01. If a ball is thrown vertically upwards with speed u, the distance covered during the last 't' seconds of its ascent is :—

(1) ut (2) $\frac{1}{2}gt^2$

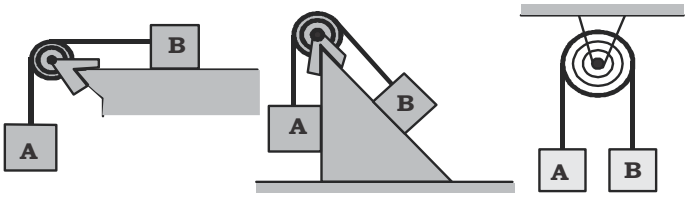
(3) $ut-\frac{1}{2}gt^2$ (4) (u + gt)t

02. A particle moves along a circle of radius $\left(\frac{20}{\pi}\right)$m with constant tangential acceleration. If the velocity of the particle is 80 m/s at the end of the second revolution after motion has begun, the tangential acceleration is :—

(1) 40 ms^{-2} (2) 640 π ms^{-2}

(3) 160 π ms^{-2} (4) 40 π ms^{-2}

03. If velocity of A is 2m/s donwards what is the velocity of B in (a), (b) and (c)



(a) (b) (c)

(1) 1m/s in all three (2) 4m/s in all three

(3) 2 m/s in all three (4) 8 m/s in all three

04. A stationary particle explodes into two particles of masses m_1 and m_2 whichmove in opposite directions with velocities v_1 and v_2. The ratio of their kinetic energies E_1/E_2 is :—

(1) m_2/m_1 (2) m_1/m_2

(3) 1 (4) m_1v_2/m_2v_1

05. A solid cylinder of mass M and radius R rolls without slipping down an inclined plane of length L and height h. What is the speed of its centre of mass when the cylinder reaches its bottom :—

(1) $\sqrt{2gh}$ (2) $\sqrt{\frac{3}{4}gh}$ (3) $\sqrt{\frac{4}{3}gh}$ (4) $\sqrt{4gh}$

06. When a long spring is stretched by 2 cm, its potential energy is U. If the spring is stretched by 10cm, the potential energy stored in it will be:

(1) U/5 (2) 5U (3) 10 U (4) 25U

07. The acceleration due to gravity on the planet A is 9 times the acceleration due to gravity on planet B.A man jumps to a height of 2m on the surface of A. What is the height of jump by the same person on the planet B :—

(1) $\frac{2}{9}$m (2) 18 m

(3) 6 m (4) $\frac{2}{3}$m

08. A monkey of mass 20 kg is holding a vertical rope. The rope will not break when a mass of 25 kg is suspended form it but will break if the mass exceeds 25kg. What is the maximum acceleration with which the monkey can climb up along the rope? (g =10 m/s^2)

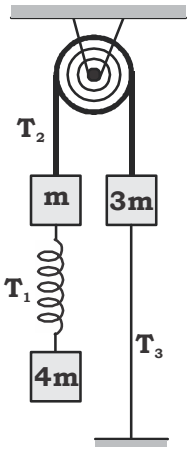
(1) 5 m/s^2 (2) 10 m/s^2

(3) 25 m/s^2 (4) 2.5 m/s^2

09. A man weights 80 kg He stands on a weighing scale in a lift which is moving upwards with a uniform acceleration of 5m/s^2. What would be the reading on the scale? (g=10m/s^2)

(1) Zero (2) 400 N (3) 800 N (4) 1200 N

10. In the given setup pulley strings and spring are light. Initially all masses are in equilibrium and at rest



(1) T_1 = 4mg (2) T_2 = 5mg

(3) T_3 = 2mg (4) All of the above

11. The vector sum of two forces is perpendicular to their vector differences. In that case, the forces:

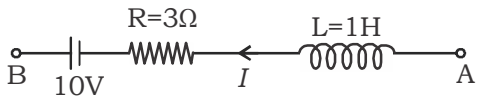
(1) Are equal to each other.

(2) Are equal to each other in magnitude.

(3) Are not equal to each other in magnitude.

(4) Cannot be predicted.

12. In the given branch AB of circuit a current $I = (10t + 5)$ A is flowing, where t is time in second. At $t = 0$, the potential difference between points A and B $(V_A - V_B)$ is



(1) 15 V (2) –5V
(3) –15 V (4) 5 V

13. A block of mass m slips on a rough horizontal table under the action of a horizontal focre applied to it. The coefficient of friction between the block and the table is μ. The table does not move on the floor. Find the total firctional force applied by the floor on the legs of the table.

(1) $f = \mu mg$ (2) $f = 4\mu mg$

(3) $f = \frac{\mu mg}{4}$ (4) data is insufficient

14. A convex lens is dipped in a liquid whose refractive index is equal to the refractive index of the lens. Then its focal length will

(1) Become zero (2) Become infinite
(3) Become small, but non-zero
(4) Remain unchanged

15. A projectile is launched at speed v_0 making an angle θ with the horizontal. Find angular velocity of projectile at the time when it reaches same level, with respect to the point of projection at the time of landing

(1) $\omega = \frac{g}{2v_0 \cos\theta}$ (2) $\omega = \frac{\theta g}{v_0 \sin\theta}$

(3) $\omega = \frac{g}{2v_0 \sin\theta}$ (4) $\omega = \frac{\theta g}{v_0 \cos\theta}$

16. The time period of a mass suspended from a spring is T. If the spring is cut into four equal parts and the same mass is suspended from one of the parts, then the new time period will be:—

(1) $\frac{T}{4}$ (2) T
(3) $\frac{T}{2}$ (4) 2T

17. A focre $\vec{F} = (cx - 3.00x^2)\hat{i}$ acts on a particle as the particle moves along an x–axis, with $\vec{F}$ in newtons, x in meters, and c a constnat. At $x = 0$, the particle's kinetic energy is 20.0J; at $x = 3.00m$, it is 11.0 J. Find c.

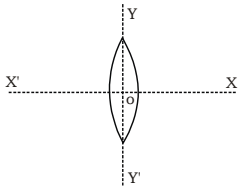
(1) $c = 2N/m$ (2) $c = 4N/m$
(3) $c = 8N/m$ (4) $C = N/m$

18. In case of a forced vibration, the resonance wave becomes very sharp when the :—

(1) Damping force is small
(2) Restoring force is small
(3) Applied periodic force is small
(4) Quality factor is small

19. An equiconvex lens is cut into two halves along (i) XOX' and (ii) YOY' as shown in the figure. Let f, f', f'' be the focal lengths of the complete lens, of each half in case (i), and of each half in case (ii), respectively. Choose the correct statement from the following :—

(1) f' = f, f'' = 2f
(2) f' = 2f, f'' = f
(3) f' = f, f'' = f
(4) f' = 2f, f'' = 2f



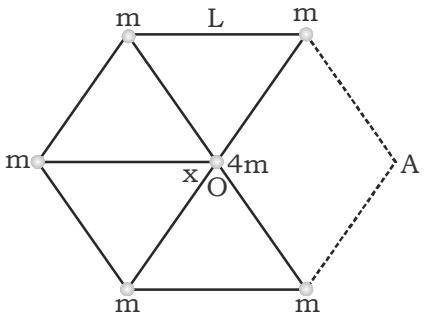
20. We consider the radiation emitted by the human body. Which of the following statements is true :

