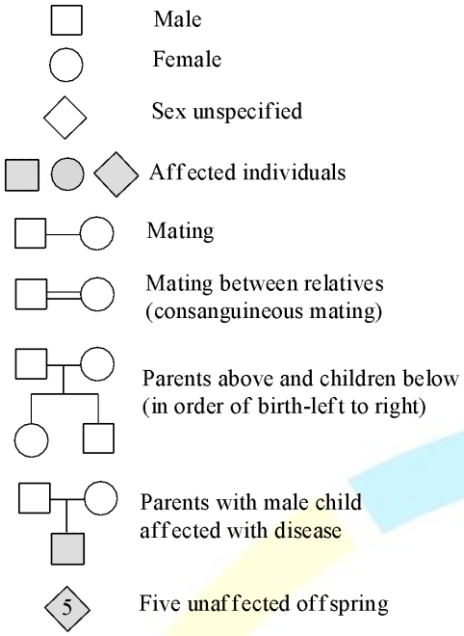
149 **(a)**
The male humans, if testes fail to descend into the scrotal sac, it is called **cryptorchidism.**

150 **(d)**
Neoteny is the retention of larval or embryonic characters even after sexual maturity. It is shown by **Axolotl larva** or *Ambystoma* (tiger salamander) found in USA and Mexico.

151 **(b)**
Mucous (jelly –like) connective tissue is present mostly in embryos with Whartorn's jelly (highly gelatinous) as the ground substance. The tissue is common in umbilical cord, cock's comb and viterous body of eye ball.

152 **(a)**
'Hum do Humare Do' slogan encourages family planning.
With 1.7% of the growth rate. India's population could double in 33 years. Such an alarming growth rate could lead to an absolute scarcity of even the basic requirement. Therefore, the government was forced to take up serious measures to check the population growth.
The most important step to overcome this problem is to motivate smaller families by using various contraceptive methods. You might have seen advertisements in the media as well as posters/bills, etc., showing a happy couple with two children with a slogan *Hum Do Humare Do* (we two, our two).
Many couples, mostly the young, urban, working ones have even adopted 'one child norm'.
Statutory raising of marriageable age of the female to 18 years and that of males to 21 years and incentives given to couples with small families are two of the other measures taken to tackle this problem

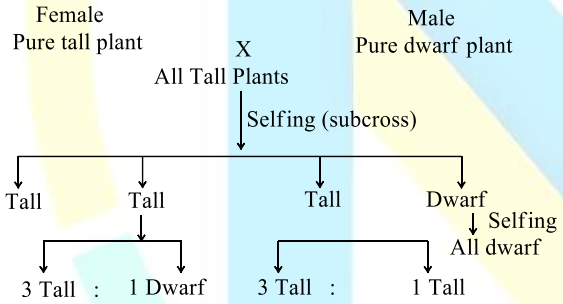
154 **(a)**
A-Male, B-Female, C-Sex unspecified.
The study of inheritance of genetic traits in several generations of a human family in the form of a family tree diagram is called **pedigree analysis**.
Advantages
(i) It helps in genetic counselling to avoid disorders
(ii) It shows the origin of a trait and flow of a trait in a family
(iii) It is important to know the possibility of a recessive allele that can cause genetic disorders like colour blindness, haemophilia, etc.
Signosed in the pedigree are



155 **(a)**

Mendel obtained the recessive character in F_2 by self pollinating the F_1-plants.

Mendel cross-pollinated a pure tall pea plant (100-120 cm hight) and a pure dwarf pea plant. (only 22 to 44 cm hight). He called them parental generation, expressed now-a-days by symbol P. This hybridization popularly called as monohybrid cross



This three generations of pea plants after crossing a pure tall plant with a dwarf one. The plants of F_1-generation are all tall, of F_2-generation three tall and one dwarf. One third of the tall plants are pure, while the remaining behave as hybrids

F_1-generation Seeds collected from the parental generation called first filial generation or F_1-generation

F_2-generationF_1-plants pollinated among them self (self breeding or inbreeding) and seed produced by F_1-plants called F_2-generation. They were in ratio 3:1 (three tall and one dwarf).

