01. $\int\left(x+\frac{1}{x}\right)^2 dx =$

(1) $x^3+\frac{1}{x}+2x$ **(2)** $\frac{x^3}{3}-\frac{1}{x}+2x$

(3) $\frac{x^3}{3}+\frac{1}{x^2}-2x$ (4) $\frac{x^3}{3}-\frac{1}{x^2}+2x$

02. The tangent to the curve $y^2 = 4x$ at (1, 2) is inclined to the axis at an angle of :

(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{3}$

(3) $\frac{\pi}{2}$ **(4)** $\frac{\pi}{4}$.

03. The derivative of $3e^x - 6$ cosec x + cot x w.r.t. x is :

(1) $3e^x + 6$ cosec x cot x – $cosec^2x$
(2) $2e^x + 4$ cosec x cot x – $cosec^2x$
(3) $e^x + 5$ cosec x cot x – $cosec^2x$
(4) $4e^x + 2$cosec x cot x – $cosec^2x$.

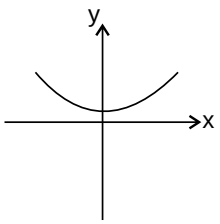
04. The radius of a circle is increasing at a rate of 1 cm/s. Find the rate of increase of its area, when its radius is 10 cm.

(1) $200\pi cm^2/s$ (2) $10\pi cm^2/s$

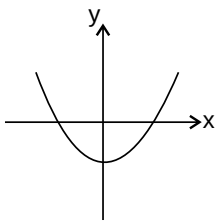
(3) $2\pi cm^2/s$ **(4)** $20\pi cm^2/s$

05. Correct graph of $y - 1 = x^2$ is :

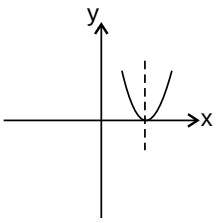
(1)



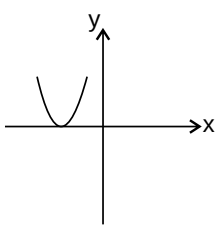
(2)



(3)



(4)



06. Select the correct option

(1) $\sin(\theta) = 2\sin\frac{\theta}{2}\times\cos\frac{\theta}{2}$

(2) $(1 - \cos\theta) = 2\sin^2\left(\frac{\theta}{2}\right)$.

(3) $(1+\cos\theta) = 2\cos^2\left(\frac{\theta}{2}\right)$

(4) All of the above

07. Obtain the magnitude of $2\vec{A} - 3\vec{B}$ if

$\vec{A} = \hat{i} + \hat{j} - 2\hat{k}$

and $\vec{B} = 2\hat{i} - \hat{j} + \hat{k}$

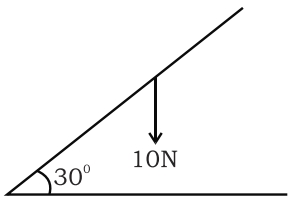
(1) $\sqrt{80}$ **(2)** $\sqrt{90}$

(3) $\sqrt{190}$ (4) None of these

08. What will be the angle between the vector $2\hat{i} + 3\hat{j}$ and the y-axis :

(1) $\tan^{-1}(3/2)$ **(2)** $\tan^{-1}(2/3)$
(3) $\sin^{-1}(2/3)$ (4) $\cos^{-1}(2/3)$.

09. Resolve a weight of 10 N in two directions which are parallel and perpendicular to a slope inclined at 30^0 to the horizontal.



(1) $5N, 5\sqrt{3}$ N (2) $5\sqrt{3}N, 5\sqrt{3}$ N

(3) 5N, 5 N (4) None

10. The component of two forces 3P and 2P is R. If the first force is doubled then the resultatn is also doubled. The angle between the two forces is

(1) 60^0 **(2)** 120^0

(3) 30^0 (4) 135^0

11. Find the dimensions of a/b in the equation : $F = a\sqrt{x} + bt^2$, where F is force, x is distance and t is time

(1) $ML^{1/2}T^{-2}$ (2) MLT^{-4}

(3) $L^{-1/2}T^2$ (4) $L^2T^{-1/2}$

12. $\alpha = \frac{Fv^2}{\beta^2}\log_e\left(\frac{2\pi\beta}{v^2}\right)$ where F = force, v = velocity

Find the dimensions of α and β.

(1) $[\alpha] = [M^1L^{-1}T^0], [\beta] = [L^2T^{-1}]$

(2) $[\alpha] = [M^1L^{-1}T^0], [\beta] = [L^2T^{-2}]$

(3) $[\alpha] = [M^1L^{-2}T^0], [\beta] = [L^2T^{-2}]$

(4) None of these

13. Using concept of significant figures, match the following :

Column –I	Column - II
(a) 0.12345	(p) 5
(b) 0.12100cm	(q) 4
(c) $47.23 \div 2.3$	(r) 3
(d) 3×10^8	(s) 2
	(t) 1