(1) The radiation emitted is in the infra-red region.
(2) The radiation is emitted only during the day.
(3) The radiation is emitted during the summers and absorbed during the winters.
(4) The radiation emitted lies in the ultraviolet region and hence is not visible

21. An ideal gas heat engine operates in a Carnot cycle between 227°C and 127°C. It absorbs 6 kcal at the higher temperature. The amount of heat (inkcal) converted into work is equal to:—

(1) 4.8 (2) 3.5 (3) 1.6 (4) 1.2

22. Find location of centre of mass of the arrangement of regular hexagon having point masses at five vertices



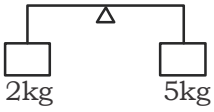
(1) L/5 left of 'O'

(2) $\frac{8L}{9}$ left of 'O'

(3) $\frac{4L}{5}$ left of 'O'

(4) $\frac{L}{9}$ left of 'O'

23. A light rod of length 1m is is pivoted at its centre and two masses of 5 kg and 2kg hung from the ends as shown in fig. Find the initial angualr acceleration of the rod assuming that it was horizontal in the beginning.



(1) $\alpha = \frac{6}{7}\text{rad/s}^2$ (2) $\alpha = \frac{60}{7}\text{rad/s}^2$

(3) 20rad/s^2 (4) None of these

24. A charge q is located at the centre of a cube. The electric flux through any face is

(1) $\frac{2\pi q}{6(4\pi\varepsilon_o)}$ (2) $\frac{4\pi q}{6(4\pi\varepsilon_o)}$

(3) $\frac{\pi q}{6(4\pi\varepsilon_o)}$ (4) $\frac{q}{6(4\pi\varepsilon_o)}$

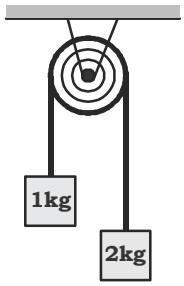
25. Two blocks of masses 1kg and 2 kg are connected by a metal wire going over a smooth pulley as shown in fig. the breaking stress of the metal is $2\times10^9\text{N/m}^2$. What should be the minimum radius of the wire used if it is not to break ? Take $g = 10\,\text{m/s}^2$.

(1) $r = \sqrt{\frac{2}{3\pi}}\times10^{-2}\text{m}$

(2) $r = \sqrt{\frac{3\pi}{2}}\times10^{-2}\text{m}$

(3) $r = \sqrt{\frac{2}{3\pi}}\times10^{-4}\text{m}$

(4) $r = \sqrt{\frac{2}{3\pi}}\times10^{-4}\text{cm}$



26. A long solenoid carrying a current produces a magnetic field B along its axis. If the current is doubled and the number of turns per cm is halved, the new value of the magnetic field is:—

(1) B/2 (2) B

(3) 2B (4) 4B

27. A charged particle moves through a magnetic field in a direction perpendicular to it. The the

(1) speed of the particle remains unchanged

(2) direction of the particle remains unchanged

(3) acceleration remains unchanged

(4) velocity remains unchanged

28. A bar magnet is oscillating in the Earth's magnetic field with a period T. What happens to its period and motion if its mas is quadrupled.

(1) Motion remains S.H. with time period = T

(2) Motion remains S.H. with time period = 2T

(3) Motion remains S.H. with time period = 4T

(4) Motion remains S.H. and period remains nearly constant

29. Two 220 volt, 100 watt bulbs are connected first in series and then in parallel. Each time the combination is connected to a 220 Volt a.c. supply line. The power drawn by the combination in each case respectively will be:–

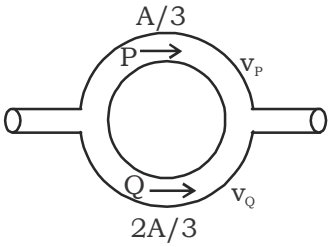
(1) 50 watt, 100 watt

(2) 100 watt, 50 watt

(3) 200 watt, 150 watt

(4) 50 watt, 200 watt

30. Shows a liquid flowing through a tube at the rate of $0.1 m^3/s$. The tube is branched into two semicircular tubes of cross-sectional are A/3 and 2A/3. The velocity of liquid at Q is (the cross-section of the main tube is $A = 10^{-2} m^2$ and $v_p = 20 m/s$)



(1) $5 m/s$ (2) $30 m/s$

(3) $35 m/s$ (4) none of the above

31. In a Wheatstone's bridge all the four arms have equal resistance R. If the resistance of the galvanometer arm is also R, the equivalent resistance of the combination as seen by the battery is :—

(1) R/4 (2) R/2 (3) R (4) 2R

32. Three capacitors each of capacity 4 μF are to be connected in such a way that the effective capacitance of 6 μF. This can be done by

(1) connecting all of then in series

(2) connecting them in parallel

(3) connecting two in series and one in parallel

(4) connecting two in parallel and one in series

33. Solar energy is mainly caused due to:—

(1) burning of hydrogen in the oxygen

(2) fission of uranium present in the Sun

(3) fusion of protons during synthesis of heavier elements

(4) gravitational contraction

34. In the following series of resonant frequencies one frequency (lower than 400 Hz) is missing : 150, 225, 300, 375 Hz

(a) What is the missing frequency ?

(b) What is the frequency of the seventh harmonic

(1) (a) f = 75Hz (b) f = 525Hz

(2) (a) f = 100 Hz (b) f = 700Hz

(3) (a) f = 525Hz (b) f = 75Hz

(4) None of the above

35. The volume occupied by an atom is greater than the volume of the nucleus by a factor of about

(1) 10^1 (2) 10^5

(3) 10^{10} (4) 10^{15}

36. Here are the equations of three waves:

(1) $y(x,t) = 2\sin(4x - 2t)$, (2) $y(x,t) = \sin(3x - 4t)$,

(3) $y(x,t) = 2\sin(3x - 3t)$. Rank the waves according to thier wave speed greatest first.

