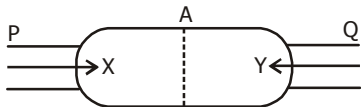
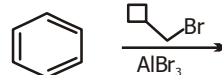
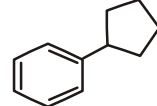
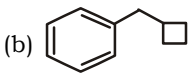
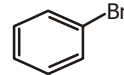
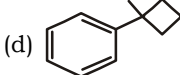


# CHEMISTRY

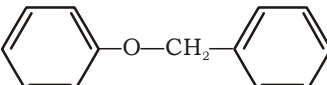
## Single Correct Choice Type

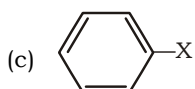
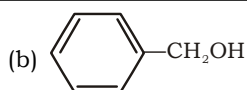
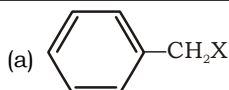
This section contains 45 questions numbered 1 to 45. Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct.

1. 3 g of activated charcoal was added to 50 mL of acetic acid solution (0.06 N) in a flask. After an hour it was filtered and the strength of the filtrate was found to be 0.042 N. The amount of acetic acid adsorbed (per gram of charcoal) is  
 (a) 36 mg (b) 42 mg  
 (c) 54 mg (d) 18 mg
2. If  $m$  and  $e$  are the mass and charge of the revolving electron in the orbit of radius  $r$  for hydrogen atom, the total energy of the revolving electron will be  
 (a)  $\frac{1}{2} \frac{e^2}{r}$  (b)  $-\frac{e^2}{r}$  (c)  $\frac{me^2}{r}$  (d)  $-\frac{1}{2} \frac{e^2}{r}$
3. Which one of the following order represents the correct sequence of the increasing basic nature of the given oxides?  
 (a)  $MgO < K_2O < Al_2O_3 < Na_2O$   
 (b)  $Na_2O < K_2O < MgO < Al_2O_3$   
 (c)  $K_2O < Na_2O < Al_2O_3 < MgO$   
 (d)  $Al_2O_3 < MgO < Na_2O < K_2O$
4. In which of the following pairs of molecules/ions, both the species are not likely to exist?  
 (a)  $H_2^-$ ,  $He_2^{2-}$  (b)  $H_2^{2+}$ ,  $He_2^{2-}$   
 (c)  $H_2^+$ ,  $He_2^{2+}$  (d)  $H_2^+$ ,  $He_2^{2-}$
5. The number of  $90^\circ$  bond angles present in the molecule of  $SF_4$  is  
 (a) 0 (b) 1  
 (c) 2 (d) 3
6. 1 mole of gas X and 2 mol of gas Y enters from the end P and Q of the cylinder, respectively. The cylinder has the same area of cross-section throughout  
  
 The length of the cylinder is 150 cm. The gas X intermixes with gas Y at the point A. If the molecular weight of the gases X and Y is 20 and 80 respectively, then what will distance of point A from Q?  
 (a) 75 cm (b) 50 cm  
 (c) 100 cm (d) 90 cm
7. Standard Gibbs energy change for a reaction is zero. The value of equilibrium constant is  
 (a) 2 (b) 1  
 (c) 3 (d) 4
8. Given that  
 $A(s) \rightarrow A(l); \Delta H = x$   
 $A(l) \rightarrow A(g); \Delta H = -y$   
 The enthalpy of sublimation of A will be  
 (a)  $x + y$  (b)  $x - y$   
 (c)  $x$  or  $y$  (d)  $-(x + y)$
9. In some solutions, the concentration of  $H_3O^+$  remains constant even when small amounts of strong acid or strong base are added to them. These solutions are known as:  
 (a) Ideal solutions (b) Colloidal solutions  
 (c) True solutions (d) Buffer solutions
10. Assuming that degree of hydrolysis is small, the pH of 0.1 M solution of sodium acetate ( $K_a = 1.0 \times 10^{-5}$ ) will be  
 (a) 5.0 (b) 6.0  
 (c) 8.0 (d) 9.0
11. Complete the balancing of the following half reaction, taking place in basic media,  
 $Br^- \rightarrow (aq) \rightarrow BrO_3^-(aq)$   
 How many electrons are needed to balance it?  
 (a) 2 electrons, left side (b) 2 electrons, right side  
 (c) 4 electrons, right side (d) 6 electrons, right side
12. Which of the following is not oxidized by  $O_3$ ?  
 (a) KI (b)  $KMnO_4$   
 (c)  $K_2MnO_4$  (d)  $FeSO_4$
13. What is formed when calcium carbide reacts with heavy water?  
 (a)  $C_2D_2$  (b)  $CaD_2$   
 (c)  $Ca_2D_2O$  (d)  $CD_2$
14. Which of the following statements about  $Na_2O_2$  is not correct?  
 (a) It is diamagnetic in nature  
 (b) It is a derivative of  $H_2O_2$   
 (c)  $Na_2O_2$  oxidizes  $Cr^{3+}$  to  $CrO_4^{2-}$  in acidic medium  
 (d) It is the super oxide of sodium
15. The product formed in the reaction of  $SOCl_2$  with white phosphorus is  
 (a)  $PCl_3$  (b)  $SO_2Cl_2$   
 (c)  $SCl_2$  (d)  $POCl_3$
16. The number of methyl groups present in 2,5-dimethyl-4-ethylheptane is  
 (a) 3 (b) 5  
 (c) 4 (d) 2
17. In the hydroboration - oxidation reaction of propene with diborane,  $H_2O_2$  and NaOH, the organic compound formed is  
 (a)  $CH_3CH_2OH$  (b)  $CH_3CHOHCH_3$   
 (c)  $CH_3CH_2CH_2OH$  (d)  $(CH_3)_3COH$
18. The reaction of propene with  $HOCl$  ( $Cl_2 + H_2O$ ) proceeds through the intermediate:  
 (a)  $CH_3 - CHCl - CH_2^+$  (b)  $CH_3 - CH^+ - CH_2 - OH$   
 (c)  $CH_3 - CH^+ - CH_2 - Cl$  (d)  $CH_3 - CH(OH) - CH_2^+$
19. The major product of the following reaction is  
  
 (a)  (b)   
 (c)  (d) 

