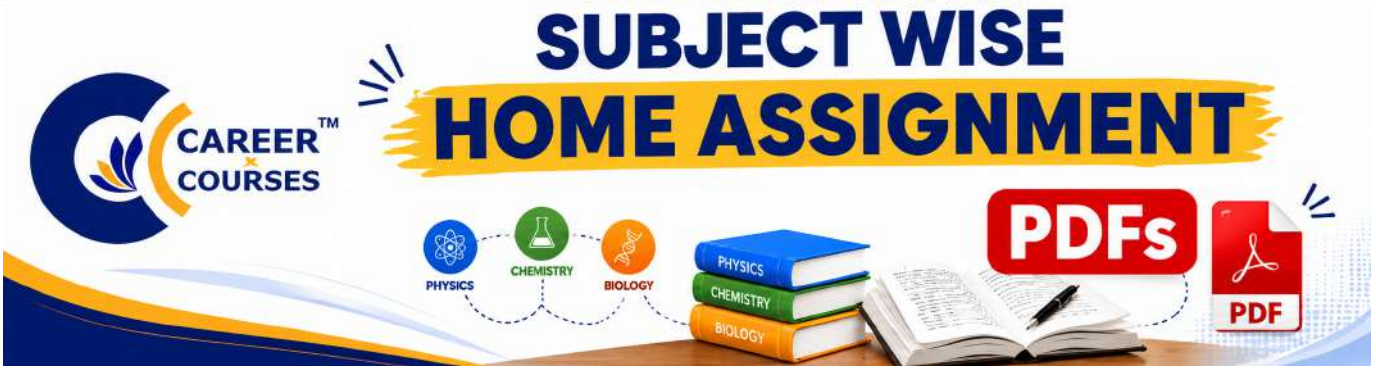


Subjects : Physics | **NEET PHYSICS** | **Date** : 10-11-2026

Total Marks : 480 | **Hours** : 3 Hours

Physics - Section A (MCQ)

1. The quantities which have the same dimensions as those of solid angle are:

   A) stress and angle
   B) strain and arc
   C) angular speed and stress
   D) strain and angle

2. A metal wire has mass $(0.4 \pm 0.002)\ g$, radius $(0.3 \pm 0.001)\ mm$ and length $(5 \pm 0.02)\ cm$. The maximum possible percentage error in the measurement of density will nearly be .....%

   A) 1.4 B) 1.2 C) 1.3 D) 1.6

3. Each side of a metallic cube of mass 5.580 kg is measured to be 9.0 cm. Keeping the significant figures in view, the density of the material of the cube can be best expressed as $X \times 10^3 kgm^{-3}$, where the value of X is :

   A) 7.654 B) 7.6 C) 7.65 D) 7.7

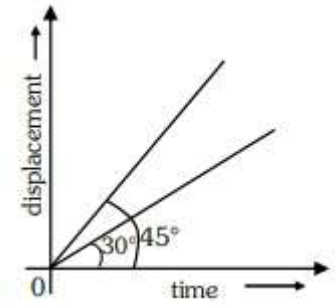
4. A screw gauge has least count of $0.01\ mm$ and there are 50 divisions in its circular scale. The pitch of the screw gauge is .....mm

   A) 1.0 B) 0.01 C) 0.25 D) 0.5

5. A vehicle travels half the distance with speed v and the remaining distance with speed $2\,v$.Its average speed is :

   A) $\frac{3v}{4}$ B) $\frac{v}{3}$ C) $\frac{2v}{3}$ D) $\frac{4v}{3}$

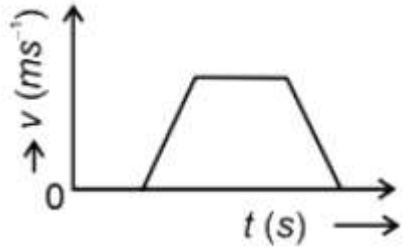
6. The displacement-time graphs of two moving particles make angles of 30° and 45° with the x-axis as shown in the figure. The ratio of their respective velocity is :