(1) 1, 2, 3 (2) 2, 3, 1

(3) 3, 2, 1 (4) 2, 1, 3

37. A sample of radioactive element has a mass of 10 gm at an instant t = 0. The approximate mass of this element in the sample after two mean lives is :—

(1) 1.35 gm (2) 2.50 gm

(3) 3.70 gm (4) 6.30 gm

38. In which of the following systems will be radius of the first orbit (n=1) be minimum

(1) Doubly ionized lithium

(2) Singly ionized helium

(3) Deuterium atom (4) Hydrogen atom

39. Reverse bias applied to a junction diode

(1) lowers the potential barrier

(2) raises the potential barrier

(3) increases the majority carrier current

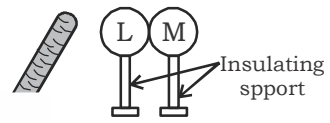
(4) increases the manority carrier current

40. In a Young's double -slit experiment the slit separation is 0.5 mm and the screen is 0.5m from the slit. For a monochromatic light of wavlength 500 nm the distance of third maxima from the second minima on the other side is

(1) 2.75 mm (2) 2.5 mm

(3) 22.5 mm (4) 2.25 mm

41. Two uncharged metal spheres, L and M, are in contact. A negatively charged rod is brought close to, but not touching L as shown in Fig. The two spheres are slightly separated and the rod is then withdrawn. As a result, the spheres are charged



(1) Both positive

(2) L positive and M negative

(3) Both negative

(4) L negatvie and M positive

42. A n-p-n transistor conduct when

(1) both collector and emitter are positive with respect to the base

(2) collector is positive and emitter is negative with respect to the base

(3) collector is positive and emitter is at same potential as the base

(4) both collector and emitter are negative with respect to the base

43. According to Curie's law, the magnetic susceptibility of a substance at an absolute temperature T is proportional to:—

(1) $1/T$ (2) T (3) $1/T^2$ (4) T^2

44. Diamagnetic material in a magnetic field moves:

(1) from stronger to the weaker parts of the field

(2) from weaker to the stronger parts of the field

(3) perpendicular to the field

(4) in none of the above direction

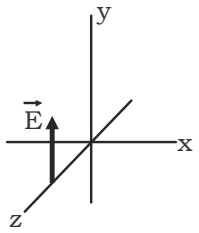
45. The figure here gives the electric field on an electromagnetic wave at a certain point and a certain instant. The wave is transporting energy in the negative z direction. What is the direction of the magnetic field of the wave at the point and instant

(1) $\hat{i}$

(2) $-\hat{i}$

(3) $\hat{j}$

(4) $\hat{k}$



46. The ions O^{2-}, F^-, Na^+, Mg^{2+} and Al^{3+} are isoelectronic. Their ionic radii show :—

(1) A significant increase from O^{2-} to Al^{3+}

(2) A significant decrease from O^{2-} to Al^{3+}

(3) An increase from O^{2-} to F^- and then decrease from Na^+ to Al^{3+}

(4) A decrease from O^{2-} to F^- and then increase from Na^+ to Al^{3+}

47. Which one of the following compounds is not a protonic acid :—

(1) $B(OH)_3$ (2) $PO(OH)_3$ (3) $SO(OH)_2$ (4) $SO_2(OH)_2$

48. The value of Planck's constant is 6.63×10^{-34} Js.The velocity of light is 3.0×10^8 ms^{-1}. Which value is closest to the wavelength in nanometers of a quantum of light with frequency of $8\times10^{15}s^{-1}$:

(1) 2×10^{-25} (2) 5×10^{-18} (3) 4×10^{1} (4) 3×10^{7}

49. Which of the following statements is not correct for sigma and pi-bonds formed between two carbon atoms :—

(1) Sigma-bond is stronger than a pi-bond

(2) Bond energies of sigma and pi-bonds are of the order of 264 KJ/mol and 347 KJ/mol, respectively

(3) Free rotation of atoms about a sigma bond is allowed but not in case of a pi-bond

(4) Sigma-bond determines the direction between carbon atoms but a pi-bond has no primary effect in this regard

50. The oxidation states of sulphur in the anions SO_3^{2-}, $S_2O_4^{2-}$ and $S_2O_6^{2-}$ follow the order:—

(1) $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$ (2) $SO_3^{2-} < SO_4^{2-} < S_2O_6^{2-}$

(3) $S_2O_4^{2-} < S_2O_6^{2-} < SO_3^{2-}$ (4) $S_2O_6^{2-} < S_2O_4^{2-} < SO_3^{2-}$

51. The pyknometric density of sodium chloride crystal is 2.165×10^3 kg m^{-3} while its X-ray density is 2.178×10^3 kg m^{-3}. The fraction of unoccupied sites in sodium chloride crystal is:—

(1) 5.96 (2) 5.96×10^{-2}

(3) 5.96×10^{-1} (4) 5.96×10^{-3}

52. For the reaction :

$C_3H_8(g)+5O_2(g)\rightarrow 3CO_2(g)+4H_2O(l)$

at constant temperature, $\Delta H-\Delta E$ is :—

(1) +RT (2) –3RT (3) +3RT (4)–RT

53. In Haber process 30 litres of dihydrogen and 30 litres of dinitrogen were taken for reaction which yielded only 50% of the expected product. What will be the composition of gaseous mixture under the above condition in the end:—

(1) 20 litres ammonia, 20 litres nitrogen 20 litres hydrogen.

(2) 10 litres ammonia, 25 litres nitrogen 15 litres hydrogen.

(3) 20 litres ammonia, 10 litres nitrogen 30 litres hydrogen.

(4) 20 litres ammonia, 25 litres nitrogen 15 litres hydrogen.

54. The densities of graphite and diamond at 298 K are 2.25 and 3.31 g cm^{-3}, respectively. If the standard free energy difference (ΔG^o) is equal to 1895 J mol^{-1}, the pressure at which graphite will be transformed into diamond at 298 K is :—

(1) 9.92×10^8 Pa (2) 9.92×10^7 Pa

(3) 9.92×10^6 Pa (4) 9.92×10^5 Pa

55. What is the entropy change (in JK^{-1} mol^{-1}) when one mole of ice is converted into water at 0°C? (The enthalpy change for the conversion of ice to liquid water is 6.0 KJ mol^{-1} at 0°C) :—

(1) 20.13 (2) 2.013 (3) 2.198 (4) 21.98

56. The reaction quotient (Q) for the reaction :—

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

is given by $Q = \frac{[NH_3]^2}{[N_2][H_2]^3}$. The reaction will proceed from right to left if :—

(1) $Q = K_c$ (2) $Q < K_c$ (3) $Q > K_c$ (4) $Q = 0$

(Where K_c is the equillibrium constant)

57. The activation energy for a simple chemical reaction A $\rightarrow$ B is E_a in forward direction. The activation energy for reverse reaction :—

(1) Is negative of E_a

(2) Is always less than E_a

(3) Can be less than or more than E_a

(4) Is always double of E_a

58. Which of the following statements is not true:—

(1) Among halide ions, iodide is the most powerful reducing agent

(2) Fluoring is the only halogen that does not show a variable oxidation state

(3) HOCl is a stronger acid than HOBr

(4) HF is a stronger acid than HCl

59. The method of zone refining of metal is based on the principle of :—

(1) Greater mobility of the pure metal than that of the impurity

(2) HIgher melting point of the impurity than that of the pure metal

(3) Greater noble character of the solid metal than that of the impurity

(4) Greater solubility of the impurity in the solid state than in the molten state

60. For which one of the following sets of four quantum numbers, an electron will have the heighst energy ?

	n	*l*	*m*	*s*		*n*	*l*	*m*	*s*
(1)	3	2	1	½	(2)	4	2	–1	½
(3)	4	1	0	–½	(4)	5	0	0	–½

61. The reaction A $\rightarrow$ B follows first order kinetics. The time taken for 0.8 mole of A to produce 0.6 mole of B is 1 hour. What is the time taken for conversion of 0.9 mole of A to produce 0.675 mole of B :—