20. The number of resonating structures for Dewar's benzene is:  
 (a) 1 (b) 2  
 (c) 3 (d) 4
21. In measurement of BOD<sub>x</sub>, x is generally taken as:  
 (a) 3 (b) 5  
 (c) 7 (d) 9
22. If the unit cell of a material has cubic close packed (ccp) array of oxygen atoms with *m* fraction of octahedral holes occupied by aluminum ions and *n* fraction of tetrahedral holes occupied by magnesium ions, *m* and *n*, respectively, are  
 (a)  $\frac{1}{2}, \frac{1}{8}$  (b)  $1, \frac{1}{4}$   
 (c)  $\frac{1}{2}, \frac{1}{2}$  (d)  $\frac{1}{4}, \frac{1}{8}$
23. The number of solutions among the following which will boil above 373 K is:  
 0.1 M NaCl, 0.1 M glucose, 0.1 M BaCl<sub>2</sub> solution, 0.1 M Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, 0.1 M KNO<sub>3</sub>, 0.1 M Na<sub>2</sub>SO<sub>3</sub>, 0.1 M K<sub>4</sub>[Fe(CN)<sub>6</sub>], 0.1 M KCl.  
 (a) 4 (b) 6  
 (c) 8 (d) 10
24. The depression in freezing point for 1 M urea, 0.5 M glucose, 1 M NaCl, and 1 M K<sub>2</sub>SO<sub>4</sub> are in the ratio *x* : 1 : *y* : *z*. The value of *x* + *z* is:  
 (a) 2 (b) 4  
 (c) 6 (d) 8
25. Given:  
 $Fe^{3+}(aq) + e^{-} \rightarrow Fe^{2+}(aq); E^{\circ} = +0.77V$   
 $Al^{3+}(aq) + 3e^{-} \rightarrow Al(s); E^{\circ} = +1.66V$   
 $Br_2(aq) + 2e^{-} \rightarrow 2Br^{-}; E^{\circ} = +1.09V$   
 Considering the electrode potentials, which of the following represents the correct order of reducing power?  
 (a)  $Fe^{2+} < Al < Br^{-}$  (b)  $Br^{-} < Fe^{2+} < Al$   
 (c)  $Al < Br^{-} < Fe^{2+}$  (d)  $Al < Fe^{2+} < Br^{-}$
26. Identify the correct statement:  
 (a) Corrosion of iron can be minimized by forming a contact with another metal with a higher reduction potential.  
 (b) Iron corrodes in oxygen-free water.  
 (c) Corrosion of iron can be minimized by forming an impermeable barrier at its surface.  
 (d) Iron corrodes more rapidly in salt water because its electrochemical potential is higher.
27. The half-period T for the decomposition of ammonia on tungsten wire was measured for different initial pressures *p* of ammonia at 25°C. Then  

<b>P (mm Hg)</b>	11	21	48	73	120
<b>t (s)</b>	48	92	210	320	525

 (i) it is a zero-order reaction.  
 (ii) it is a first-order reaction.  
 (iii) rate constant for reaction is 0.114 s<sup>-1</sup>.  
 (iv) rate constant for reaction is 1.14 s.  
 (a) (i) (ii) (b) (ii) (iii)  
 (c) (i) (iii) (d) (iii) (iv)
28. Which of the following expressions are correct?  
 (a)  $t_{1/2}(\text{second order}) = \frac{1}{2K[A]_0}$   
 (b)  $t_{1/2}(\text{first order}) = \log \frac{2.303}{k} - \frac{1}{n}$   
 (c)  $t_{1/2}(\text{first order}) = \log \frac{0.693}{k}$   
 (d) None of these
29. Methylene blue, from its aqueous solution, is adsorbed on activated charcoal at 25°C. For this process, the correct statement is:  
 (a) The adsorption requires activation at 25°C  
 (b) The adsorption is accompanied by a decrease in enthalpy.  
 (c) The adsorption increases with increase of temperature.  
 (d) The adsorption is irreversible.
30. Which one of the following ores is known as malachite?  
 (a) Cu<sub>2</sub>O (b) Cu<sub>2</sub>S  
 (c) CuFeS<sub>2</sub> (d) Cu(OH)<sub>2</sub>·CuCO<sub>3</sub>
31. Calamine is an ore of  
 (a) aluminium (b) copper  
 (c) iron (d) zinc
32. The coefficient of H<sub>2</sub>SO<sub>4</sub> on balancing the following equation is:  
 $K_2Cr_2O_7 + H_2SO_4 + KI \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + H_2O + I_2$   
 (a) 7 (b) 6  
 (c) 5 (d) 4
33. An octahedral complex with molecular composition - M. 5NH<sub>3</sub>.Cl.SO<sub>4</sub> has two isomers, A and B. The solution of A gives a white precipitate with AgNO<sub>3</sub> solution and the solution of B gives white precipitate with BaCl<sub>2</sub> solution. The type of isomerism exhibited by the complex is:  
 (a) Linkage isomerism (b) Ionization isomerism  
 (c) Coordinate isomerism (d) Geometrical isomerism
34. In a nucleophilic substitution reaction:  
 $R-Br + Cl^{-} \xrightarrow{DMF} R-Cl + Br^{-}$   
 Which one of the following undergoes complete inversion of configuration?  
 (a) C<sub>6</sub>H<sub>5</sub>CHC<sub>6</sub>H<sub>5</sub>Br (b) C<sub>6</sub>H<sub>5</sub>CH<sub>2</sub>Br  
 (c) C<sub>6</sub>H<sub>5</sub>CH<sub>2</sub>CH<sub>3</sub>Br (d) C<sub>6</sub>H<sub>5</sub>CCH<sub>3</sub>C<sub>6</sub>H<sub>5</sub>Br
35. The number of chiral isomers that are possible for 2-chloro-3-bromobutane is:  
 (a) 1 (b) 2  
 (c) 3 (d) 4
36. What is the final product?  
 $Phenol \xrightarrow[AlCl_3]{tert\text{-butyl chloride}} C_{10}H_{14}O \xrightarrow[2. CH_3CH_2I]{1. NaOH} \text{para-isomer}$   
 (a) 1-*tert*-Butyl-4-ethoxybenzene  
 (b) 1-*tert*-Butyl-4-ethylbenzene  
 (c) 1-*tert*-Butoxy-4-ethoxybenzene  
 (d) *tert*-Butyl ethyl ether
37. The ether  when treated with HX produces



(d) None of these

38. The smallest ketone and its next homologue are reacted with  $\text{NH}_2\text{OH}$  to form oxime.

- (a) Two different oximes are formed.  
 (b) Three different oximes are formed.  
 (c) Two oximes are optically active.  
 (d) All oximes are optically active

39. The correct statement about the synthesis of erythritol ( $\text{C}(\text{CH}_2\text{OH})_4$ ) used in the preparation of PETN is:

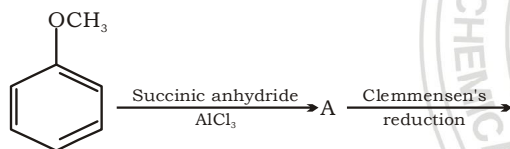
- (a) The synthesis requires three aldol condensation and one Cannizzaro reaction.  
 (b) Alpha hydrogens of ethanol and methanol are involved in this reaction.  
 (c) The synthesis requires two aldol condensations and two Cannizzaro reactions.  
 (d) The synthesis requires four aldol condensations between methanol and ethanol.