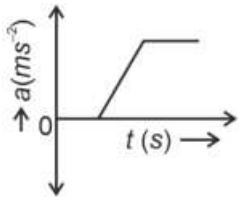


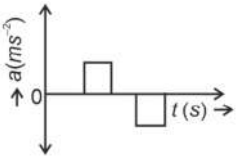
   A) 1 : 1 B) 1 : 2 C) $1 : \sqrt{3}$ D) $\sqrt{3} : 1$

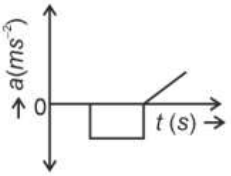
7. The velocity $(v)-$ time (t) plot of the motion of a body is shown below:
   (image)

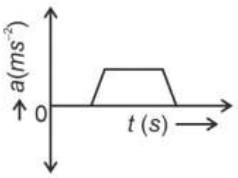
The acceleration $(a)-$ time (t) graph that best suits this motion is :



A) 

B) 

C) 

D) 

8. The ratio of the distances travelled by a freely falling body in the 1^{st} , 2^{nd} , 3^{rd} and 4^{th} second :

A) $1:4:9:16$ B) $1:3:5:7$ C) $1:1:1:1$ D) $1:2:3:4$

9. The x and y coordinates of the particle at any time are $x = 5t - 2t^2$ and $y = 10t$ respectively, where x and y are in metres and t in seconds. The acceleration of the particle at $t = 2\,s$ is.....m/sec^2

A) -4 B) -5 C) -8 D) 0

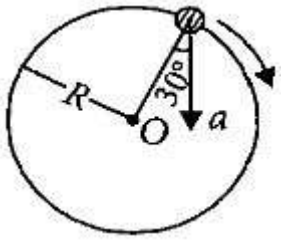
10. A ball of mass $1\ kg$ is thrown vertically upwards and returns to the ground after $3\ seconds$. Another ball, thrown at 60° with vertical also stays in air for the same time before it touches the ground. The ratio of the two heights are

A) $1:2$ B) $1:1$ C) $2:1$ D) $1:3$

11. A car travels on a circular racetrack of radius 50 m, which is banked at an angle θ. If the car travels at a speed $10ms^{-1}$, then the wear and tear on its tyres is minimum. Taking the acceleration due to gravity to be $10ms^{-2}$, the value of θ is:

A) $\tan^{-1}(2\sqrt{3})$ B) $\tan^{-1}\left(\frac{1}{5}\right)$ C) $\tan^{-1}\left(\frac{2}{5}\right)$ D) $\tan^{-1}(\sqrt{3}/2)$

12. In the given figure, $a = 15\ ms^{-2}$ represents the total acceleration of a particle moving in the clockwise direction in a circle of radius $R = 2.5\,m$ at a given instant of time. The speed of the particle is ..... m/s



A) 5.7 B) 6.2 C) 4.5 D) 5.0

13. A girl jumps down from a moving bus, along the direction of motion of the bus, tilting slightly forward. She falls on (a) a sheet of ice (b) a patch of glue.

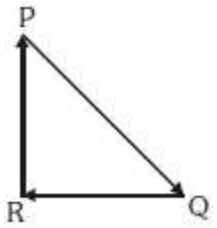
A) In both cases (a) and (b) she falls forward

B) In both cases (a) and (b) she falls backward

C) In case (a) she falls forward and in case (b) she falls backward

D) In case (a) she falls backward and in case (b) she falls forward

14. A particle moving with velocity $\overrightarrow{V}$ is acted by three forces shown by the vector triangle PQR. The velocity of the particle will

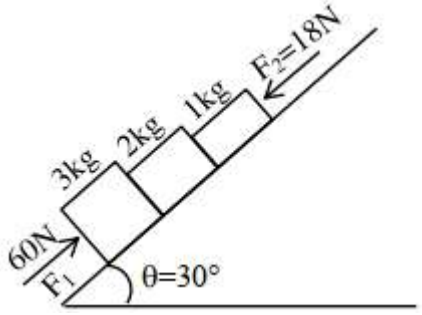


A) increase
B) decrease
C) remain constant
D) change according to the smallest force $\overrightarrow{QR}$

15. A ball of mass 0.5 kg is dropped from a height of 40 m. The ball hits the ground and rises to a height of 10 m. The impulse imparted to the ball during its collision with the ground is ....Take $(g = 9.8m/s^2)$