(1) 1 hour (2) 0.5 hour (3) 0.25 hour (4) 2 hour

62. The solubility product of AgI at 25°C is 1.0×10^{-16} mol^2L^2. The solubility of AgI in 10^{-4} N solution of KI at 25°C is approximately (in mol L^{-1}) :—

(1) 1.0×10^{-16} (2) 1.0×10^{-12}

(3) 1.0×10^{-10} (4) 1.0×10^{-8}

63. Formation of a solution from two components can be considered as :—

(i) Pure solvent $\rightarrow$ separated solvent molecules, ΔH_1

(ii) Pure solvent $\rightarrow$ separated solvent molecules, ΔH_2

(iii) Separated solvent and solute molecules $\rightarrow$ solution, ΔH_3

Solution so formed will be ideal if:—

(1) $\Delta H_{soln} = \Delta H_1 + \Delta H_2 + \Delta H_3$

(2) $\Delta H_{soln} = \Delta H_1 + \Delta H_2 - \Delta H_3$

(3) $\Delta H_{soln} = \Delta H_1 - \Delta H_2 - \Delta H_3$

(4) $\Delta H_{soln} = \Delta H_3 - \Delta H_1 - \Delta H_2$

64. For which one of the following equations is ΔH^o_{react} equal to ΔH^o_f for the product :—

(1) $N_2(g) + O_3(g) \rightarrow N_2O_3(g)$

(2) $CH_4(g) + 2Cl_2(g) \rightarrow CH_2Cl_2(l) + 2HCl(g)$

(3) $Xe(g) + 2F_2(g) \rightarrow XeF_4(g)$

(4) $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$

65. The following equilibria are given :

$N_2 + 3H_2 \rightleftharpoons 2NH_3$ K_1

$N_2 + O_2 \rightleftharpoons 2NO$ K_2

$H_2 + \frac{1}{2}O_2 \rightleftharpoons H_2O$ K_3

The equilibrium constant of the reaction

$2NH_3 + \frac{5}{2}O_2 \rightleftharpoons 2NO + 3H_2O$ in terms of K_1, K_2 and K_3 is :—

(1) $K_1K_2K_3$ (2) $\frac{K_1K_2}{K_3}$ (3) $\frac{K_1K_3^2}{K_2}$ (4) $\frac{K_2K_3^3}{K_1}$

66. The moler heat capacity of water at constant pressure, C, is 75 JK^{-1} mol^{-1}. When 1.0 KJ of heat is supplied to 100 g of water which is free to expand, the increase in temperatue of water is:—

(1) 1.2 K (2) 2.4 K (3) 4.8 K (4) 6.6 K

67. If the rate of the reaction is equal to the rate constant, the order of the reaction is:—

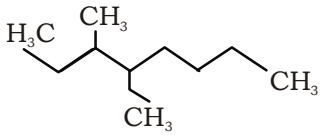
(1) 0 (2) 1 (3) 2 (4) 3

68. The temperature dependence of rate constant (k) of a chemical reaction is written in terms of Arrhenius equation, $k=A.e^{-E^*/RT}$.Activation energy (E^*) of the reaction can be calculated by plotting :

(1) k vs T (2) k vs $\frac{1}{\log T}$

(3) $\log k$ vs $\frac{1}{T}$ (4) $\log k$ vs $\frac{1}{\log T}$

69. IUPAC name of the compound given below is :—



(1) 4- Ethyl - 3- methyloctane

(2) 3 - Methyl - 4- ethyloctane

(3) 2, 3 - Diethylheptane

(4) 5-Ethyl-6-methyloctane

70. In this reaction :

$CH_3CHO + HCN \rightarrow CH_3CH(OH)CN \xrightarrow{H.OH}$ $CH_3CH(OH)COOH$

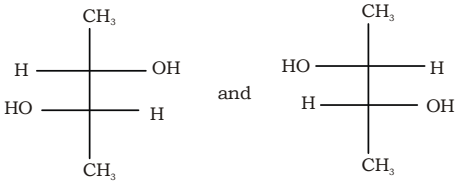
an asymmetric centre is generated. The acid obtained would be :—

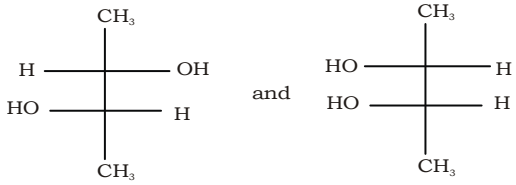
(1) D-isomer (2) L-isomer

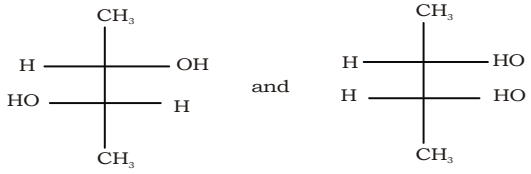
(3) 50% D + 50% L–isomer

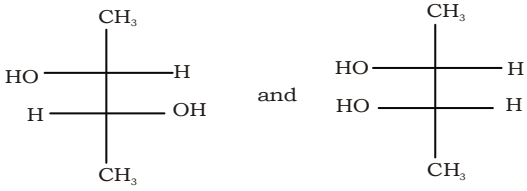
(4)20% D + 80% L-isomer

71. Which of the following pairs of compounds are enantiomers :—

(1) 

(2) 

(3) 

(4) 

72. In a set of the given reactions, acetic acid yielded a product C.

$CH_3COOH + PCl_5 \rightarrow A \xrightarrow[Anh.AlCl_3]{C_6H_6} B \xrightarrow[ether]{C_2H_5MgBr} C$

product C would be :—

(1) $CH_3CH(OH)C_2H_5$ (2) $CH_3COC_6H_5$

(3) $CH_3CH(OH)C_6H_5$ (4) $CH_3-\overset{C_2H_5}{\overset{|}{C}}(OH)C_6H_5$

73. The compound on reaction with $NaIO_4$ in the presence of $KMnO_4$ gives :—

(1) CH_3COCH_3

(2) CH_3COCH_3+CH_3COOH

(3) CH_3COCH_3+CH_3CHO

(4) CH_3CHO+CO+CO_2

74. The e.m.f. of a Daniell cell at 298 K is E_1.

$Zn/ZnSO_4(0.01M)||CuSO_4(1.0M)/Cu$

When the concentration of $ZnSO_4$ is1.0 M and that of $CuSO_4$is 0.01 M, the e.m.f. is changed to E_2. What is the relationship between E_1 and E_2:—

(1) $E_1 > E_2$ (2) $E_1 < E_2$ (3) $E_1 = E_2$ (4) $E_2 = 0 \neq E_1$

75. According to the adsorption theory of catalysis, the speed of the reaction increases because :—

(1) The concentration of reactant molecules at the active centres of the catalyst becomes high due to adsorption.