40. The number of acids among the following that do not contain a  $\text{COOH}$  group is.

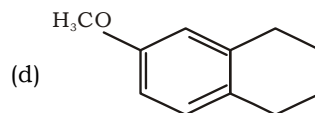
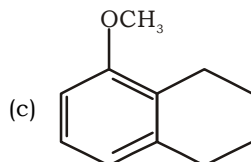
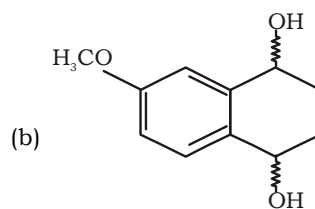
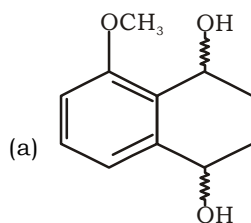
Picric acid, lactic acid, propanoic acid, carbolic acid

- (a) 2 (b) 1  
 (c) 0 (d) 4

41. Consider the reaction sequence below:



x is:



42. Fluorobenzene ( $\text{C}_6\text{H}_5\text{F}$ ) can be synthesized in the laboratory

- (a) by heating phenol with  $\text{HF}$  and  $\text{KF}$ .  
 (b) from aniline by diazotization followed by heating the diazonium salt with  $\text{HBF}_4$ .  
 (c) by direct fluorination of benzene with  $\text{F}_2$  gas.  
 (d) by reacting bromobenzene with  $\text{NaF}$  solution.

43. The test to distinguish primary, secondary and tertiary amines is:

- (a) Sandemeyer's reaction (b) Carbylamine reaction  
 (c) Mustard oil test (d)  $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$

44. Among cellulose, poly(vinyl chloride), nylon and natural rubber, the polymer in which the intermolecular force of attraction is weakest is

- (a) nylon (b) poly(vinyl chloride).  
 (c) cellulose (d) natural rubber

45. Vitamin  $\text{B}_6$  is known as

- (a) pyridoxine (b) thiamine  
 (c) tocopherol (d) riboflavin

## PHYSICS

### Single Correct Choice Type

This section contains 45 questions numbered 46 to 90. Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct.

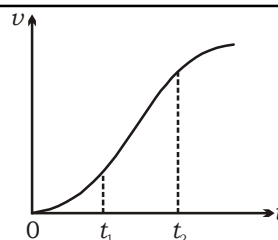
46. Which of the following statements is incorrect regarding significant figures?

- (a) All the non-zero digits are significant.  
 (b) All the zeros between two non-zero digits are significant.  
 (c) Greater the number of significant figures in a measurement, smaller is the percentage error.  
 (d) The power of 10 is counted while counting the number of significant figures.

47. A body sliding on a smooth inclined plane requires 4 seconds to reach the bottom, starting from rest at the top. How much time does it take to cover one-fourth the distance starting from rest at the top?

- (a) 1 s (b) 4 s  
 (c) 2 s (d) 16 s

48. The velocity-time graph of a particle in one-dimensional motion is shown in the figure. Which of the following formulae is correct for describing the motion of the particle over the time interval  $t_1$  to  $t_2$ ?



- (a)  $x(t_2) = x(t_1) + v(t_1)(t_2 - t_1) + \left(\frac{1}{2}\right)a(t_2 - t_1)^2$   
 (b)  $v(t_2) = v(t_1) + a(t_2 - t_1)$   
 (c)  $v_{\text{average}} = \frac{x(t_2) + x(t_1)}{(t_2 - t_1)}$   
 (d)  $a_{\text{average}} = \frac{v(t_2) - v(t_1)}{(t_2 - t_1)}$

49. The component of vector  $\vec{A} = 2\hat{i} + 3\hat{j}$  along the direction of  $(\hat{i} - \hat{j})$  is

- (a)  $\frac{1}{\sqrt{2}}$  (b)  $-\frac{1}{\sqrt{2}}$   
 (c)  $\frac{1}{2}$  (d)  $-\frac{1}{2}$

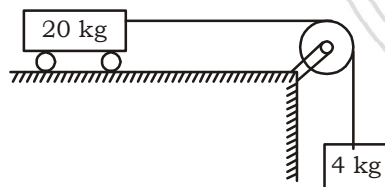
50. When air resistance is taken into account while dealing with the motion of the projectile which of the following properties of the projectile, shows an increase?

- (a) range  
 (b) maximum height  
 (c) speed at which it strikes the ground  
 (d) the angle at which the projectile strikes the ground.

51. A ball is travelling with uniform translatory motion. This means that:

- (a) it is at rest.  
 (b) the path can be a straight line or circular and the ball travels with uniform speed.  
 (c) all parts of the ball have the same velocity (magnitude and direction) and the velocity is constant.  
 (d) the centre of the ball moves with constant velocity and the ball spins about its centre uniformly.

52. A trolley of mass 20 kg is attached to a block of mass 4 kg by a massless string passing over a frictionless pulley as shown in the figure. If the coefficient of kinetic friction between trolley and the surface is 0.02, then the acceleration of the trolley and block system is (Take  $g = 10 \text{ m s}^{-2}$ )



- (a)  $1 \text{ m s}^{-2}$  (b)  $2 \text{ m s}^{-2}$   
 (c)  $1.5 \text{ m s}^{-2}$  (d)  $2.5 \text{ m s}^{-2}$

53. A running man has half the kinetic energy than a boy of half his mass has. The man speed up by  $1.0 \text{ m s}^{-1}$  and then he has the same energy as the boy. The original speeds of the man and boy respectively are

- (a)  $2.4 \text{ m s}^{-1}$ ,  $1.2 \text{ m s}^{-1}$  (b)  $1.2 \text{ m s}^{-1}$ ,  $4.4 \text{ m s}^{-1}$   
 (c)  $2.4 \text{ m s}^{-1}$ ,  $4.8 \text{ m s}^{-1}$  (d)  $4.8 \text{ m s}^{-1}$ ,  $2.4 \text{ m s}^{-1}$

54. Which of the following principles a circus acrobat employs in his performance?

- (a) Conservation of energy  
 (b) Conservation of linear momentum  
 (c) Conservation of mass  
 (d) Conservation of angular momentum

55. As observed from earth, the sun appears to move in an approximate circular orbit. For the motion of

another planet like mercury as observed from earth, this would

- (a) be similarly true.  
 (b) not be true because the force between earth and mercury is not inverse square law.  
 (c) not be true because the major gravitational force on mercury is due to sun.  
 (d) not be true because mercury is influenced by forces other than gravitational forces.

56. Which of the following statements is correct about satellites?

- (a) A satellite cannot move in a stable orbit in a plane passing through the earth's centre.  
 (b) Geostationary satellites are launched in the equatorial plane.  
 (c) We can use just one geostationary satellite for global communication around the globe.  
 (d) The speed of satellite increases with an increase in the radius of its orbit.