A) 21 NS
B) 7 NS
C) 0
D) 84 NS

16. In the diagram shown, the normal reaction force between 2 kg and 1 kg is (Consider the surface, to be smooth).....N (Given $g = 10\,ms^{-2}$)



A) 25
B) 39
C) 6
D) 10

17. There are two inclined surface of equal length (L) and same angle of inclination 45° with the horizontal. One of them is rough and the other is perfectly smooth. A given body takes 2 times as much time to slide down on rough surface than on the smooth surface. The coefficient of kinetic friction (μ_k) between the object and the rough surface is close to:

A) 0.25
B) 0.4
C) 0.5
D) 0.75

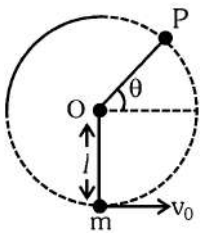
18. The energy required to break one bond in DNA is $10^{-20}\,J$. This value in eV is nearly

A) 0.006
B) 6
C) 0.6
D) 0.0625

19. Consider a drop of rain water having mass 1 g falling from a height of 1 km. It hits the ground with a speed of $50\,ms^{-1}$. Take g constant with a value $10\,ms^{-1}$. The work done by the (i) gravitational force and the (ii) resistive force of air is

A) $100\,J,\ 8.75\,J$
B) $10\,J,\ -8.75\,J$
C) $-10\,J,\ 8.25\,J$
D) $1.25\,J,\ -8.25\,J$

20. A bob of heavy mass m is suspended by a light string of length l. The bob is given a horizontal velocity v_0 as shown in figure. If the string gets slack at some point P making an angle θ from the horizontal, the ratio of the speed v of the bob at point P to its initial speed v_0 is:



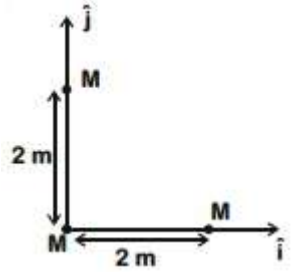
A) $(\sin\theta)^{\frac{1}{2}}$
B) $\left(\frac{1}{2+3\sin\theta}\right)^{\frac{1}{2}}$

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

21. A body of mass 1 kg begins to move under the action of a time dependent force $\overrightarrow{F} = (2t\hat{i} + 3t^2\hat{j})$ N where $\hat{i}$ and $\hat{j}$ are unit vectors along x and y axis. What 10.Power will be developed by the force at the time t?

A) $(2t^2 + 4t^4)\ W$ B) $(2t^3 + 3t^4)\ W$ C) $(2t^3 + 3t^5)\ W$ D) $(2t^2 + 3t^3)\ W$

22. Three identical spheres, each of mass M, are placed at the corners of a right angle triangle with mutually perpendicular sides equal to 2 m (see figure). Taking the point of intersection of the two mutually perpendicular sides as the origin, find the position vector of centre of mass.



A) $\frac{4}{3}(\hat{i} + \hat{j})$ B) $2(\hat{i} + \hat{j})$ C) $(\hat{i} + \hat{j})$ D) $\frac{2}{3}(\hat{i} + \hat{j})$

23. The angular speed of the wheel of a vehicle is increased from 360 rpm to 1200 rpm in 14 $second$. Its angular acceleration is,

A) $1\ rad/s^2$ B) $2\pi\ rad/s^2$ C) $28\pi\ rad/s^2$ D) $120\pi\ rad/s^2$

24. From a circular ring of mass 'M' and radius 'R' an arc corresponding to a 90° sector is removed. The moment of inertia of the remaining part of the ring about an axis passing through the centre of the ring and perpendicular to the plane of the ring is 'K' times MR^2. Then the value of 'K' is

A) $\frac{3}{4}$ B) $\frac{7}{8}$ C) $\frac{1}{4}$ D) $\frac{1}{8}$

25. The angular momentum of a rigid body of mass m about an axis is n times the linear momentum (P) of the body. Total kinetic energy of the rigid body is