(2) In the process of adsorption, the activation energy of the molecules becomes large

(3) Adsorption produces heat which increases the speed of the reaction

(4) Adsorption lowers the activation energy of the reaction

76. Which one of the following characteristics of the transition metals is associated with their catalytic activity :—

(1) High enthalpy of atomization

(2) Paramagnetic behaviour

(3) Colour of hydrated ions

(4) Variable oxidation states

77. The basic character of the transition metal monoxides follows the order :—

(1) VO > CrO > TiO > FeO

(2) CrO > VO > FeO> TiO

(3) TiO > FeO > VO > CrO

(4) TiO > VO> CrO > FeO

(Atomic nos. Ti = 22, V = 23, Cr = 24 Fe = 26)

78. The correct order of ionic radii of Y^{3+}, La^{3+}, Eu^{3+} and Lu^{3+} is :—

(1) $Y^{3+} < La^{3+} < Eu^{3+}$ Lu^{3+} (2) $Y^{3+} < Lu^{3+} < Eu^{3+}$ La^{3+}

(3) $Lu^{3+} < Eu^{3+} < La^{3+} < Y^{3+}$ (4) $La^{3+} < Eu^{3+} < Lu^{3+} < Y^{3+}$

79. According to IUPAC nomenclature sodium nitroprusside is named as :—

(1) Sodium nitroferricyanide

(2) Sodium nitroferrocyanide

(3) Sodium pentacyanonitrosyl ferrate (II)

(4) Sodium pentacyanonitrosyl ferrate (III)

80. The number of unpaired electrons in the complex ion $[CoF_6]^{3-}$ is :— (Atomic no. : Co = 27)

(1) 2 (2) 3 (3) 4 (4) Zero

81. Which one of the following octahedral complexes will **not** show geometric isomerism? (A and B are monodentate ligands):—

(1) $[MA_2B_4]$ (2) $[MA_3B_3]$

(3) $[MA_4B_2]$ (4) $[MA_5B]$

82. Vitamin B_{12} contains :—

(1) Fe(II) (2) Co(III) (3) Zn (II) (4) Ca (II)

83. Among the following, which is not the π-bonded organometallic compound :—

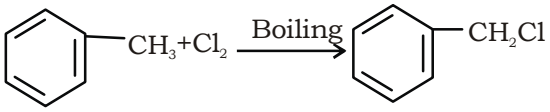
(1) $K[PtCl_3(\eta^2\text{–}C_2H_4)]$ (2) $Fe(\eta^5\text{–}C_5H_5)_2$

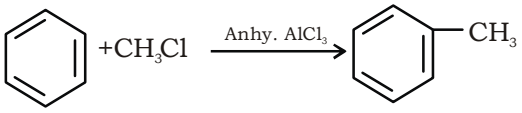
(3) $Cr(\eta^6\text{–}C_6H_6)_2$ (4) $(CH_3)_4Sn$

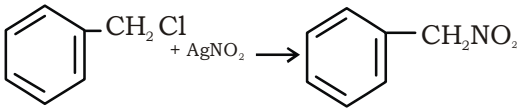
84. The radioisotope, tritium (^3_1H) has a half-life of 12.3 years. If the initial amount oftritium is 32 mg,how many milligrams of it would remain after 49.2 years :—

(1) 1 mg (2) 2 mg (3) 4 mg (4) 8 mg

85. Which one of the following is a free-radical substitution reaction :—

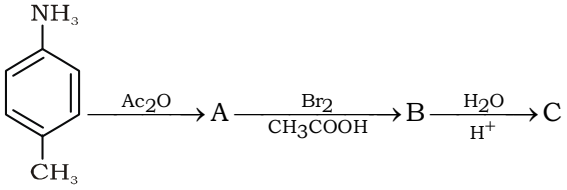
(1) 

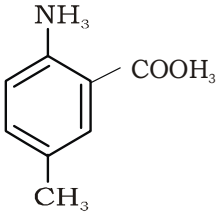
(2) 

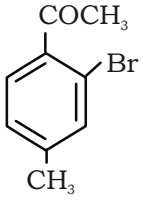
(3) 

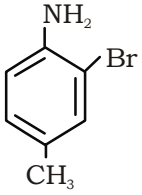
(4) $CH_3CHO + HCN \rightarrow CH_3CH(OH)CN$

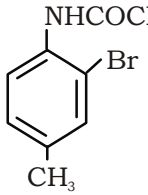
86. The final product C, obtained in this reaction,would be



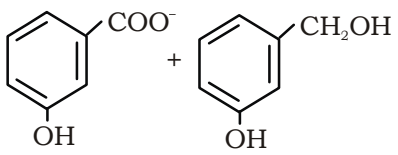
(1) 

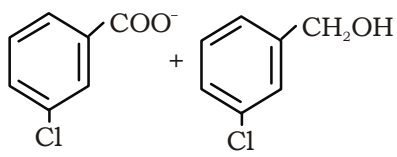
(2) 

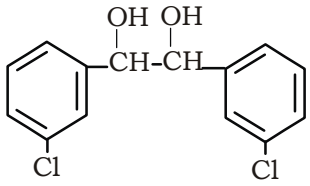
(3) 

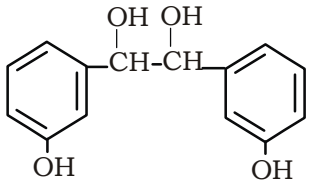
(4) 

87. When m-chlorobenzaldehyde is treated with 50% KOH solution, the product(s) obtained is (are)

(1) 

(2) 

(3) 

(4) 

88. The correct order of reactivity towards the electrophilic substitution of the compounds
(I) aniline (II) Benzene (III) nitrobenzene is
(1) III > II > I (2) II > III > I
(3) I < II > III (4) I > II > III

89. Which of the following orders of acid strength is correct :—
(1) RCOOH > ROH > HOH > HC ≡ CH
(2) RCOOH > HOH > ROH > HC ≡ CH
(3) RCOOH > HOH > HC ≡ CH > ROH
(4) RCOOH > HC ≡ CH > HOH > ROH

90. Acrolein is a hard, horny and a high melting point material. Which of the following represent its structure.

(1) $\left(-CH_2-\underset{\underset{CN}{|}}{CH}-\right)_n$ (2) $\left(-CH_2-\underset{\underset{COOC_2H_5}{|}}{\overset{\overset{CH_3}{|}}{C}}-\right)_n$

(3) $\left(-CH_2-\underset{\underset{COOC_2H_5}{|}}{CH}-\right)_n$ (4) $\left(-CH_2-\underset{\underset{Cl}{|}}{CH}-\right)_n$

91. Which one single organism or the pair of organisms is correctly assigned to its or their named taxonomic group ?
(1) Paramecium and Plasmodium belong to the same kingdom as that of Penicillium
(2) Lichen is a composite organism formed from the symbiotic association of an algae and a protozoan
(3) Yeast used in making bread and beer is a fungus
(4) Nostoc and Anabaena are examples of Protista

92. Which statement is wrong for viruses ?
(1) All are parasites
(2) All of them have helical symmetry
(3) They have ability to synthesize nucleic acids and proteins with the help of host cell
(4) Antibiotics have no effect on them

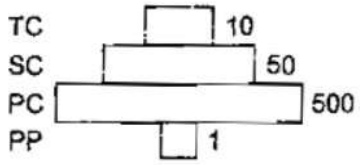
93. The cyanobacteria are also referred to as :-
(1) protists (2) golden algae
(3) slime moulds (4) blue-green algae

94. Maximum nutritional diversity is found in the group :-
(1) Fungi (2) Animalia
(3) Monera (4) Plantae

95. The upright pyramid of number is absent in :-
(1) pond (2) forest
(3) lake (4) grassland

96. Which one of the following is not a functional unit of an ecosystem ?
(1) Energy flow (2) Decomposition
(3) Productivity (4) Stratification

97. Given below is an imaginary pyramid of numbers. What could be one of the possibilities about certain organisms at some of the different levels ?