57. A copper and a steel wire of the same diameter are connected end to end. A deforming force  $F$  is applied to this composite wire which causes a total elongation of 1 cm. The two wires will have

- (a) the same stress and strain  
 (b) the same stress but different strain  
 (c) the same strain but different stress  
 (d) different strains and stress

58. For a perfectly rigid body

- (a) Young's modulus is infinite and bulk modulus is zero  
 (b) Young's modulus is zero and bulk modulus is infinite.  
 (c) Young's modulus is infinite and bulk modulus is also infinite  
 (d) Young's modulus is zero and bulk modulus is also zero

59. Pressure at a point inside a liquid does not depend on

- (a) the nature of the liquid  
 (b) shape of the container.  
 (c) the depth of point below the surface of the liquid  
 (d) acceleration due to gravity at the point

60. Two capillaries of same length and radii in the ratio 1 : 2 are connected in series. A liquid flows through them in streamlined condition. If the pressure across the two extreme ends of the combination is 1 m of water, the pressure difference across first capillary is

- (a) 9.4 m (b) 4.9 m  
 (c) 0.49 m (d) 0.94 m

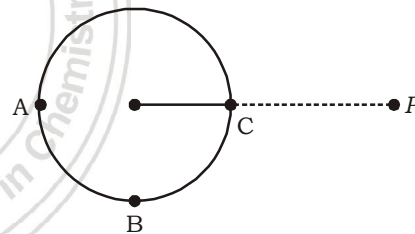
61. The latent heat of vaporisation of a substance is always

- (a) greater than its latent heat of fusion  
 (b) greater than its latent heat of sublimation  
 (c) equal to its latent heat of sublimation  
 (d) less than its latent heat of fusion

62. The rate of cooling at 600 K, if surrounding temperature is 300 K is  $H$ . The rate of cooling at 900 K is

- (a)  $\frac{16}{3}H$  (b)  $2H$   
 (c)  $3H$  (d)  $\frac{2}{3}H$

63. In changing the state of a gas adiabatically from an equilibrium state A to another equilibrium state B an amount of work equal to 22.3 J is done on the system. If the gas is taken from state A to B via a process in which the net heat absorbed by the system is 9.35 cal then the net work done by the system in latter case is (Take 1 cal = 4.2 J)
- (a) 15 J (b) 16 J  
(c) 17 J (d) 18 J
64. In the given reaction which of the following nuclear fusion reaction is not possible?
- (a)  ${}^{13}_6\text{C} + {}^1_1\text{H} \rightarrow {}^{14}_6\text{C} + 4.3 \text{ MeV}$   
(b)  ${}^{12}_6\text{C} + {}^1_1\text{H} \rightarrow {}^{13}_7\text{N} + 2 \text{ MeV}$   
(c)  ${}^{14}_7\text{N} + {}^1_1\text{H} \rightarrow {}^{15}_8\text{O} + 7.3 \text{ MeV}$   
(d)  ${}^{235}_{92}\text{C} + {}^1_0\text{n} \rightarrow {}^{140}_{54}\text{Xe} + {}^{94}_{38}\text{Sr} + {}^1_0\text{n} + 200 \text{ MeV}$
65. Two moles of a gas A at 27°C mixed with a 3 moles of gas at 37°C. If both are monoatomic ideal gases, what will be the temperature of the mixture?
- (a) 66 °C (b) 11 °C  
(c) 22 °C (d) 33 °C
66. The temperature of an ideal gas is increased from 120 K to 480 K. If at 120 K, the rms velocity of the gas molecules is  $v_{rms}$ , then at 480 K, it becomes
- (a)  $4v_{rms}$  (b)  $2v_{rms}$   
(c)  $\frac{v_{rms}}{2}$  (d)  $\frac{v_{rms}}{4}$
67. Simple harmonic motion, at the extreme positions
- (a) kinetic energy is minimum, potential energy is maximum.  
(b) kinetic energy is maximum, potential energy is minimum.  
(c) both kinetic and potential energies are maximum.  
(d) both kinetic and potential energies are minimum.
68. A block of mass 200 g executing SHM under the influence of a spring of spring constant  $k = 90 \text{ N m}^{-1}$  and a damping constant  $b = 40 \text{ g s}^{-1}$ . The time elapsed for its amplitude to drop to half of its initial value is (Given  $\ln(1/2) = -0.693$ )
- (a) 7 s (b) 9 s  
(c) 4 s (d) 11 s
69. A wave travelling along the x-axis is described by the equation  $y(x, t) = 0.005 \sin(\alpha x - \beta t)$ . If the wavelength and time period of the wave are 0.08 m and 2 s respectively, then  $\alpha, \beta$  in appropriate units are
- (a)  $\alpha = 25\pi, \beta = \pi$  (b)  $\alpha = \frac{0.08}{\pi}, \beta = \frac{2}{\pi}$   
(c)  $\alpha = \frac{0.04}{\pi}, \beta = \frac{1}{\pi}$  (d)  $\alpha = 12.5\pi, \beta = \frac{\pi}{2}$
70. Sound waves travel at 350 m s<sup>-1</sup> through a warm air and at 3500 m s<sup>-1</sup> through brass. The wavelength of a 700 Hz acoustic wave as it enters brass from warm air
- (a) decrease by a factor 10  
(b) increase by a factor 20  
(c) increase by a factor 10  
(d) decrease by a factor 20
71. Consider a region inside which there are various types of charges but the total charge is zero. At points outside the region
- (a) the electric field is necessarily zero.  
(b) the electric field is due to the dipole moment of the charge distribution only.  
(c) the dominant electric field is inversely proportional to  $r^3$ , for large  $r$  (distance from origin).  
(d) the work done to move a charged particle along a closed path, away from the region will not be zero.
72. A point charge  $+q$ , is placed at a distance  $d$  from an isolated conducting plane. The field at a point P on the other side of the plane is:
- (a) directed perpendicular to the plane and away from the plane.  
(b) directed perpendicular to the plane but towards the plane.  
(c) directed radially away from the point charge.  
(d) directed radially towards the point charge.
73. A hollow conducting sphere is placed in an electric field produced by a point charge placed at P as shown in figure. Let  $V_A, V_B, V_C$  be the potential at point A, B and C respectively, then

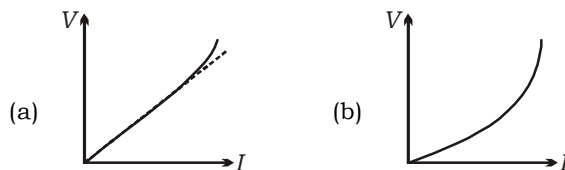


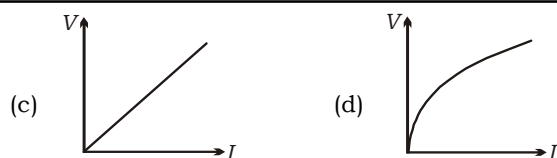
- (a)  $V_C > V_B$  (b)  $V_A > V_B$   
(c)  $V_B > V_C$  (d)  $V_A = V_C$

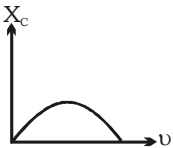
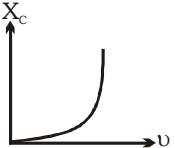
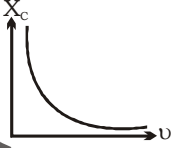
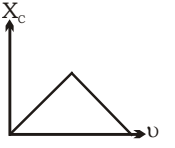
74. If a charged spherical conductor of radius 10 cm has potential V at a point distance 5 cm from its centre, then the potential at a point distance 15 cm from the centre will be