(1) a → p; b → p; c → s; d → t

(2) a → p; b → r; c → s; d → t

(3) a → r; b → p; c → s; d → t

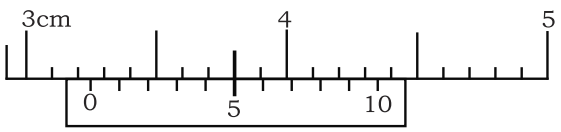
(4) None

14. The amount of heat produced in an electric circuit depends upon the current (I), resistance (R) and time (t). If the errors created in the measurements of the above quantities are 2%, 1%, and 1% respectively then the maximum possible errors will be ($H = i^2Rt$)

(1) 1% (2) 2%

(3) 3% **(4)** 6%

15. Find the reading of vernier calipers shown in figure.



(1) 3.25 cm **(2)** 3.15 cm

(3) 3.15 mm (4) None

16. A man walks 3 steps forward and then takes 2 steps backwards. Each step is 1m wide. Find the distance travelled by the man when he reaches a point 6 m away from the starting point :

(1) 8m (2) 6m

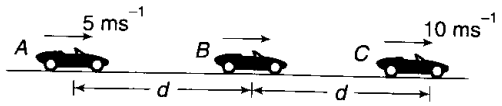
(3) 18m (4) 24m.

17. A particle moves with constant speed v along a regular hexagon ABCDEF in the same order (i.e., A to B, B to C, C to D, D to E, E to F, F to A and so on), then the magnitude of average velocity for its motioin from A to C is

(1) V (2) V/2

(3) $\sqrt{3}$ V/2 (4) None of these

18. Three cars A, B and C are moving uniformly along a straight line as shown. Velocity of A is 5 ms^{-1} and that of c is 10 ms^{-1}. Initial separation between A and B is *d* and that between *B* and *C* is also *d*. When *B* catches *C* separation between *A* and *C* becomes 3*d*. Find the velocity (u) of *B*.



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

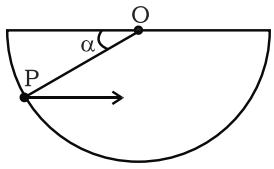
(3) 12m/s **(4)** 15m/s.

19. A particle of unit mass undergoes one – dimensional motion such that its velocity varies according to $v(x) = \beta x^{-2n}$ where, β and n are constants and x is the position of the particle. The acceleration of the particle as a function of x. is given by

(1) $-2n\beta^2x^{-2n-1}$ **(2)** $-2n\beta^2x^{-4n-1}$

(3) $-2\beta^2x^{-2n+1}$ (4) $-2n\beta^2x^{-4n+1}$.

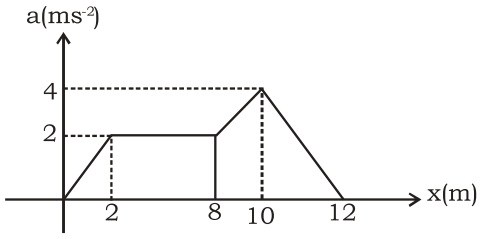
20. A particle of mass m is initially situated at point P inside a hemispherical surface of radius r as shown in the figure. A horizontal acceleration of magnitude a_0 is suddenly produced on the particle in the horizontal direction. If gravitational acceleration is neglected, then time taken by the particle to touch the sphere again is



(1) $\sqrt{\frac{4r\sin\alpha}{a_0}}$ (2) $\sqrt{\frac{4r\tan\alpha}{a_0}}$

(3) $\sqrt{\frac{4r\cos\alpha}{a_0}}$ (4) None of these

21. The acceleration-displacement (a-x) graph of a particle moving in a straight line is as shown. Assume the particle to start from rest, find the velocity of the particle when displacement of the particle is, 12m.



(1) $2\sqrt{3}\,ms^{-1}$ (2) $4\,ms^{-1}$

(3) $8\sqrt{3}\,ms^{-1}$ **(4)** $4\sqrt{3}\,ms^{-1}$

22. A particle is moving on a straight line. Its acceleration as function of displacement is $a=\left(2+\frac{100}{s^2}\right)ms^{-2}$. If the velocity of particle is $5\ ms^{-1}$ at $s=10m$, then the velocity of the particle at $s=25\,m$ is

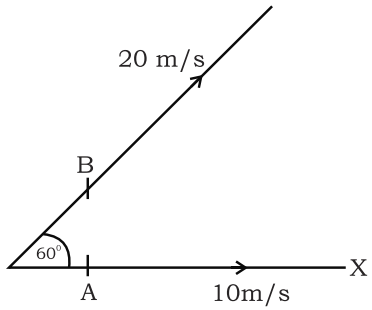
(1) 9.8 ms^{-1} (2)10 ms^{-1} (3) 20 ms^{-1} (4) 8 ms^{-1}

23. A body falls freely under gravity. The distance travelled by it in the last second of its ourney equals the distance travelled by it in the first three second of its free fall. The total time taken by the body to reach the ground is

(a) 5 s (b) 8 s

(c) 12 s (d) 15 s

24. Particle A moves laong X-axis with a uniform velocity of magnitude 10m/s. Particle B moves with uniofrm velocity 20 m/s along a direction making an angle of 60^0 with the positive direction of X-axis as shwon in figure. The relative velocity of B with respect to that of A is



(1) 10 m/s along X-axis

(2) $10\sqrt{3}$ m/s along Y-axis (perpendicular to X-axis)

(3) $10\sqrt{5}$ along the bisection of the velocity of A and B

(4) 30 m/s along negative X-axis

25. Two stones are projected simultaneously with same speed 10 ms^{-1} from same point. The range of both are same and is equal to $5\sqrt{3}$ m. Find the difference in their time of flight.