(1) Level PC is insects and level SC is small insectivorous birds.
(2) Level PP is phytoplanktons in sea and whale on top level TC
(3) level one PP is pipal trees and the level SC is sheep
(4) Level PC is rats and level SC is cats

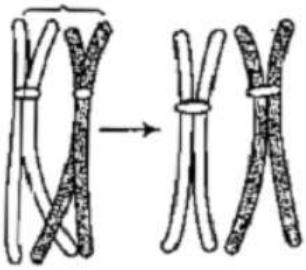
98. The highest number of species in the world is represented by :-
(1) fungi (2) algae
(3) mosses (4) lichens

99. Which one of the following areas in India, is a hot spot of biodiversity ?
(1) Eastern Ghats
(2) Gangetic plain
(3) Sunderbans
(4) Western Ghats

100. Measuring Biochemical Oxygen Demand (BOD) is a method used for :-
(1) estimating the amount of organic matter in sewage water
(2) working out the efficiency of oil driven automobile engines
(3) measuring the activity of Saccharomyces cerevisae in producing curd on a commercial scale
(4) working out the efficiency of RBCs about their capacity to carry oxygen

101. Which one of the following is a wrong statement ?
(1) Most of the forests have been lost in tropical areas
(2) Ozone in upper part of atmosphere is harmful to animals
(3) Greenhouse effect is a natural phenomenon
(4) Eutrophication is a natural phenomenon in freshwater bodies

102. Given below is the representation of a certain event at a particular stage of a type of cell division. Which is this stage ?



(1) Prophase-I during meiosis
(2) Prophase-II during meiosis
(3) Prophase of mitosis
(4) Both prophase and metaphase of mitosis

103. During gamete formation, the enzyme recombinase participates during :-
(1) Metaphase-I (2) Anaphase-II
(3) Prophase-I (4) Prophase-II

104. Water containing cavities in vascular bundles are found in :-
(1) sunflower (2) maize
(3) Cycas (4) Pinus

105. Closed vascular bundles lack :-
(1) ground tissue (2) conjunctive tissue
(3) cambium (4) pith

106. Companion cells are closely associate4d with :-
(1) sieve elements (2) vessel elements
(3) trichomes (4) guard cells

107. Which one of the following is not an example of carrying out biological control of pests/diseases using microbes ?
(1) Trichoderma sp. against certain plant pathogens.
(2) Nucleopolyhedrovirus against insects and other arthropods
(3) Bt-cotton to increase yield
(4) Lady bird beetle against aphids

108. Yeast is used in the production of :-
(1) citric acid and lactic acid
(2) lipase and pectinase
(3) bread and beer
(4) cheese and butter

109. Removal of introns and joining of exons in a defined order during transcription is called :-
(1) looping (2) inducing
(3) slicing (4) splicing

110. If one strand of DNA has the nitrogenous base sequence as ATCTG, what would be the complementary RNA strand sequence ?
(1) TTAGU (2) UAGAC
(3) AACTG (4) ATCGU

111. Which one of the following is not a part of a transcription unit in DNA ?
(1) The inducer (2) A terminator
(3) A promoter (4) The structural gene

112. How many plants in the list given below have composite fruits that develop from an inflorescence?
Walnut, poppy, radish, fig, pineapple, apple, tomato, mulberry
(1) Four (2) Five
(3) Two (4) Three

113. Which one of the following is correctly matched ?
(1) Onion - Bulb
(2) Ginger - Sucker
(3) Chlamydomonas - Conidia
(4) Yeast - Zoospores

114. The gynoecium consists of many free pistils in flowers of :-
(1) Aloe (2) tomato
(3) Papaver (4) Michelia

115. A nitrogen fixing microbe associated with Azolla in rice fields is :-
(1) Spirulina (2) Anabaena
(3) Frankia (4) Tolypothrix

116. Which one of the following is wrong statement?
(1) Anabaena and Nostoc are capable of fixing nitrogen in free-living state also
(2) Root nodule forming nirogen fixers live as aerobes under free-living conditions
(3) Phosphorus is a constituent of cell membranes, certain nucleic acids and all proteins
(4) Nitrosomonas and Nitrobacter are chemoautotrophs

117. The correct sequence of cell organelles during photorespiration is :-
(1) chloroplast-Golgi bodies-mitochondria
(2) chloroplast-rough endoplasmic reticulum-dictyosomes
(3) chloroplast-peroxisome-mitochondria
(4) chloroplast-vacuole-peroxisome

118. Gymnosperms are also called soft wood spermatophhytes because they lack :-
(1) cambium (2) phloem fibres
(3) thick-walled tracheids
(4) xylem fibres

119. Which one of the following is common to multicellular fungi, filamentous algae and protonema of mosses ?
(1) Diplontic life cycle
(2) Members of kingdom-Plantae
(3) Mode of nutrition
(4) Multiplication by fragmentation

120. Which one of the following is a correct statement?
(1) Pteridophyte gametophyte has a protonemal and leafy stage
(2) In gymnosperms female gametophyte is free-living
(3) Antheridiophores and archegoniophores are present in pteridophytes
(4) Origin of seed habit can be traced in pteridophytes

121. Which one of the following is correctly matched ?
(1) Passive transport of nutrients - ATP
(2) Apoplast - Plasmodesmata
(3) Potassium - Readily mobilization
(4) Bakane of rice seedlings - F Skoog

122. 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 :-
(1) codominance
(2) dihybrid cross
(3) monohybrid cross with complete
(4) monohybird cross the incomplete dominance

123. A normal-visioned man whose father was colourblind, marries a woman whose father was also a colourblind. They have their first child as a daughter. What are the chances that this child would be colourblind ?
(1) 100% (2) 0%
(3) 25% (4) 50%

124. If both parents are carriers for thalassemia, which is an autosomal recessive disorder, what are the chances of pregnancy resulting in an affected child ?
(1) No chance (2) 50%
(3) 25% (4) 100%

125. The overall goal of glycolysis, Krebs cycle and the electron transport system is the formation of :-
(1) ATP in small stepwise units
(2) ATP in one large oxidation reaction
(3) Sugars
(4) Nucleic acids

126. The coconut water and the edible part of coconut are equivalent to :-
(1) endosperm (2) endocarp
(3) mesocarp (4) embryo

127. Even in absence of pollinating agents seed-setting is assured in :-
(1) Commellina (2) Zostera
(3) Salvia (4) Fig

128. An organic substance that can withstand environmental extremes and cannot be degraded by any enzyme is :-
(1) cuticle (2) sporopollenin
(3) lignin (4) cellulose