- (a) 3V (b)  $\frac{3}{2}V$   
(c)  $\frac{2}{3}V$  (d)  $\frac{1}{3}V$

75. Which of the following is correct for  $V-I$  graph a good conductor?





76. Range of resistivity for metals is  
 (a)  $10^{-6} \Omega \text{ m}$  to  $10^{-4} \Omega \text{ m}$  (b)  $10^{-7} \Omega \text{ m}$  to  $10^{-5} \Omega \text{ m}$   
 (c)  $10^{-8} \Omega \text{ m}$  to  $10^{-6} \Omega \text{ m}$  (d)  $10^{-9} \Omega \text{ m}$  to  $10^{-7} \Omega \text{ m}$
77. In an inertial frame of reference, the magnetic force on a moving charged particle is  $\vec{F}$ . Its value in another inertial frame of reference will be  
 (a) remain same  
 (b) changed due to change in the amount of charge  
 (c) changed due to change in velocity of charged particle  
 (d) changed due to change in field direction
78. Which of the following is not showing the essential difference between electrostatic shielding by a conducting shell and magnetostatic shielding?  
 (a) Electrostatic field lines can end on charges and conductors have free charges.  
 (b) Magnetic field lines can end but conductors cannot end them.  
 (c) Lines of magnetic field cannot end on any material and perfect shielding is not possible.  
 (d) Shells of high permeability materials can be used to divert lines of magnetic field from the interior region.
79. A conducting ring of radius  $r$  is placed in a varying magnetic field perpendicular to the plane of the ring if the rate at which the magnetic field varies is  $x$ , the electric field intensity at any point of the ring is  
 (a)  $rx$  (b)  $\frac{rx}{2}$   
 (c)  $2rx$  (d)  $\frac{4r}{x}$
80. In an inductor of self-inductance  $L = 2 \text{ mH}$ , current changes with time according to relation,  $I = t^2 e^{-1}$ . At what time emf is zero?  
 (a) 4 s (b) 3 s  
 (c) 2 s (d) 1 s
81. Which of the following graphs represents the correct variation of capacitive reactance  $X_C$  with frequency  $\nu$ ?  
 (a)  (b)   
 (c)  (d) 
82. A power transmission line feeds input power at 2400 V to a step down transformer with its primary windings having 4000 turns. What should be the number of turns in the secondary windings in order to get output power at 240 V?  
 (a) 400 (b) 420  
 (c) 424 (d) 436
83. The charge on a parallel plate capacitor varies as  $q = q_0 \cos 2\pi\nu t$ . The plates are very large and close together (area =  $A$ , separation =  $d$ ). The displacement current through the capacitor is  
 (a)  $q_0 2\pi\nu \sin \pi\nu t$  (b)  $-q_0 2\pi\nu \sin 2\pi\nu t$   
 (c)  $q_0 2\pi \sin \pi\nu t$  (d)  $q_0 \pi\nu \sin 2\pi\nu t$
84. X-rays, gamma rays and microwaves travelling in vacuum have  
 (a) same wavelength but different velocities  
 (b) same frequency but different velocities  
 (c) same velocity but different wavelengths  
 (d) same velocity and same frequency
85. Two plane mirrors are placed parallel to each other at a distance  $L$  apart, A point object  $O$  placed between them, at a distance  $L/3$  from one mirror. Both mirrors form multiple images. The distance between any two images cannot be  
 (a)  $\frac{3L}{2}$  (b)  $\frac{2L}{3}$   
 (c)  $2L$  (d)  $L$
86. Two slits in young's double slit experiment have widths in the ratio 81 : 1. The ratio of the amplitudes of light waves is.  
 (a) 3 : 1 (b) 3 : 2  
 (c) 9 : 1 (d) 6 : 1
87. In a double slit interference pattern, the first maxima for infrared light would be  
 (a) at the same place as the first maxima for green light  
 (b) closer to the centre than the first maxima for green light  
 (c) farther from the centre than the first maxima for green light  
 (d) infrared light does not produce an interference pattern
88. Electrons with de Broglie wavelength  $\lambda$  fall on the target in an X ray tube. The cut off wavelength ( $\lambda_0$ ) of the emitted X rays is  
 (a)  $\lambda_0 = \frac{2mc\lambda^2}{h}$  (b)  $\lambda_0 = \frac{2h}{mc}$   
 (c)  $\lambda_0 = \frac{2m^2c^2\lambda^2}{h^2}$  (d)  $\lambda_0 = \lambda$
89. An electron (mass  $m$ ) with an initial velocity  $\vec{v} = \nu_0 \hat{i}$  is in an electric field  $\vec{E} = E_0 \hat{j}$ . If  $\lambda_0 = \frac{h}{m\nu_0}$ , it's de Broglie wavelength at time  $t$  is given by

(a)  $\lambda_0$  (b)  $\lambda_0 \sqrt{1 + \frac{e^2 E_0^2 t^2}{m^2 v_0^2}}$

(c)  $\frac{\lambda_0}{\sqrt{1 + \frac{e^2 E_0^2 t^2}{m^2 v_0^2}}}$  (d)  $\left( \frac{\lambda_0}{1 + \frac{e^2 E_0^2 t^2}{m^2 v_0^2}} \right)$

90. An electron is in an excited state in a hydrogen like atom. It has a total energy of -3.4 eV. The kinetic

energy of the electron is E and its de Broglie wavelength is  $\lambda$ . Then

(a)  $E = 6.8 \text{ eV}, \lambda = 6.6 \times 10^{-10} \text{ m}$

(b)  $E = 3.4 \text{ eV}, \lambda = 6.6 \times 10^{-10} \text{ m}$

(c)  $E = 3.4 \text{ eV}, \lambda = 6.6 \times 10^{-11} \text{ m}$

(d)  $E = 6.8 \text{ eV}, \lambda = 6.6 \times 10^{-11} \text{ m}$

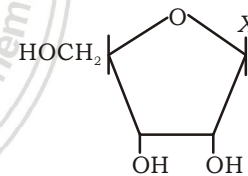
## BIOLOGY

### Single Correct Choice Type

This section contains 90 questions numbered 91 to 180. Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct.