(a) $\sqrt{3}\,s$ (b) $1s$

(c) $\left(\sqrt{3}-1\right)s$ (d) $2\,s$

26. A ball is projected with a velocity $20\,ms^{-1}$ at an angle to the horizontal. In order to have the maximum range. Its velocity at the highest position must be

(a) $10\,ms^{-1}$ **(b)** $14\,ms^{-1}$

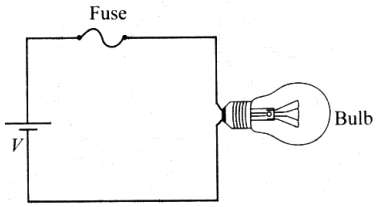
(c) $18\,ms^{-1}$ (d) $16\,ms^{-1}$

27. A constant current of 2A passes a wire for 10s. Find the total charge flowing through the wire in 10s. If charge carriers are electrons, how many electrons passes the wire in 10s?

(1) 1.25×10^{20} (2) 1.25×10^{21}

(3) 1.25×10^{19} (4) zero.

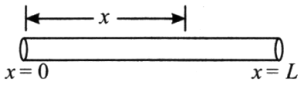
28. A bulb is connected to a 100 V source. There is a 5A fuse in the circuit. Find the maximum wattage of the bulb that will not blow out the fuse. Neglect resistance of the fuse and connecting wires.



(1) 400W **(2)** 500W
(3) 200W (4) None.

29. A cylindrical wire has cross sectioal area A and its length is L. Its resistivity changes with distance (*x*) from one of its ends $\rho = \rho_0\left(1+\frac{x}{L}\right)$.

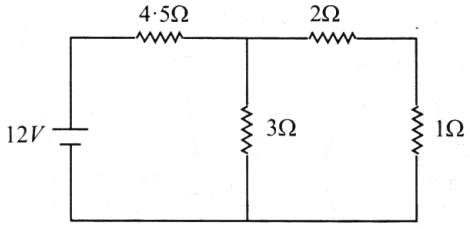
Find the resistance of the wire.



(1) $\frac{3}{2}\frac{\rho_0 L}{A}$ (2) $\frac{3}{4}\frac{\rho_0 L}{A}$

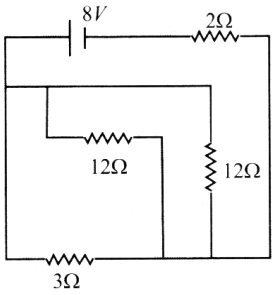
(3) $\frac{1}{4}\frac{\rho_0 L}{A}$ (4) None

30. In the circuit shown, find the current in 3Ω resistor.



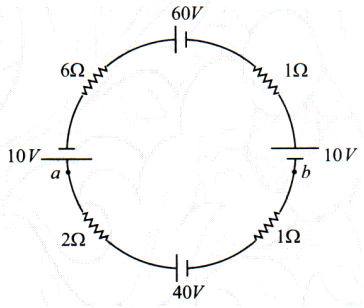
(1) 1 A (2) Zero
(3) 4 A (4) 10 A

31. In the circuit shown, find the cumulative heat dissipated in all the resistors in 30 seconds.



(1) 480 J (2) 380 J
(3) 850 J (4) 580 J

32. Find the potential difference between the points a and b in the figure.



(1) 62 V (2) 42 V
(3) 52V (4) 32 V

33. Two wires of equal diameters of resistivities ρ_1 and ρ_2 and lengths x_1 and x_2 are joined in series. The equivalent resistivity of the combination is:

(1) $\frac{\rho_1 x_1 + \rho_2 x_2}{x_1 + x_2}$ (2) $\frac{\rho_1 x_2 - \rho_2 x_1}{x_1 - x_2}$

(3) $\frac{\rho_1 x_2 + \rho_2 x_1}{x_1 + x_2}$ (4) $\frac{\rho_1 x_1 + \rho_2 x_2}{\rho_1 + \rho_2}$

34. Two point charges are 3m apart and their combined charge is 20μC.If the force between them is 0.075 N, what are the charges ?