A) $\frac{P^2[1+n^2]}{2m}$ B) $\frac{n^2P^2}{2m}$ C) $n^2P^2 \times 2m$ D) $\frac{P^2}{2}\left(\frac{n^2}{I} + \frac{1}{m}\right)$

26. The acceleration due to gravity at a height 1 km above the earth is the same as at a depth d below the surface of earth. Then $d =$ ..... km

A) $\frac{4}{3}$ B) $\frac{3}{2}$ C) $\frac{2}{3}$ D) 2

27. The minimum energy required to launch a satellite of mass m from the surface of earth of mass M and radius R in a circular orbit at an altitude of $2R$ from the surface of the earth is:

A) $\frac{2GmM}{3R}$ B) $\frac{GmM}{2R}$ C) $\frac{GmM}{3R}$ D) $\frac{5GmM}{6R}$

28. The ratio of escape velocity at earth (v_e) to the escape velocity at a planet (v_p) whose radius and mean density are twice as that of earth is

A) $1 : 2\sqrt{2}$ B) $1 : 4$ C) $1 : \sqrt{2}$ D) $1 : 2$

29. The radius of Martian orbit around the Sun is about 4 times the radius of the orbit of Mercury. The Martian year is 687 Earth days. Then which of the following is the length of 1 year on Mercury?

A) 88 earth days B) 225 earth days C) 172 earth days D) 124 earth days

30. Let a wire be suspended from the ceiling (rigid support) and stretched by a weight W attached at its free end. The longitudinal stress at any point of cross-sectional area A of the wire is :

A) Zero B) $2W/A$ C) W/A D) $W/2A$

31. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A):The stretching of a spring is determined by the shear modulus of the material of the spring.
Reason (R):A coil spring of copper has more tensile strength than a steel spring of same dimensions.
In the light of the above statements, choose the most appropriate answer from the options given below:

A) Both (A) and (R) are true and (R) is not the correct explanation of (A)

B) (A) is true but (R) is false

C) (A) is false but (R) is true

D) Both (A) and (R) are true and (R) is the correct explanation of (A)

32. The maximum elongation of a steel wire of $1\ \mathrm{m}$ length if the elastic limit of steel and its Young's modulus, respectively, are $8 \times 10^8\ \mathrm{N\ m^{-2}}$ and $2 \times 10^{11}\ \mathrm{N\ m^{-2}}$, is:

A) $0.4\ \mathrm{mm}$ B) $40\ \mathrm{mm}$ C) $8\ \mathrm{mm}$ D) $4\ \mathrm{mm}$

33. The density of a metal at normal pressure is ρ. Its density when it is subjected to an excess pressure p is ρ' If B is Bulk modulus of the metal, the ratio of $\frac{\rho'}{\rho}$ is

A) $\frac{1}{1-\frac{p}{B}}$ B) $1+\frac{p}{B}$ C) $\frac{1}{1+\frac{p}{B}}$ D) $1+\frac{B}{p}$

34. Two copper vessels A and B have the same base area but of different shapes. A takes twice the volume of water as that B requires to fill upto a particular common height. Then the correct statement among the following is

A) Pressure on the base area of vessels A and B is same.

B) Pressure on the base area of vessels A and B is not same.

C) Both vessels A and B weigh the same.

D) Vessel B weighs twice that of A.

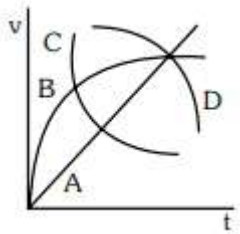
35. Two non-mixing liquids of densities ρ and $n\rho\ (n > 1)$ are put in a container. The height of each liquid is h. A solid cylinder of length L and density d is put in this container. The cylinder floats with its axis vertical and length $\rho L(\rho < 1)$ in the denser liquid. The density d is equal to

A) $[2 + (n + 1)P]\rho$ B) $[2 + (n - 1)P]\rho$ C) $[1 + (n - 1)P]\rho$ D) $[1 + (n + 1)P]\rho$

36. The terminal velocity of a copper ball of radius $5\,mm$ falling through a tank of oil at room temperature is $10\ cm\,s^{-1}$. If the viscosity of oil at room temperature is $0.9\,kg\,m^{-1}s^{-1}$, the viscous drag force is :