91. Praying mantis is a good example of  
 (a) warning colouration (b) social insects  
 (c) camouflage (d) mullerian mimicry
92. Homeostasis is  
 (a) tendency to change with change in environment  
 (b) tendency to resist change  
 (c) disturbance in regulatory control  
 (d) plants and animals extracts used in homeopathy
93. Pigment-containing membranous extensions in some cyanobacteria are  
 (a) heterocysts (b) basal bodies  
 (c) pneumatophores (d) chromatophores
94. Viruses are no more 'alive' than isolated chromosomes because  
 (a) both require the environment of a cell to replicate  
 (b) they require both RNA and DNA  
 (c) they both need food molecules  
 (d) they both require oxygen for respiration
95. Excretion in Amoeba occurs through  
 (a) lobopodia (b) uroid portion  
 (c) plasma membrane (d) contractile vacuole
96. Malignant tertian malarial is caused by  
 (a) *Plasmodium falciparum* (b) *P. vivax*  
 (c) *P. ovale* (d) *P. malariae*
97. Which pair of the following belongs to Basidiomycetes?  
 (a) Birds nest fungi and puff balls  
 (b) Puff balls and *Claviceps*  
 (c) *Peziza* and stink horns  
 (d) *Morchella* and mushrooms
98. Adhesive pad of fungi penetrates the host with the help of  
 (a) mechanical pressure and enzymes  
 (b) hooks and suckers  
 (c) softening by enzymes  
 (d) only by mechanical pressure
99. Select the wrong statement.  
 (a) Isogametes are similar in structure, function and behaviour  
 (b) Anisogametes differ either in structure, function and behaviour  
 (c) In oomycetes female gamete is smaller and motile, while male gamete is larger and non-motile  
 (d) *Chlamydomonas* exhibits both isogamy and anisogamy and *Fucus* show oogamy
100. Auxospores and hormocysts are formed respectively by  
 (a) several diatoms and a few cyanobacteria  
 (b) several cyanobacteria and several diatoms  
 (c) some diatoms and several cyanobacteria  
 (d) some cyanobacteria and many diatoms
101. The plant body of moss (*Funaria*) is  
 (a) completely sporophyte  
 (b) completely gametophyte  
 (c) predominantly sporophyte with gametophyte  
 (d) predominantly gametophyte with sporophyte
102. In *Ulothrix/Spirogyra*, reduction division (meiosis) occurs at the time of  
 (a) gamete formation (b) zoospore formation  
 (c) zygospore germination (d) vegetative reproduction
103. One of the representative of Phylum-Arthropoda is  
 (a) cuttle fish (b) silver fish  
 (c) puffer fish (d) flying fish
104. In which one of the following the genus name, its two characters and its class/phylum are correctly matched?
- | Genus                 | Two characters  | Class / phylum |
|-----------------------|---|----------------|
| (a) <i>Salamandra</i> | (i) A tympanum represents ear<br>(ii) Fertilisation is external | Amphibia       |
| (b) <i>Pteropus</i>   | (i) Skin possesses hair<br>(ii) Oviparous                       | Mammalia       |
| (c) <i>Aurelia</i>    | (i) Cnidoblast<br>(ii) Organ level of organisation              | Coelenterata   |
| (d) <i>Ascaris</i>    | (i) Body segmented<br>(ii) Males and females distinct           | Annelida       |
105. If a live earthworm is pricked with a needle on its outer surface without damaging its gut, the fluid that comes out is  
 (a) excretory fluid (b) coelomic fluid  
 (c) haemolymph (d) slimy mucus
106. Which one of the following is matching pair of an animal and a certain phenomenon it exhibits?  
 (a) Chameleon - Mimicry  
 (b) Taenia - Polymorphism  
 (c) Pheretima - Sexual dimorphism  
 (d) Musca - Complete metamorphosis

107. Functionwise, just as there are nephridia in an earthworm, so are  
 (a) parotid glands in toad  
 (b) statocysts in prawn  
 (c) flame cells in liver fluke  
 (d) myotomes in fish
108. What is common in whale, bat and rat?  
 (a) Absence of neck  
 (b) Muscular diaphragm between thorax and abdomen  
 (c) Extra-abdominal testes to avoid high temperature of body  
 (d) Presence of external ears
109. **Assertion (A)** Periplaneta americana is nocturnal, omnivorous, household pest.  
**Reason (R)** It is because it acts as scavenger.  
 (a) A is true, but R is false  
 (b) A is false, but R is true  
 (c) Both A and R are true and R is correct explanation of A  
 (d) Both A and R are true, but R is not correct explanation of A
110. Hair occur in all mammals except those of  
 (a) Rodentia (b) Chiroptera  
 (c) Primata (d) Cetacea
111. In China rose the flowers are  
 (a) actinomorphic, hypogynous with twisted aestivation  
 (b) actinomorphic, epigynous with valvate aestivation  
 (c) zygomorphic, hypogynous with imbricate aestivation  
 (d) zygomorphic, epigynous with twisted aestivation
112. Perisperm differs from endosperm in  
 (a) being a haploid tissue  
 (b) having no reserve food  
 (c) being a diploid tissue  
 (d) its formation by fusion of secondary nucleus with several sperms
113. A drupe develops in  
 (a) wheat (b) pea  
 (c) tomato (d) mango
114. A perennial plant differs from biennial in  
 (a) having underground perennating structure  
 (b) having asexual reproductive structures  
 (c) being tree species  
 (d) not dying after seasonal production of flowers
115. Oil reserve of groundnut is present in  
 (a) embryo (b) cotyledons  
 (c) endosperm (d) underground tubers
116. Anatomically fairly old dicotyledonous root is distinguished from the dicotyledonous stem by  
 (a) absence of secondary xylem  
 (b) absence of secondary phloem  
 (c) presence of cortex  
 (d) position of protoxylem
117. For union between stock and scion in grafting which one is the first to occur?  
 (a) Formation of callus  
 (b) Production of plasmodesmata  
 (c) Differentiation of new vascular tissues  
 (d) Regeneration of cortex and epidermis
118. The kind of epithelium which forms the inner walls of blood vessels is  
 (a) cuboidal epithelium  
 (b) columnar epithelium  
 (c) ciliated columnar epithelium  
 (d) squamous epithelium
119. Simple epithelium is a tissue in which the cells are  
 (a) hardened and provide support to the organ  
 (b) cemented directly to one another to form a single layer  
 (c) continuously dividing to provide form to an organ  
 (d) loosely connected to one another to form an irregular organ
120. Characteristics of smooth muscle fibres are  
 (a) spindle-shaped, unbranched, unstriated, uninucleate and involuntary  
 (b) spindle-shaped, unbranched, unstriped, multinucleate and involuntary  
 (c) cylindrical, unbranched, unstriped, multinucleate and involuntary  
 (d) cylindrical, unbranched, unstriated, multinucleate and voluntary
121. Which structure perform the function of mitochondria in bacteria?  
 (a) Nucleoid (b) Ribosomes  
 (c) Cell wall (d) Mesosomes
122. Cytoskeleton is made up of  
 (a) calcium carbonate granules  
 (b) callose deposits  
 (c) cellulosic microfibrils  
 (d) proteinaceous filaments
123. Photosynthetic bacteria have pigments in  
 (a) chromoplasts (b) leucoplasts  
 (c) chloroplasts (d) chromatophore
124. Given below is the diagrammatic representation of one of the categories of small molecular weight organic compounds in the living tissues. Identify the category shown and the one blank component X in it



- | Category        | - | Component       |
|-----------------|---|-----------------|
| (a) Cholesterol | - | Guanine         |
| (b) Amino acid  | - | NH <sub>2</sub> |
| (c) Nucleotide  | - | Adenine         |
| (d) Nucleoside  | - | Uracil          |
125. During gamete formation, the enzyme recombinase participated during  
 (a) metaphase - I (b) anaphase - II  
 (c) prophase - I (d) prophase - II
126. Which one of the following precedes reformation of the nuclear envelope during M-phase of the cell cycle?  
 (a) Decondensation from chromosomes and reassembly of the nuclear lamina  
 (b) Transcription from chromosomes and reassembly of the nuclear lamina  
 (c) Formation of the contractile ring and formation of the phragmoplast  
 (d) Formation of the contractile ring and transcription from chromosomes
127. Number of chromatids at metaphase is  
 (a) two each in mitosis and meiosis  
 (b) two in mitosis and one in meiosis  
 (c) two in mitosis and four in meiosis  
 (d) one in mitosis and two in meiosis