(1) $q_1 = 15\mu C$ and $q_2 = 5\mu C$

(2) $q_1 = 5\mu C$ and $q_2 = 15\mu C$

(3) $q_1 = 10\mu C$ and $q_2 = 15\mu C$

(4) $q_1 = 19\mu C$ and $q_2 = 20\mu C$

35. If the electric potential in a region is represented as $V = 2x + 3y - 4z$, obtain expression for the electric field strength

(1) $-2\hat{i} - 3\hat{j} + 4\hat{k}$ (2) $2\hat{i} + 3\hat{j} + 4\hat{k}$

(3) $-2\hat{i} + 3\hat{j} - 2\hat{k}$ (4) $2\hat{i} - 6\hat{j} - 2\hat{k}$

36. An electric dipole has a fixed dipole moment $\vec{p}$, which makes angle θ with respect to x – axis. When subjected to an electric field $\vec{E}_1 = E\hat{i}$, it experiences a torque $\vec{T}_1 = \tau\hat{i}$. When subjecte bo another electric field $\vec{E}_2 = \sqrt{3E_1}\hat{j}$ it experiences torque $\vec{T}_2 = -\vec{T}_1$. The angle θ is :

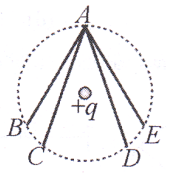
(1) 60° (2) 90°
(3) 30° (4) 45°

37. A electric dipole is formed by two equal and opposite charge q with separation d. The charges have same mass m. It is kept in a uniform electric field E. If it is slightly rotated from its equilibiru orientation, then its angular frequency ω is :

(1) $\sqrt{\frac{qE}{md}}$ **(2)** $\sqrt{\frac{2qE}{md}}$

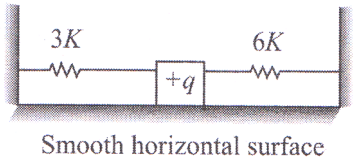
(3) $2\sqrt{\frac{qE}{md}}$ (4) $2\sqrt{\frac{qE}{2md}}$

38. In the electric field of a point charge, q, a certain charge is carried from point A to B, C, D and E. The the work done



(1) is least along the path AB
(2) is least along the path AD
(3) is zero along the paths AB, AC, AD and AE
(4) is least along AE

39. A block (with charge + q) placed on a smooth horizontal surface and connected to two springs is in equilibirum. Springs are massless and relaxed. Now a horizontal electric field E is switched on in the region. Maximum compression or extension in the springs is



(1) $\frac{2qE}{9K}$ (2) $\frac{qE}{2K}$

(3) $\frac{qE}{K}$ (4) $\frac{9qE}{2K}$

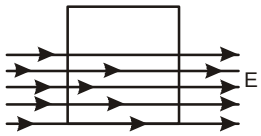
40. The equation of an equi-potential line in an electric field is y=2x, then the electric field strength vector at (1, 2) may be :

(1) $4\hat{i}+3\hat{j}$ (2) $4\hat{i}+8\hat{j}$

(3) $8\hat{i}+4\hat{j}$ **(4)** $-8\hat{i}+4\hat{j}$

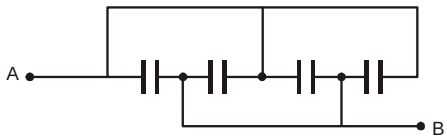
41. A square surface of side L *metres* in the plane of the paper. A uniform electric field $\vec{E}$ $(volt/m)$, also in the plane of the paper, is limited only to the lower half of the square surface, (see figure). The electric flux is SI unit associated with the surface is

(1) Zero
(2) EL^2
(3) $EL^2/(2\varepsilon_0)$
(4) $EL^2/2$



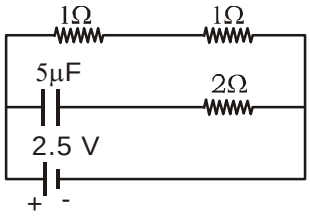
42. Four condensersw are joined as shown in the adjoining figure. The capacity of each $8\mu F$. the equivalent capacity between the points A and B will be

(1) $32\mu F$
(2) $2\mu F$
(3) $8\mu F$
(4) $16\mu F$

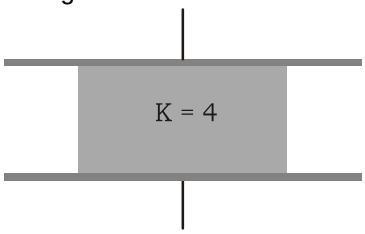


43. A capacitor of capacitance $5\mu F$ is connected as shown in the figure. The internal resistance of the cell is 0.5Ω. The amount of charge on the capacitor plate is

(1) $0\mu C$
(2) $5\mu C$
(3) $10\mu C$
(4) $25\mu C$



44. Consider a parallel plate capacitor of $10\mu F$ (*micro – farad*) with air filled in the gap between the plates. Now one half of the space between the plates is filled with a dielectric of dielectric constant 4, as shown in the fiugre. the capacity of the capacitor changes to



(1) $2\mu F$

(2) $20\mu F$

(3) $40\mu F$

(4) $25\mu F$

45. A $20F$ capacitor is charged to 5V and isolated. It is then connected in parallel with an uncharged $30F$ capacitor. The decrease in the energy of the system will be

(1) $25J$ (2) $200J$ (3) $125J$ **(4)** $150J$

46. The unit cell with crystallographic dimensions $a = b \neq c; \alpha = \beta = \gamma = 90^0$ is

(1) cubic **(2)** tetragonal

(3) monoclinic (4) hexagonal

47. For an octahedral arrangement the lowest radius ratio limit is

(1) 0.155 (2) 0.732 **(3)** 0.414 (4) 0.225

48. A binary solid (A^+B^-) has a zinc blende structure with B^- ions consituting the lattice and A^+ ions occupying 25% tetrahedral holes. The formula of solid is