A) $8.48 \times 10^{-3}\,N$ B) $8.48 \times 10^{-5}\,N$ C) $4.23 \times 10^{-3}\,N$ D) $4.23 \times 10^{-6}\,N$

37. A spherical ball is dropped in a long column of a highly viscous liquid. The curve in the graph shown, which represents the speed of the ball (v) as a function of time (t) is



A) B B) C C) D D) A

38. A thin flat circular disc of radius $4.5\ \mathrm{cm}$ is placed gently over the surface of water. If surface tension of water is $0.07\ \mathrm{N\ m^{-1}}$, then the excess force required to take it away from the surface is

A) $198\ \mathrm{N}$ B) $1.98\mathrm{mN}$ C) $99\ \mathrm{N}$ D) $19.8\mathrm{mN}$

39. The amount of energy required to form a soap bubble of radius $2\,cm$ from a soap solution is nearly ..... $\times 10^{-4}\,J$: (surface tension of soap solution $= 0.03\,N\,m^{-1}$)

A) 50.1 B) 30.16 C) 5.06 D) 3.01

40. A soap bubble, having radius of 1 mm, is blown from a detergent solution having a surface tension of 2.5 $\times 10^{-2}$ N/m. The pressure inside the bubble equals at a point Z_0 below the free surface of water in a container. Taking $g = 10$ m/s^2 density of water $= 10^3$ kg/m^3, the value of Z_0 is.....cm

A) 100 B) 10 C) 1 D) 0.5

41. A capillary tube of radius r is immersed in water and water rises in it to a helght h. The mass of the water in the capillary is 5 g. Another capillary tube of radlus 2 r is immersed in water. The mass of water that will rise in this tube is ..... g

A) 20.0 B) 2.5 C) 5.0 D) 10.0

42. A copper rod of 88 cm and an aluminum rod of unknown length have their increase in length independent of increase in temperature. The length of aluminum rod is....cm
($\alpha_{Cu} = 1.7 \times 10^{-5}$ K^{-1} and $\alpha_{Al} = 2.2 \times 10^{-5}$ K^{-1})

A) 6.8 B) 113.9 C) 88 D) 68

43. A metallic bar of Young's modulus, 0.5×10^{11} N m^{-2} and coefficient of linear thermal expansion 10^{-5}°C^{-1}, length 1 m and area of cross-section 10^{-3} m^2 is heated from 0°C to 100°C without expansion or bending. The compressive force developed in it is :

A) 50×10^3 N B) 100×10^3 N C) 2×10^3 N D) 5×10^3 N

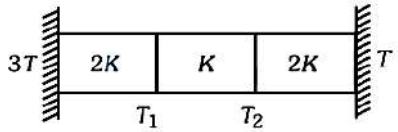
44. The quantities of heat required to raise the temperature of two solid copper spheres of radil r_1 and r_2 ($r_1 = 1.5r_2$) through 1 K are in the ratio

A) $\frac{5}{3}$ B) $\frac{27}{8}$ C) $\frac{9}{4}$ D) $\frac{3}{2}$

45. A piece of ice falls from a height h so that it melts completely. Only one-quarter of the heat produced is absorbed by the ice and all energy of ice gets converted into heat during its fall. The value of h is
[Latent heat of ice is 3.4×10^5 J/kg and $g = 10$ N/kg]

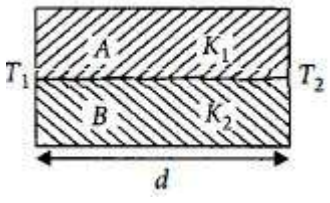
A) 544 B) 136 C) 68 D) 34

46. Three identical heat conducting rods are connected in series as shown in the figure. The rods on the sides have thermal conductivity $2K$ while that in the middle has thermal conductivity K. The left end of the combination is maintained at temperature $3T$ and the right end at T. The rods are thermally insulated from outside. In steady state, temperature at the left junction is T_1 and that at the right junction is T_2. The ratio T_1/T_2 is



A) $\frac{3}{2}$ B) $\frac{4}{3}$ C) $\frac{5}{3}$ D) $\frac{5}{4}$

47. Two rods A and B of different materials are welded together as shown in figure.Their thermal conductivities are K_1 and K_2 The thermal conductivity of the composite rod will be