128. Two cells A and B are contiguous. Cell A has osmotic pressure 10 atm, turgor pressure 7 atm and diffusion pressure deficit 3 atm. Cell B has osmotic pressure 8 atm, turgor pressure 3 atm and diffusion pressure deficit 5 atm. The result will be  
 (a) movement of water from cell B - A  
 (b) no movement of water  
 (c) equilibrium between the two  
 (d) movement of water from cell A - B
129. Which of the following is an effective adaptation for better gas exchange in plants?  
 (a) Presence of multiple epidermis  
 (b) Presence of hair on the lower epidermis  
 (c) Presence of waxy cuticle covering the epidermis of the leaves  
 (d) The location of the stomata primarily on the lower surface of the leaf, the side turned away from the direct sun rays
130. Nitrifying bacteria  
 (a) convert free nitrogen to nitrogen compounds  
 (b) convert proteins into ammonia  
 (c) reduce nitrates to free nitrogen  
 (d) oxidise ammonia to nitrates
131. Phosphorus and nitrogen ions generally get depleted in soil because they usually occur as  
 (a) neutral ions  
 (b) negatively charged ions  
 (c) positively charged ions  
 (d) both positively and negatively charged but disproportionate mixture
132. Cyclic-photophosphorylation results in the formation of  
 (a) NADPH (b) ATP and NADPH  
 (c) ATP, NADPH and  $O_2$  (d) ATP
133. The first acceptor of electrons from an excited chlorophyll molecule of photosystem-II is  
 (a) cytochrome (b) iron-sulphur protein  
 (c) ferredoxin (d) quinone
134. In sugarcane plant  $^{14}CO_2$  is fixed in malic acid, in which the enzyme that fixes  $CO_2$  is  
 (a) fructose phosphatase  
 (b) ribulose biphosphate carboxylase  
 (c) phosphoenol pyruvic acid carboxylase  
 (d) ribulose phosphate kinase
135. The size of chlorophyll molecule is  
 (a) head  $15 \times 15 \text{ \AA}$ , tail  $25 \text{ \AA}$   
 (b) head  $20 \times 20 \text{ \AA}$ , tail  $25 \text{ \AA}$   
 (c) head  $15 \times 15 \text{ \AA}$ , tail  $20 \text{ \AA}$   
 (d) head  $10 \times 12 \text{ \AA}$ , tail  $25 \text{ \AA}$
136. The three boxes in this diagram represent the three major biosynthetic pathways in aerobic respiration. Arrows represent net reactants or products
- 
- Arrows numbered 4, 8, and 12 can all be  
 (a) NADH (b) ATP  
 (c)  $H_2O$  (d)  $FAD^+$  or  $FADH_2$
137. Link between glycolysis, Krebs' cycle and  $\beta$ -oxidation of fatty acid or carbohydrate and fat metabolism is  
 (a) oxaloacetic acid (b) succinic acid  
 (c) citric acid (d) acetyl Co-A
138. Emp can produce a total of  
 (a) 6 ATP (b) 8 ATP  
 (c) 24 ATP (d) 38 ATP
139. A few normal seedlings of tomato were kept in a dark room. After a few days they were found to have become white-coloured like albinos. Which of the following terms will you use to describe them?  
 (a) Mutated (b) Embolised  
 (c) Etiolated (d) Defoliated
140. One set of a plant was grown at 12 hr day and 12 hr night period cycles and it flowered while in the other set night phase was interrupted by flash of light and it did not produce flower. Under which one of the following categories will you place this plant?  
 (a) Long-day (b) Darkness neutral  
 (c) Day neutral (d) Short day
141. Hormone primarily connected with cell division is  
 (a) IAA (b) NAA  
 (c) cytokinin/zeatin (d) gibberellic acid
142. A young infant may be feeding entirely on mother's milk, which is white in colour but the stools, which the infant passes out is quite yellowish. What is this yellow colour due to  
 (a) Intestinal juice  
 (b) Bile pigments passed through bile juice  
 (c) Undigested milk protein casein  
 (d) Pancreatic juice poured into duodenum
143. A patient is generally advised to specially, consume more meat, lentils, milk and eggs in diet only when he suffers from  
 (a) kwashiorkor (b) rickets  
 (c) anaemia (d) scurvy
144. Vitamin - K is required for  
 (a) change of prothrombin to thrombin  
 (b) synthesis of prothrombin  
 (c) change of fibrinogen to fibrin  
 (d) formation of thromboplastin
145. Listed below are four respiratory capacities (1- 4) and four jumbled respiratory volumes of a normal human adult
- | Respiratory Capacities        | Respiratory Volumes |
|-------------------------------|---------------------|
| 1. Residual volume            | 2500 mL             |
| 2. Vital capacity             | 3500 mL             |
| 3. Inspiratory reserve volume | 1200 mL             |
| 4. Inspiratory capacity       | 4500 mL             |
- Which one of the following is the correct matching of two capacities and volumes?  
 (a) (2) 2500 mL, (3) 4500 mL  
 (b) (3) 1200 mL, (4) 2500 mL  
 (c) (4) 3500 mL, (1) 1200 mL  
 (d) (1) 4500 mL, (2) 3500 mL
146. Air is breathed through  
 (a) trachea - lungs - larynx - pharynx - alveoli  
 (b) nose - larynx - pharynx - bronchus - alveoli - bronchioles  
 (c) nostrils - pharynx - larynx - trachea - bronchi - bronchioles - alveoli  
 (d) nose - mouth - lungs
147. 'Bundle of His' is a part of which one of the following organs in humans?  
 (a) Heart (b) Kidney  
 (c) Pancreas (d) Brain