(1) AB (2) A_2B **(3)** AB_2 (4) AB_4

49. In a face centred cubic arrangement of A and B atoms whose A atoms are at the corner of the unit cell and B atoms at the face centres, one of the A atom is missing from one corner in unit cell. The simplest formula of compound is

(1) A_7B_3 (2) AB_3 **(3)** A_7B_{24} (4) $A_{7/8}B_4$

50. A unit cell is obtained by closed packing layers of atoms in ABCABC.....pattern. The total number of tetrahedral and octahedral voids in the unit cell are respectively

(1) 6, 12 **(2)** 8, 4 (3) 4, 8 (4) 12, 6

51. Edge length of a cube is 400 pm. Its body diagonal would be

(1) 566 pm (2) 600 pm (3) 500 pm **(4)** 693 pm

52. An alloy of copper, silver and gold is found to have copper forming the simple cubic close packed lattice. If the silver atoms occupy the face centre and gold is present at the body centre, then the formula of the alloy will be

(1) Cu_4Ag_4Au (2) Cu_4Ag_2Au

(3) CuAgAu **(4)** $CuAg_3Au$

53. Analysis shows that an oxide ore of nickel has formula $Ni_{0.98}O_{1.00}$. The has percentage of nickel as Ni^{3+} ions is nearly

(1) 2 (2) 96 **(3)** 4 (4) 98

54. If ionic radii of Cs^+ and Ce^- are 1.69Å and 1.81Å respectively, the edge length of unit cell is

(1) 4.04Å (2) 3.50Å (3) 7.00Å (4) None

55. The interionic distance of cesium chloride crystals will be

(1) a (2) a / 2 **(3)** $\sqrt{3}$ a / 2 (4) $2a / \sqrt{3}$

56. If the distance between Na^+ and Cl^- ion in sodium chloride crystal is X pm, the length of the edge of the unit cell is

(1) 4X pm (2) X / 4 pm

(3) X / 2 pm **(4)** 2X pm

57. Coordination number of Zn is ZnS (Zinc blende) is

(1) 4 (2) 6 (3) 2 (4) None

58. Based on equation $E = -2.178 \times 10^{-18}\ J \left(\frac{Z^2}{n^2}\right)$ certain conclusions are written. Which of them is not correct?

(1) Larger the value of n, the larger is the orbit radius

(2) Equation can be used to calculate the change in energy when the electron changes orbit

(3) For n = 1, the electron has a more negative energy than it does for n = 6 which means that the electron is more loosely bound in the smallest allowed orbit

(4) The negative sign in equation simply means that the energy of electron bound to the nucleus is lower than it would be if the electrons were at the infinite distance from the nucleus

59. The electrons, identified by quantum numbers n and *l*

(i) n = 4, l = 1 (ii) n = 4, l = 0

(iii) n = 3, l = 2 (iv) n = 3, l = 1

can be placed in order of increasing energy, from the lowest to highest, as:

(1) (iv) < (ii) < (iii) < (i) (2) (ii) < (iv) < (i) < (iii)

(3) (i) < (iii) < (ii) < (iv) (4) (iii) < (i) < (iv) < (ii)

60. The atomic number of elements X, Y and Z are 19, 21 and 25 respectively. The number of electrons present in the 'M' shell of these elements follows the order

(1) Z > X > Y (2) X > Y > Z

(3) Z > Y > X (4) Y > Z > X

61. Number of waves made by a Bohr electron in one complete revolution in its fourth orbit is

(1) 2 (2) 3 **(3)** 4 (4) Infinite

62. The electronic configuration of an element is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5\ 4s^1$. This presentation is

(1) excited state **(2)** ground state

(3) cationic form (4) anionic form

63. The electronic configuration of Cr^{3+} is

(1) $[Ar]3d^5 4s^1$ (2) $[Ar]3d^2 4s^1$

(3) $[Ar]3d^3 4s^0$ (4) $[Ar]3d^4 4s^2$

64. The energy of a photon is 3×10^{-12} ergs. What is its wavelength in nm?

($h = 6.62 \times 10^{-27}$ ergs, $c = 3 \times 10^{10}$ cm/s)

(1) 662 (2) 1324 (3) 66.2 (3) 6.62

65. The calculated magnetic moment (in Bohr magneton) of Cu^{2+} ion is

(1) 1.73 (2) 0 (3) 2.6 (4) 3.4

66. The atomic number of an element 'M' is 26. How many electrons are present in the M-shell of the element in its M^{3+} state?

(1) 11 (2) 15 (3) 14 **(4)** 13

67. The atomic number of an element is 35. What is the total number of electrons present in all the P-orbitals of the ground state atom of the element

(1) 6 (2) 11 **(3)** 17 (4) 23

68. Maximum number of electrons in a subshell with *l* = 3 and n = 4 is

(1) 10 (2) 12 **(3)** 14 (4) 16

69. The correct set of four quantum numbers for the valence electron of rubidium atom (Z = 37) is

(1) 5, 0, 0, $+\frac{1}{2}$ (2) 5, 1, 0, $+\frac{1}{2}$

(3) 5, 1, 1, $+\frac{1}{2}$ (4) 6, 0, 0, $+\frac{1}{2}$

70. The vapour pressure of a liquid

(1) depends on temperature

(2) does not change at its boiling point

(3) does not change at its freezing point

(4) depends on the volume of the liquid

71. Which of the following expressions is correct for a binary solution when both the solute and the solvent are in vapour state ?