129. Both, autogamy and geitonogamy are prevented in :-
(1) papaya (2) cucumber
(3) castor (4) maize

130. Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin-A deficiency ?
(1) Flaver savr tomato
(2) Canolla
(3) Golden rice
(4) Bt-brinjal

131. Which part would be most suitable for raising virus-free plants for micropropagation ?
(1) Bark (2) Vascular tissue
(3) Meristem (4) Node

132. Select the correct statement from the following regarding cell membrane.
(1) Na and K ions move across cell membrane by passive transport
(2) Proteins make up 60 to 70% of the cell membrane
(3) Lipids are arranged in a bilayer with polar heads towards the inner part
(4) Fluid mosaic model of cell membrane was proposed by Singer and Nicolson

133. What is true about ribosomes ?
(1) The prokaryotic ribosomes are 80 S, where S stands for sedimentation coefficient
(2) These are composed of ribonucleic acid and proteins
(3) These are found only in eukaryotic cells
(4) These are self-splicing introns of some RNAs

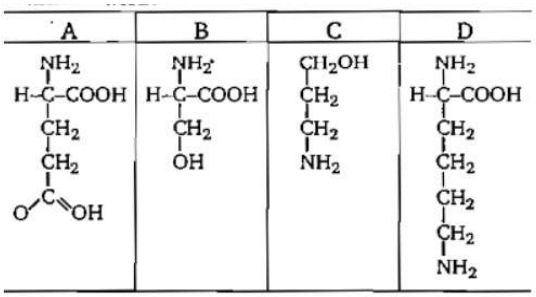
134. Ribosomal RNA is actively synthesized in :-
(1) lysosomes (2) nucleolus
(3) nucleoplasm (4) ribosomes

135. 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 :-
(1) Movement of water from cell B to A
(2) No movernent of water
(3) Equilibrium between the two
(4) Movement of water from cell A to B

136. In which one of the following, the genus name, its two characters and its phylum are not correctly matched, whereas the remining three are correct ?

Genus Name	Two characters	Phylum
(1) Pila	(i) Body segmented (ii) Mouth with Radula	Mollusca
(2) Asterias	(i) Spiny skinned (ii) Water vascular system	Echinodermata
(3) Sycon	(i) Pore bearing (ii) Canal system	Porifera
(4) Periplaneta	(i) Jointed appendages (ii) Chitinous exoskeleton	Arthropoda

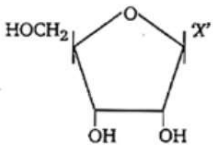
137. Which one out of A-D given below correctly represents the structural formula of the basic amino acid ?



(1) A (2) B
(3) C (4) D

138. Which one is the most abundant protein in the animal world ?
(1) Trypsin (2) Haemoglobin
(3) Collagen (4) Insulin

139. 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
(1) Cholesterol	Guanin
(2) Amino acid	NH_2
(3) Nucleotide	Adenine
(4) Nucleoside	Uracil

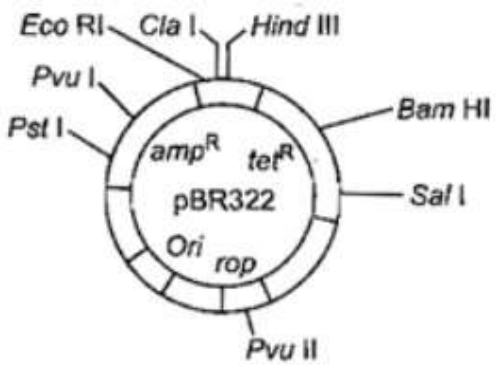
140. For transformation, microparticles coated with DNA to be bombarded with gene gun are made up of :-
(1) silver or platinum
(2) gold or tungsten
(3) silicon or platinum
(4) platinum or zinc

141. Which one is a one statement regarding DNA polymerase used in PCR ?
(1) It is used to ligate introduced DNA in recipient cells
(2) It serves as a selectable marker
(3) It is isolated from a virus
(4) It remains active at high temperature

142. A single strand of nucleic acid tagged with a radioactive molecule is called :-
(1) vector (2) selectable marker
(3) probe (4) plasmid

143. PCR and Restriction Fragment Length Polymorphism are the methods for :-
(1) study of enzymes
(2) genetic fingerprinting
(3) DNA sequencing
(4) genetic transformation

144. The figure below is the diagrammatic representation of the E.Coli vector pBR 322. Which one of the given options correctly identifies its certain component(s) ?



(1) Ori-original restriction enzyme
(2) rop-reduced osmotic pressure
(3) Hind III, Eco RI -selectable markers
(4) amp , tet -antibiotic resistance genes

145. A patient brought to a hospital with myocardial infarction is normally immediately given :-
(1) penicillin (2) streptokinase
(3) cyclosporin-A (4) statins

146. A certain road accident patient with unknown blood group needs immediate blood transfusion. His one doctor friend at once offers his blood. What was the blood group of the donor ?
(1) Blood group B
(2) Blood group AB
(3) Blood group O
(4) Blood group A

147. People who have migrated from the planes to an area adjoining Rohtang Pass about six months back :-
(1) have more RBCs and their haemoglobin has a lower binding affinity to O_2
(2) are not physically fit to play games like football
(3) suffer from sickness like nausea, fatigue, etc.
(4) have the usual RBC count but their haemoglobin has very high binding affinuty to O_2

148. Which one of the following is the correct statement for respiration in humans ?
(1) Cigarette smoking may lead to inflammation of bronchi
(2) Neural signals from pneumotoxic centre in pons region of brain can increase the duration of inspiration
(3) Workers in grinding and stone breaking industries may suffer, from lung fibrosis
(4) About 90% of carbon dioxide (CO_2) is carried by haemoglobin as carbamino haemoglobin

149. What is correct to say about the hormone action in humans ?
(1) Glucagon is secreted by -cells of islets of Langerhans and stimulates glycogenolysis
(2) Secretion of thymosine is stimulated with ageing.
(3) In females, FSH first binds with specific receptors on ovarian cell membrane
(4) FSH stimulates the secretion of oestrogen and progesterone

150. Which one of the following pairs of hormones are the examples of those that can easily pass through the cell membrane of the target cell and bind to a receptor inside it (mostly in the nucleus) ?
(1) Insulin and glucagon
(2) Thyroxin and insulin
(3) Somatostatin and oxytocin
(4) Cortisol and testosterone

151. The extinct human who lived 100000 to 40000 years ago, in Europe, Asia and parts of Africa, with short stature, heavy eye brows, retreating fore heads, large jaws with heavy teeth, stocky bodies, a lumbering gait and stooped posture was :-
(1) Homo habilis
(2) Neanderthal human
(3) Cro- magnon humans
(4) Ramapithecus

152. What was the most significant trend in the evolution of modern man (Homo sapiens) from his ancestors ?
(1) Shortening of jaws
(2) Binocular vision
(3) Increasing cranial capacity
(4) Upright posture