148. Which one of the following statements about blood constituents and transport of respiratory gases is most accurate?
- RBCs transport oxygen whereas WBCs transport  $\text{CO}_2$
  - RBCs transport oxygen whereas plasma transports only  $\text{CO}_2$
  - RBCs as well as WBCs transport both oxygen and  $\text{CO}_2$
  - RBCs as well as plasma transport both oxygen and  $\text{CO}_2$
149. Dup sound is produced during closure of
- semilunar valves
  - bicuspid valve
  - tricuspid valve
  - Both (b) and (c)
150. Which one of the following statements is correct with respect to kidney function regulation?
- Exposure to cold temperature stimulates ADH release
  - An increase in glomerular blood flow stimulates formation of angiotensin-II
  - During summer when body loses lot of water by evaporation, the release of ADH is suppressed
  - When someone drinks lot of water ADH release is supposed
151. Which one of the following pair of items correctly belongs to the category of organs mentioned against it?
- Thorn of Bougainvillea - Analogous organs
  - Nictitating membrane - Vestigial organs
  - Nephridia of earthworm - Excretory organs
  - Wings of honey bee - Homologous organs
152. Nitrogenous waste products are eliminated mainly as
- urea in tadpole and ammonia in adult frog
  - ammonia in tadpole and urea in adult frog
  - urea in both tadpole and adult frog
  - urea in tadpole and uric acid in adult frog
153. Select the correct statement regarding the specific disorder of muscular or skeletal system.
- Muscular dystrophy - Age related shortening of muscles
  - Osteoporosis - Decrease in bone mass and higher chances of fractures with advancing age
  - Myasthenia gravis - Autoimmune disorder which inhibits sliding of myosin filaments
  - Gout - Inflammation of joints due to extra deposition of calcium
154. Ligament is a
- modified yellow elastic fibrous tissue
  - inelastic white fibrous tissue
  - modified white fibrous tissue
  - None of the above
155. An action potential in the nerve fibre is produced when positive and negative charges on the outside and the inside of the axon membrane are reversed, because
- more potassium ions enter the axon as compared to sodium ions leaving it
  - more sodium ions enter the axon as compared to potassium ions leaving it
  - all potassium ions leave the axon
  - all sodium ions enter the axon
156. Afferent nerve fibres carry impulses from
- effector organs to CNS
  - receptors to CNS
  - CNS to receptors
  - CNS to muscles
157. Select the answer which correctly matches the endocrine gland with the hormone it secretes and its function/deficiency symptom
- | Endocrine gland         | Hormone             | Function/deficiency symptoms                     |
|-------------------------|---------------------|--|
| (a) Anterior pituitary  | Oxytocin            | Stimulates uterus contraction during child birth |
| (b) Posterior pituitary | Growth Hormone (GH) | Oversecretion stimulates abnormal growth         |
| (c) Thyroid gland       | Thyroxine           | Lack of iodine in diet results in goitre         |
| (d) Corpus luteum       | Testosterone        | Stimulates spermatogenesis                       |
158. Which one of the following pairs is incorrectly matched?
- Glucagon - Beta cells (source)
  - Somatostatin - Delta cells (source)
  - Corpus luteum - Relaxin (secretion)
  - Insulin - Diabetes mellitus (disease)
159. Why is vivipary an undesirable character for annual crop plants?
- It reduces the vigour of the plant
  - It adversely affects the fertility of the plant
  - The seeds exhibit long dormancy
  - The seeds cannot be stored under normal conditions for the next season
160. A population of genetically identical individuals, obtained from asexual reproduction is
- callus
  - clone
  - deme
  - aggregate
161. The scutellum observed in a grain of wheat or maize is comparable to which part of the seed in other monocotyledons?
- Cotyledon
  - Endosperm
  - Aleurone layer
  - Plumule
162. Select the correct option describing gonadotropin activity in a normal pregnant female
- High level of FSH and LH stimulates the thickening of endometrium
  - High level of FSH and LH facilitate implantation of the embryo
  - High level of hCG stimulates the synthesis of estrogen and progesterone
  - High level of hCG stimulates the thickening of endometrium
163. Which one of the following statements about morula in human is correct?
- It has almost equal quantity of cytoplasm as an uncleaved zygote but much more DNA
  - It has far less cytoplasm as well as less DNA than in an uncleaved zygote

- (c) It has more or less equal quantity of cytoplasm and DNA  
(d) It has more cytoplasm and more DNA than an uncleaved zygote
164. One of the legal methods of birth control is  
(a) abortion by taking an appropriate medicine  
(b) by abstaining from coitus from day 10 - 17 of the menstrual cycle  
(c) by having coitus at the time of day break  
(d) by a premature ejaculation during coitus
165. Certain characteristic demographic features of developing countries are  
(a) high fertility, low or rapidly falling mortality rate, rapid population growth and a very young age distribution  
(b) high fertility, high density rapidly rising mortality rate and a very young age distribution  
(c) high infant mortality, low fertility uneven population growth and a very young age distribution  
(d) high mortality high density uneven population growth and a very old age distribution
166. If two persons with 'AB' blood group marry and have sufficiently large number of children, these children could be classified as 'A' blood group : 'AB' blood group : 'B' blood group in 1 : 2 : 1 ratio. Modern technique of protein electrophoresis reveals presence of both 'A' and 'B' type proteins in 'AB' blood group individuals. This is an example of  
(a) codominance (b) incomplete dominance  
(c) partial dominance (d) complete dominance
167.  $F_2$  - generation in a Mendelian cross showed that both genotypic and phenotypic ratios are same as 1 : 2 : 1. It represents a case of  
(a) codominance  
(b) dihybrid cross  
(c) monohybrid cross with complete dominance  
(d) monohybrid cross with incomplete dominance
168. Which enzyme/s will be produced in a cell in which there is a non-sense mutation in the *lac Y*-gene?  
(a)  $\beta$  - galactosidase  
(b) Lactose permease  
(c) Transacetylase  
(d) Lactose permease and transacetylase
169. The following ratio is generally constant for a given species  
(a)  $A + G/C + T$  (b)  $T + C/G + A$   
(c)  $G + C/A + T$  (d)  $A + C/T + G$
170. The process by which organisms with different evolutionary history evolve similar phenotypic adaptations in response to a common environmental challenge, is called  
(a) natural selection (b) convergent evolution  
(c) non-random evolution (d) adaptive radiation
171. Weismann cut off tails of mice generation after generation but tails neither disappeared nor shortened showing that  
(a) Darwin was correct  
(b) tail is an essential organ  
(c) mutation theory is wrong  
(d) Lamarckism was wrong in inheritance of acquired characters
172. A patient brought to a hospital with myocardial infarction is normally immediately given  
(a) penicillin (b) streptokinase  
(c) cyclosporin - A (d) statins
173. Which of the following pair of diseases is caused by virus?  
(a) Rabies, mumps (b) Cholera, tuberculosis  
(c) Typhoid, tetanus (d) AIDS, syphilis
174. Why is vivipary an undesirable character for annual crop plants?  
(a) It reduces the vigour of plant  
(b) The seeds cannot be stored under normal conditions for the next season  
(c) The seeds exhibit long dormancy  
(d) It adversely affects the fertility of the plant
175. In crop improvement programme, haploids are important because they  
(a) require one half of nutrients  
(b) are helpful in study of meiosis  
(c) grow better under adverse conditions  
(d) form perfect homozygous
176. Organisms called methanogens are most abundant in a  
(a) cattle yard (b) polluted stream  
(c) hot spring (d) sulphur rock
177. The aquatic fern, which is an excellent biofertiliser is  
(a) Azolla (b) Pteridium  
(c) Salvinia (d) Marselia
178. Which vector can clone only a small fragment of DNA?  
(a) Bacterial artificial chromosome  
(b) Yeast artificial chromosome  
(c) Plasmid  
(d) Cosmid
179. Which one of the following is commonly used in transfer of foreign DNA into crop plants?  
(a) *Trichoderma harzianum*  
(b) *Meloidogyne incognita*  
(c) *Agrobacterium tumefaciens*  
(d) *Penicillium expansum*
180. Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin-A deficiency?  
(a) Flavr savr tomato (b) Canolla  
(c) Golden rice (d) Bt brinjal