(1) $X_A^p = \frac{p_A}{p_B}$ (2) $X_A^v = \frac{n_A}{n_A + n_B}$

(3) $X_A^v = \frac{p_A + p_B}{p_B}$ **(4)** $X_A^v = \frac{p_A}{p_A + p_B}$

72. Which statement is incorrect about osmotic pressure (Π), volume (V) and temperature (T) ?

(1) $\Pi \propto \frac{1}{V}$ when T is constant.

(2) $\Pi \propto T$ when V is constant

(3) $\Pi \propto V$ when T is constant

(4) ΠV is constant when T is constant.

73. Which of the following condition is correct for an ideal solution ?

(1) $\Delta H_{mix} = 0$ and $\Delta V_{mix} > 0$

(2) $\Delta V_{mix} = 0$ and $\Delta S_{mix} > 0$

(3) $\Delta H_{mix} > 0$ and $\Delta S_{mix} > 0$

(4) $\Delta V_{mix} = 0$ and $\Delta S_{mix} < 0$

74. At boiling point, a liquid is an equilibrium with its vapour. On an average, the molecule in the two phases have equal

(1) potential energy

(2) kinetic energy

(3) intermolecular forces

(4) total energy

75. At 298 K, the highest osmotic pressure is exhibited by a 0.1 M solution of

(1) urea (2) glucose

(3) KCl **(4)** $CaCl_2$

76. The osmotic pressures of equimolar solutions of $Al_2(SO_4)_3$, KCl and sugar will be in the order

(1) $KCl < Al_2(SO_4)_3 <$ sugar

(2) sugar $< KCl < Al_2(SO_4)_3$

(3) sugar $> KCl > Al_2(SO_4)_3$

(4) $KCl <$ sugar $< Al_2(SO_4)_3$

77. The van't Hoff factor of a very dilute solution of weak acid HA is 1.00005. The percentage dissociation is

(1) 5.0×10^{-5}

(2) 5.0×10^{-7}

(3) 5.0×10^{-3}

(4) 2.5×10^{-4}

78. Among 0.1 M solution of urea, Na_3PO_4 and $Al_2(SO_4)$,

(1) the vapour pressure and freezing point are the lowest for urea

(2) the vapour pressure and freezing point are the highest for urea

(3) the elevation in boiling point is the highest for $Al_2(SO_4)_3$

(4) the depression in freezing point is the highest for $Al_2(SO_4)_3$

79. It is possible to calculate ΔT_f and the molar mass of a nonvolatile solute only when

(1) the solution in a dilute one

(2) the solute is not associated or dissociated in the solvent

(3) the solvent along separates out as a pure solid from the solution

(4) all the above are true

80. The molar boiling-point constant for water is $0.513\,Km^{-1}$. When 0.1 mole of sugar is dissolved in 200.0 g of water, the solution boils under a pressure of 1.0 atm at

(1) 100.513^0C (2) 100.0513^0C

(3) 100.256^0C (4) 101.025^0C

81. If 342.0 g of cane sugar ($C_{12}H_{22}O_{11}$) is dissolved in 1000 g of water, the solution will freeze at ($K_{f\ H_2O} = 1.86\,Km^{-1}$)