A) $\frac{3K_1K_2}{2}$ B) $\frac{K_1+K_2}{3}$ C) $\frac{K_1K_2}{3(K_1+K_2)}$ D) $\frac{K_1+K_2}{2}$

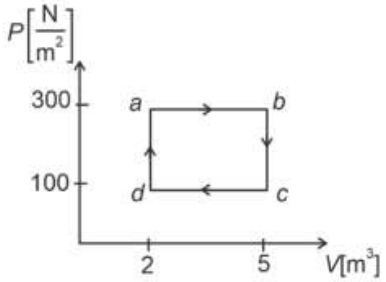
48. An object kept in a large room having air temperature of 25°C takes 12 minutes to cool from 80°C to 70°C. The time taken to cool for the same object from 70°C to 60°C would be nearly.....min

A) 10 B) 12 C) 20 D) 15

49. Three stars A, B, C have surface temperatures T_A, T_B, T_C respectively. Star A appears bluish, star B appears reddish and star C yellowish. Hence,

A) $T_A > T_C > T_B$ B) $T_A > T_B > T_C$ C) $T_B > T_C > T_A$ D) $T_C > T_B > T_A$

50. One mole of an ideal monatomic gas undergoes a cyclic process as shown in the figure. The total heat supplied to the gas is:

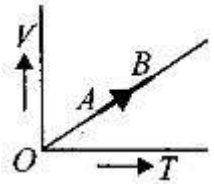


A) 800 J B) 400 J C) 500 J D) 600 J

51. In which of the following processes, heat is neither absorbed nor released by a system ?

A) isothermal B) adiabatic C) isobaric D) isochoric

52. The volume (V) of a monatomic gas varies with its temperature (T) , as shown in the graph. The ratio of work done by the gas , to the heat absorbed by it, when it undergoes a change from state A to state B , is



A) $\frac{2}{5}$ B) $\frac{2}{3}$ C) $\frac{2}{7}$ D) $\frac{1}{3}$

53. A Carnot engine has an efficiency of 50% when its source is at a temperature $327^{\circ}\,C$. The temperature of the sink is $\ldots\ldots\ldots^{\circ}C$

A) 200 B) 27 C) 15 D) 100

54. A cylinder contains hydrogen gas at pressure of $249\ kPa$ and temperature $27^{\circ}C$. Its density is $\ldots\ldots\ldots\ldots kg/m^3$ $\left(R = 8.3\,J\,mol^{-1}K^{-1}\right)$

A) 0.02 B) 0.5 C) 0.2 D) 0.1

55. Match Column $-I$ and Column $-II$ and choose the correct match from the given choices.

Column $-I$	Column $-II$
(A) Root mean square speed of gas molecules	$(P)\ \frac{1}{3}\mathrm{n}m\bar{v}^2$
(B) Pressure exerted by ideal gas	$(Q)\ \sqrt{\frac{3\mathrm{RT}}{\mathrm{M}}}$
(C) Average kinetic energy of a molecule	$(R)\ \frac{5}{2}\mathrm{RT}$
(D) Total internal energy of 1 mole of a diatomic gas	$(S)\ \frac{3}{2}\mathrm{k_B T}$

A) $(A)-(R),(B)-(P),(C)-(S),(D)-(Q)$

B) $(A)-(Q),(B)-(R),(C)-(S),(D)-(P)$

C) $(A)-(Q),(B)-(\mathrm{P}),(\mathrm{C})-(\mathrm{S}),(\mathrm{D})-(\mathrm{R})$

D) $(A)-(R),(B)-(Q),(C)-(P),(D)-(S)$

56. The temperature of a gas is $-50^\circ\,C$. To what temperature the gas should be heated so that the rms speed is increased by 3 times?