153. Which one of the following options gives one correct example each of convergent evolution and divergent evolution ?

	Convergent evolution	Divergent evolution
(1)	Eyes of octopus and mammals	Bones of forelimbs of vertebrates
(2)	Thorns of Bougainvillea and tendrils of Cucurbita	Wings of butterflies and birds
(3)	Bones of forelimbs of vertebrates	Wings of butterfly and birds
(4)	Thorns of Bougainvillea and tendrils of Cucurbita	Eyes of octopus and mammals

154. Evolution of different species in a given area starting from a point and spreading to other geographical areas is known as :-
(1) Adaptive radiation
(2) Natural selection
(3) Migration
(4) Divergent evolution

155. A person who is on a long hunger strike and is surviving only on water, will have :-
(1) More sodium in his urine
(2) Less amino acids in his urine
(3) More glucose in his blood
(4) Less urea in his urine

156. Angiotensinogen is a protein produced and secreted by :-
(1) Macula densa cells
(2) Endothelial cells (cells lining the blood vessels)
(3) Liver cells
(4) Juxtaglomerular (JG) cells

157. Cirrhosis of liver is caused by the chronic intake of :-
(1) opium (2) alcohol
(3) tobacco(chewing) (4) cocaine

158. Mast cells secrete :-
(1) hippurin (2) myoglobin
(3) histamine (4) Haemoglobin

159. Which one of the following is not a property of cancerous cells, whereas the remaining three are ?
(1) They compete with normal cells for vital nutrients.
(2) They do not remain confined in the area of formation
(3) They divide in an uncontrolled manner
(4) They show contact inhibition

160. Common cold differs from pneumonia in that :-
(1) pneumonia is a communicable disease, whereas the common cold is a nutritional deficiency disease
(2) pneumonia can be prevented by a live attenuated bacterial vaccine, whereas the common cold has no effective vaccine
(3) pneumonia is caused by a virus, while the common cold is caused by the bacterium Haemophilus influenzae
(4) pneumonia pathogen infects alveoli whereas the common cold affects nose and respiratory passage but not the lungs

161. Widal test is carried out to test :-
(1) malaria (2) diabetes mellitus
(3) typhoid fever (4) HIV/AIDS

162. Motile zygote of Plasmodium occurs in :-
(1) gut of female Anopheles
(2) salivary glands of Anopheles
(3) human RBCs
(4) human liver

163. The Leydig cells as found in the human body are the secretory source of :-
(1) progesterone (2) intestinal mucus
(3) glucagon (4) androgens

164. In a normal pregnant woman, the amount of total gonadotropin activity was assessed. The result expected was :-
(1) High level of circulating FSH and LH in the uterus to stimulate implantation of the embryo
(2) High level of circulating HCG to stimulate oestrogen and progesterone synthesis
(3) High level of circulating HCG to stimulate endometrial thickening
(4) High levels of FSH and LH in uterus to stimulate endometrial thickening

165. Signals for parturition originate from :-
(1) both placenta as well as fully developed foetus
(2) oxytocin released from maternal pituitary
(3) placenta only
(4) fully developed foetus only

166. Which one of the following statements is false in respect of viability of mammalian sperm?
(1) Sperm is viable for only up to 24 h
(2) Survival of sperm depends on the pH of the medium and is more active in alkaline medium
(3) Viability of sperm is determined by its motility
(4) Sperms must be concentrated in a thick suspension

167. Select the correct statement from the ones given below with respect to Periplaneta americana.
(1) Nervous system dorsally, consists of segmentally arranged ganglia joined by a pair of longitudinal connectives
(2) Males bear a pair of short thread like anal styles
(3) There are 16 very long Malpighian tubules present at the junctions of midgut and hindgut
(4) Grinding of food is carried out only by the mouth parts

168. Compared to those of humans, the erythrocytes in frog are :-
(1) without nucleus but with haemoglobin
(2) nucleated and with haemoglobin
(3) very much smaller and fewer
(4) nucleated and without haemoglobin

169. Pheretima and its close relatives derive nourishment from :-
(1) sugarcane roots
(2) decaying fallen leaves and soil organic matter
(3) soil insects
(4) small pieces of fresh fallen leaves of maize

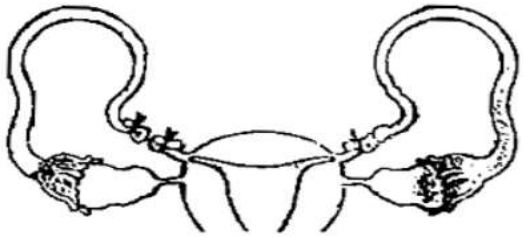
170. During muscular contraction, which of the following events occur ?
(i) H-zone disappears
(ii) A band widens
(iii) I band shortens
(iv) Width of A band is unaffected
(v) M line and Z line come closer
(1) (i),(iii),(iv) and (v) (2) (i),(ii) and (v)
(3) (ii),(iv) and (v) (4) (i),(ii) and (iii).

171. A person entering an empty room suddenly finds a snake right in front on opening the door. Which one of the following is likely to happen in his neurohormonal control system?
(1) Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal medulla
(2) Neurotransmitters diffuse rapidly across the cleft and transmit a nerve impulse
(3) Hypothalamus activates the parasympathetic division of brain
(4) Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal cortex

172. Which part of the human ear plays no role in hearing as such but is otherwise very much required ?
(1) Eustachian tube
(2) Organ of Corti
(3) Vestibular apparatus
(4) Ear ossicles

173. The test-tube baby programme employs which one of the following techniques ?
(1) Intra Cytoplasmic Sperm Injection (ICSI)
(2) Intra Uterine Insemination (IUI)
(3) Gamete Intra Fallopian Transfer (GIFT)
(4) Zygote Intra Fallopian Transfer (ZIFT)

174. What is the figure given below showing particular ?



(1) Ovarian cancer
(2) Uterine cancer
(3) Tubectomy
(4) Vasectomy

175. The incorrect statement with regard to haemophilia is :-
(1) it is a sex-linked disease
(2) it is a recessive disease
(3) it is a dominant disease
(4) a single protein involved in the clotting of blood effected

176. Which Mendelian idea is depicted by a cross in which the F generation resembles both the parents ?
(1) Incomplete dominance
(2) Law of dominance
(3) Inheritance of one gene
(4) Codominance

177. Removal of RNA polymerase III from nucleoplasm will affect the synthesis of :-
(1) tRNA (2) hnRNA
(3) mRNA (4) rRNA

178. Which one of the following microbes forms symbiotic association with plants and helps them in their nutrition ?
(1) Azotobacter
(2) Aspergillus
(3) Glomus
(4) Trichoderma

179. Monascus purpureus is a yeast used commercially in the production of :-
(1) ethanol
(2) streptokinase for removing clots from the blood vessels.
(3) citric acid
(4) blood cholesterol lowering statins

180. Which of the metabolites is common to respiration mediated breakdown of fats, carbohydrates and proteins ?
(1) Glocose-6-phosphate
(2) Fructose 1, 6, bisphosphate
(3) Pyruvic acid
(4) Acetyl Co-A