(1) -1.86^0C (2) 1.86^0C

(3) -3.92^0C (4) 2.42^0C

82. Osmotic prerssure is measured quickly and accurately by

(1) Brakeley and Hartley method

(2) Morse's method

(3) Pfeffer's method

(4) de Vries method

83. The radii of F, F^-, O and O^{-2} are in the order of

(1) $O^{2-} > F^- > O > F$

(2) $O^{2-} > F^- > F > O$

(3) $F^- > O^{2-} > F > O$

(4) $O^{2-} > O > F^- > F$

84. The lanthanide contraction is responsible for the fact that

(1) *Zr* and *Y* have about the same radius

(2) *Zr* and *Nb* have simillar oxidation state

(3) *Zr* and *Hf* have about the same radius

(4) *Zr* and *Zn* have the same oxidation state

85. Correct increasing order of first *I*. *P*. is

(1) $Na < Mg > Al < Si$

(2) $Na < Mg < Al < Si$

(3) $Na > Mg > Al > Si$

(4) $Na < Mg < Al > Si$

86. Among the following options, the sequence of increasing first ionisation potential will be

(1) $B < C < N$ (2) $B > C > N$

(3) $C < B < N$ (4) $N > C > B$

87. Which of the following is not the correct increasing order of ionisation energy

(1) $Cl^- < Ar < K^+$ **(2)** $Au < Ag < Cu$

(3) $Cs < Rb < K$ (4) $K < Ca < Sc$

88. The decreasing order of the ionisation potential in the following elements is

(1) $Ne > Cl > P > S > Al > Mg$

(2) $Ne > Cl > P > S > Mg > Al$

(3) $Ne > Cl > S > P > Mg > Al$

(4) $Ne > Cl > S > P > Al > Mg$

89. In which of the following process highest energy is absorbed

(1) $Cu \rightarrow Cu^+$ (2) $Br \rightarrow Br^-$

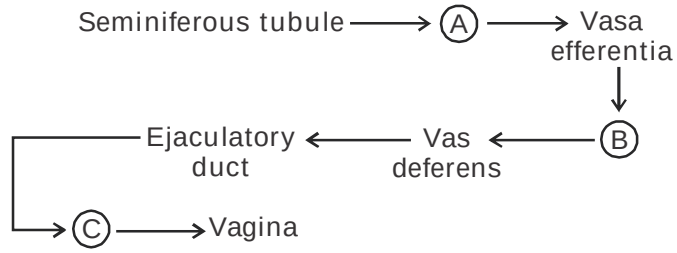
(3) $I \rightarrow I^-$ (4) $Li \rightarrow Li^+$

90. Which of the following elements will have the highest electron affinity

(1) Nitrogen (2) Flourine

(3) Chlorine (4) Phosphorus

151. Path of sperm in human is shown below :–



A, B and C respectively are :–

	(A)	**(B)**	**(C)**
(1)	Epididymis	Testes	Urethra
(2)	Rete testis	Epididymis	Urethra
(3)	Ovary	Epididymis	Uterus
(4)	Testes	Rete testis	Epididymis

152. Which of the following are functions of sertoli cells :–

(1) Protection of developing spermatogenic cells

(2) Nourishment of spermatids and sperm

(3) Phagocytosis of excess sperms cytoplasm as development proceeds.

(4) Convert androgen to Oestrogen

(1) (a), (b) (2) (a), (d)

(3) (a), (b), and (c) **(4)** All

153. Which of the following statements regarding mammary gland is incorrect ?

(1) They are paired glandular structure that lies over the pectoral muscles

(2) Each gland has 100-500 lobulated milk glands each having a number of tobules containing number of alveoli.

(3) The cells of alveoli secrets milk which is stored in the cavity of the alveoli

(4) Each milk gland or lobules has lactiferous ducts that drain into the openings in the nipple

154. Which of the following terms is not correctly defined ?

(1) Cryptorchidism :– Failure of testis to descend into scrotum.

(2) Semen :– secretions from prostate gland only

(2) Puberty :– Stage of development before the reproductive organs become functional

(4) Primordial :– The first stage of meiosis for follicle Oogenesis.

155. Which of the following is the first change that occurs to the zygote after fertilization ?

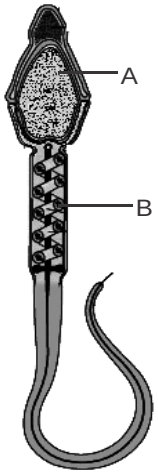
(1) It divides to form a hollow ball of cells called the blastocyst

(2) It begins to secrete the hormones

(3) It contacts the endometrial wall of the uterus and becomes buried inside it

(4) It intiates the formation of a placenta

156. Structure of a Human sperm is shown in the figure with labels (A) and (B). Identify these and given their characteristics :–



(1) (A) → Acrosome – it's enzyme helps in fertilisation

(2) (B) → Mitochondria – Provides energy of fusion of sperms with ovum

(3) (A) → Plasma membrane – envelops whole sperm

(4) (B) → polysomes – Synthesis enzyme to facilitate fertilisation

157. Match the following and choose the correct options :–

Column -I	**Column -II**
(A) Trophoblast	(i) Embedding of blastocyst in the endometrium
(B) Cleavage	(ii) Group of cells that would differentiate as embryo
(C) Inner cell mass	(iii) Outer layer of blastocyst attached to the endometrium
(D) Implantation	(iv) Mitotic division of zygote

(1) A – (ii) B – (i) C – (iii) D – (iv)
(2) A – (iii) B – (iv) C – (ii) D – (i)
(3) A – (iii) B – (i) C – (ii) D – (iv)
(4) A – (ii) B – (iv) C – (iii) D – (i)

158. Match the column I with column II

Column I	**Column II**
(A) FSH	I. Prepare endometrium for implantation
(B) LH	II. Develops female secondary sexual characters
(C) Progesterone	III. Contraction of urine wall
(D) Estrogen	IV. Development of corpus luteum
	V. Maturation of Graffian follicle

(1) A – V B – IV C – I D – II
(2) A – IV B – V C – II D – I
(3) A – IV B – III C – II D – V
(4) A – V B – I C – II D – IV

159. Chorionic villi are surrounded by :–

(1) Trophoblast

(2) Chorion

(3) By uterine tissue and maternal blood

(4) By 100 % foetal blood

160. The milk secretion and milk release is function of _____ and _____ hormones respectively.

(1) Vasopressin, oxytocin
(2) Oxytocin, Prolactin
(3) Prolactin, vasopressin
(4) Prolactin, oxytocin.

161. Read the following statements and answer the following questions :–

I. Each testes has highly coiled 250 compartments called seminiferous tubules

II. Erection of the penis due to presence of special tissues facilitates insemination

III. Immunologically competent cells are also present in the interstitial spaces of seminiferous tubules.

IV. Testes lie outside the abdominal cavity in a thin pouch like skin called scrotum

which among following option contain only correct statements ?