A) $223\,K$ B) $669^\circ\,C$ C) $3295^\circ\,C$ D) $3097\,K$

57. The mean free path of molecules in an ideal gas A is half that of another ideal gas B. The diameter of the spherical molecules of gas A is twice the diameter of the molecules of B. If number densities of the gases A and B are n_A and n_B, respectively, the correct option is:

A) $n_A = \frac{1}{2}n_B$ B) $n_A = n_B$ C) $n_A = 2n_B$ D) $n_A = \frac{1}{4}n_B$

58. Identify the function which represents a periodic motion.

A) $e^{-\omega t}$ B) $e^{\omega t}$ C) $\log_e(\omega t)$ D) $\sin\omega t + \cos\omega t$

59. A pendulum is hung from the roof of a sufficiently high building and is moving freely to and fro like a simple harmonic oscillator. The acceleration of the bob of the pendulum is 20 m/s^2 at a distance of 5 m from the mean position. The time period of oscillation is

A) $2\pi\ s$ B) $\pi\ s$ C) $1\ s$ D) $2\ s$

60. A body is executing simple harmonic motion with frequency $'n'$, the frequency of its potential energy is :

A) n B) 3n C) 2n D) 4n

61. A particle executes linear simple harmonic motion with an ampilitude of $3\,cm$. When the particle is at $2\,cm$ from the mean position , the magnitude of its velocity is equal to that of its acceleration. Then its time period in seconds is

A) $\frac{4\pi}{\sqrt{5}}$ B) $\frac{2\pi}{\sqrt{5}}$ C) $\frac{\sqrt{5}}{\pi}$ D) $\frac{\sqrt{5}}{2\pi}$

62. If the initial tension on a stretched string is doubled, then the ratio of the initial and final speeds of a transverse wave along the string is :

A) $\sqrt{2}:1$ B) $1:\sqrt{2}$ C) $1:2$ D) $1:1$

63. Two open organ pipes of fundamental frequencies n_1 and n_2 are joined in series. The fundamental frequecny of the new pipe so obtained will be

A) $\frac{n_1+n_2}{2}$ B) $\sqrt{{n_1}^2+{n_2}^2}$ C) $\frac{n_1 n_2}{n_1+n_2}$ D) (n_1+n_2)

64. The second overtone of an open organ pipe has the same frequency as the first overtone of a closed pipe L metre long. The length of the open pipe will be

A) $\frac{L}{2}\ m$ B) $4L\ m$ C) $L\ m$ D) $2L\ m$

65. The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system .... Hz ?

A) 10 B) 20 C) 30 D) 40

66. Suppose the charge of a proton and an electron differ slightly. One of them is $-e$, the other is $(e+\Delta e)$. If the net of electrostatic force and gravitational force between two hydrogen atoms placed at a distanced (much greater than atomic size) apart is zero, then Δe is of the order of [Given: mass of hydrogen $m_h = 1.67\times10^{-27}\ kg$]

A) $10^{-23}\ C$ B) $10^{-37}\ C$ C) $10^{-47}\ C$ D) $10^{-20}\ C$

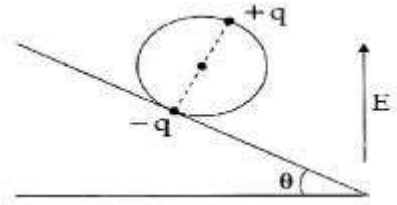
67. An electron falls from rest through a vertical distance h in a uniform and vertically upward directed electric field E. The direction of electric field is now reversed, keeping its magnitude the same. A proton is allowed to fall from rest in it through the same vertical distance h. The time of fall of the electron, in comparison to the time of fall of the proton is

A) smaller B) 5 times greater C) equal D) 10 times greater

68. Two parallel infinite line charges with linear charge densities $+\lambda$ C/m and $-\lambda$ C/m are placed at a distance of 2R in free space. What is the electric field mid-way between the two line charges?

A) Zero B) $\frac{2\lambda}{\pi\epsilon_0 \mathrm{R}}$N/C C) $\frac{\lambda}{\pi \mathrm{e}_0 \mathrm{R}}$N/C D) $\frac{\lambda}{2\pi\epsilon_0 R}$N/C

69. A wheel having mass m has charges $+q$ and $-q$ on diametrically opposite points. It remains in equilibrium on a rough inclined plane in the presence of a vertical electric field E. Then value of E is