F_3-generation Mendel allowed F_2-plant to form seed by self-pollination called F_3-generation. Mendel observed that tall and dwarf plant behave differently

(i) Dwarf plant produced dwarf plant on self-pollinated

(ii) In tall plants one third plants breed true so they were pure

(iii) Other two third plant behave like parents and give tall to dwarf plants 3 : 1 indicate that their parents have dwarf genes also

156 **(d)**

Correct statements are

(i) Myotonic dystrophy is an autosomal dominant trait

(ii) Sickle-cell anaemia is autosomal recessive disease

(iii) Failure segregation result in chromosomal loss and gain. One daughter cell get one extrachromosome and other gets one less chromosome

(iv) Cystic fibrosis is Mendelian disorder

157 **(b)**

Introns are the non-coding sequences found in eukaryotes only. In prokarytoes they are absent

158 **(b)**

The genetic code inside the cell is said to be **non-ambiguous** because a particular codon always codes for the same amino acid. But in certain rare cases, the genetic code is found to be **ambiguous.**

159 **(a)**

Almost all modern reptiles, birds and mammals, have forelimbs means, they all have same basic plan of the structure but they perform different functions. This phenomenon is called ancestral homology

160 **(b)**

Cro –magnon man (*Homo sapiens fossilis*) had a highest cranial capacity, *i.e.*, 1680 cc.

Modern man (*Homo sapiens sapiens*) had cranial capacity 1400-1450 cc.

161 **(c)**

The correct matching pairs are

pathogen	Disease
Leishmaniadonovani	Kala-azar
Wuchereriabancrofti	Filariasis
Trypanosoma gambiense	Sleeping sickness
Entamoeba histolytica	Amoebiasis

162 **(c)**
Benign tumour is a non-cancerous Tumour. It does not show metastasis and is non-invasive. It is less fatal to the body

163 **(a)**
Toxins released from *Corynebacterium diphtheriae*causes diphtheria. Actually, bacterial cells do not contain gene for toxin production-a phage carries the gene for it. Only those lysogenised cells of C. *diphtheriae*which carryβ −phage, can produce the toxin and cause diphtheria.

164 **(a)**
A-11 million, B-75 million, C-35 million, D-89.5 million

166 **(b)**
All the given symptoms are of infectious coryza disease of poultry birds.

167 **(a)**
Carbid beetles, an insect group containing ground and tiger beetles, are important biological agents in agroecosystems. Carbid beetles play a major role in agroecosystems by contributing to the mortality of weed seeds, insects and slugs.

169 **(a)**
Autonomously replicating circular extrachromosomal DNA.
Manipulation of gene and genetic material by man is a fast emerging branch of science, which started with the formation of recombinant DNA molecule. This branch of science is named as recombinant DNA technology, genetic engineering and DNA manipulation technology, genetic engineering and DNA manipulation technology. This technology involves cutting and pasting of desired DNA fragments into the specified hosts for the benefits of human beings

170 **(b)**
Protoplasts are naked cells from which cell wall has been removed. Fusion of protoplast is done with solution of PEG or a very brief high voltage current.

171 **(c)**
Removed during the maturation of proinsulin to insulin.
Insulin contains two short polypeptide chains, chain A and B-chain linked by disulphide bridge. In mammals, insulin is synthesised as prohormone (that needs to be processed to become mature and functional hormone). It contains an extra stretch called-peptide. C-peptide is absent in mature insulin and is removed during the maturation into insulin

172 **(c)**
Automated DNA sequencers, which sequence DNA fragments, work on the principle of a method developed by **Frederick Sanger.**

173 **(b)**
Population keeps on changing due to various factors like immigration, emigration, natality and mortality. So, it is dynamic rather than stable phenomena

174 **(b)**
Mutualism is called (+) and (+) interaction, where both partners are benefitted.

175 **(d)**
Pioneer community is the Ist biotic community, which develops in barren area. Pioneer community is established over a previously bare area

176 **(b)**
Organism are classified into trophic levels according to the source of their nutrients

177 **(c)**
According to the IUCN (2004), the total number of plants and animals species described, so far is slightly more than 1.5 million but there is no clear idea of how many species are yet to be discovered and described

178 **(c)**
Rajaji National park is situated close to Dehradun in **Uttarakhand**. Its main wildlife are elephant, tiger, panther, slothbear, nilgai, cheetal, wild bear, etc.

179 **(a)**
Eutrophication is nutrient enrichment of water body resulting in increased growth of algae,other plants and animals.It is often seen in fresh water

lakes.Actually it is the natural ageing of a lake by biological enrichment of its water.

180 **(b)**

Deforestation is the removal of a forest or stand of trees where the land is thereafter converted to a non-forest use. Examples of deforestation include conversion of forest land to farms, ranches or urban use