(1) (I), (II) and (III) (2) (I) and (IV)
(3) (I) and (IV) **(4)** (II), (III) and (IV)

162. The hormones which are secreted in human women only during pregnancy are :
(1) hCG, estrogen and progesterone
(2) hCG only
(3) hCG, hPL, relaxin
(4) hCG and Estrogen only.

163. The _____ is a emporary organ that connects a mammalian mother to its foetus.
(1) Placenta
(2) Chorion
(3) Endometrium
(4) None of the Above

164. The function of the Male secondary sex organ is to :–
(1) Transfer spermatozoa to the female
(2) Regulate sperm production
(3) Produce sperm
(4) Produce male

165. Ovulation occurs :-
(1) Between menstruation and Proliferative phase
(2) Between menstruation and secretory phase
(3) Between menstruation and luteal phase
(4) Between proliferative phase and secretory phase.`

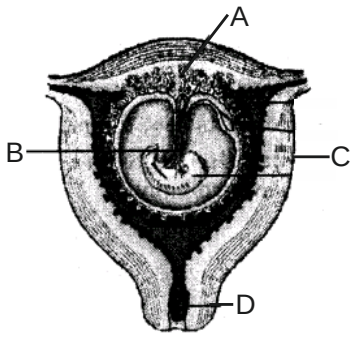
166. The method of directly injecting a sperms into ovum in assisted by reproductive technology is called :–
(1) GIFT (2) ZIFT
(3) ICSI (4) Both (1) and (2)

167. The male acessary glands include :–
(a) Testes (b) Seminal vesicle
(c) Epididymis (d) Prostate
(e) Bulbourethral (f) Sertoli cells
(1) (a), (b), (c), (e), (f) (2) (a), (b), (d), (e)
(3) (a), (b), (d), (e), (f) **(4)** (b), (d), (e)

168. What happens during fertilization in Human after many sperms reach close to the ovum ?
(1) cells of corona radiata trap all the sperms except one.
(2) Only the closest sperm to the ovum penetrates the Zona pellucida.
(3) The secretions of acrosome helps one sperm enter cytoplasm of ovum through the zona pellucida and plasma membrane.
(4) All sperms except the one nearest to the ovum lose their tails

169. What is the correct sequence of sperm formation :–
(1) Spermatogonia, Spermatozoa, Spermatocyte, spermatid
(2) Spermatogonia, spermatocyte, spermatid, spermatozoa
(3) Spermatid, spermatocyte, spermatocyte, spermatogonia, spermatozoa
(4) Spermatogonia, spermatocyte, spermatozoa, spermatid

170. Mark the correct description of the labelled parts from the following option.



(1) A – chorionic villi formed from yolk sac
(2) B – Umbilical cord has one umbilical artery and two umbilical veins
(3) C – allantois forms RBCs in early embryo stages
(4) D – Plug of mucus in cervix formed by activity of progesterone

171. Which age group among the human is more vulnerable to STDs?
(1) 15 – 24 years (2) 22 – 29 years
(3) 30 – 35 years (4) 35 – 42 years

172. Test tube baby programme involves :–
(1) Zygote intrafallopian transfer
(2) Intrauterine insemination
(3) Gamete intrafallopian transfer
(4) Intra cytoplasmic sperm injection

173. Government of India has legalised MTP (Medical Termination of Pregnancy) in :–
(1) 1951 **(2)** 1971
(3) 1976 (4) 1987

174. Which is wrongly matched ?
(1) ICSI – Sperm directly injected into ovum
(2) ICSI – Sperm introduced artificially into ovum
(3) GIFT – Embryo with more than 8 blastomeres transfered into fallopian tube
(4) IVF – Fertilization outside the body

175. Early symptoms of STDs are :–
(a) Itching (b) Swellings
(c) Fluid discharge (d) Tumor is formed
Which of the following option is correct.
(1) (a) and (b) (2) (b), (c) and (d)
(3) (a), (c) and (d) **(4)** (a), (b) and (c)

176. Which of the following cells during gametogenesis is normally diploid ?
(1) Secondary polar body
(2) Primary polar body
(3) Spermatid
(4) Spermatogonia

177. Match the column I with column II and choose the correct option :–

Column - I	**Column-II**
(A) Non-medicated IUD	(1) Vault
(B) Copper releasing IUD	(2) Lippes loop
(C) Hormone releasing IUD	(3) Multiload 375
(D) Barrier	(4) LNG -20

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

178. Hysterectomy is surgical removal of :–
(1) Mammary glands **(2)** Uterus
(3) Prostate gland (4) Vas-deference

179. Pills prevent conception by inhibiting :-
(1) Ovulation
(2) Implantation
(3) After the quality of cervical mucus to prevent entry of sperms
(4) All of the above

180. The permissible use of the technique amniocentesis is for :–
(1) Artificial insemination
(2) Transfer of embryo into the uterus of a surrogate mother
(3) Detecting any genetic abnormality
(4) Detecting sex of the unborn