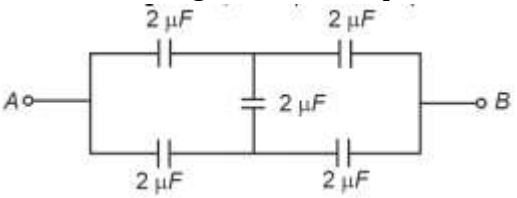
A) $\frac{mg}{q}$ B) $\frac{mg}{2q}$ C) $\frac{mgtan\theta}{2q}$ D) $\frac{mgtan\theta}{q}$

70. Consider a fixed uniformly charged insulating sphere with radius R and total charge $+Q$. A point charge $-q$ $(q \ll Q)$ with mass m is released from rest at a distance of 3R from the centre of the charged sphere. When the point charge reaches the surface of the sphere, its speed is:
(ε_0 is the permittivity of vacuum, neglect gravitational forces).

A) $\sqrt{\frac{Qq}{4\pi\varepsilon_0 mR}}$ B) $\sqrt{\frac{3Qq}{4\pi\varepsilon_0 mR}}$

C) $\sqrt{\frac{2Qq}{3\pi\varepsilon_0 mR}}$ D) $\sqrt{\frac{Qq}{3\pi\varepsilon_0 mR}}$

71. In the following circuit, the equivalent capacitance between terminal $A$and terminal B is :

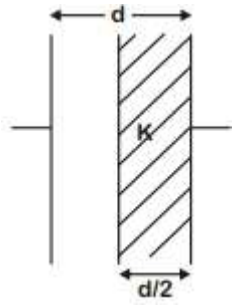


A) 1μF B) 0.5μF C) 4μF D) 2μF

72. If the plates of a parallel plate capacitor connected to a battery are moved close to each other, then
A. the charge stored in it, increases.
B. the energy stored in it, decreases.
C. its capacitance increases.
D. the ratio of charge to its potential remains the same.
E. the product of charge and voltage increases.
Choose the most appropriate answer from the options given below:

A) A, C and E only B) B, D and E only C) A, B and C only D) A, B and E only

73. A parallel plate capacitor having crosssectional area A and separation d has air in between the plates. Now an insulating slab of same area but thickness $d/2$ is inserted between the plates as shown in figure having dielectric constant $K(=4)$. The ratio of new capacitance to its original capacitance will be,

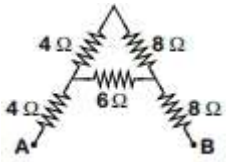


A) 4 : 1 B) 2 : 1 C) 8 : 5 D) 6 : 5

74. The reciprocal of resistance is

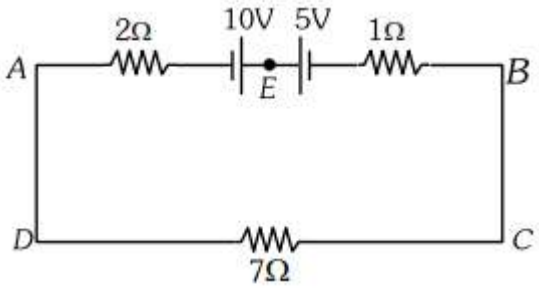
A) reactance B) mobility C) conductivity D) conductance

75. The equivalent resistance between A and B for the mesh shown in the figure is ..... Ω



A) 4.8 B) 7.2 C) 16 D) 30

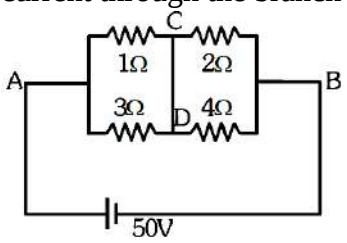
76. The magnitude and direction of the current in the following circuit is :-



A) 1.5 A from B to A through E B) 0.2 A from B to A through E

C) 0.5 A from A to B through E D) $\frac{5}{9}$ A from A to B through E

77. A constant voltage of 50 V is maintained between the points A and B of the circuit shown in the figure. The current through the branch CD of the circuit is :-



A) 1.5 A B) 2.0 A C) 2.5 A D) 3.0 A

78. Given below are two statements:
Statement I : Biot-Savart's law gives us the expression for the magnetic field strength of an infinitesimal current element (IdI) of a current carrying conductor only.
Statement II : Biot-Savart's law is analogous to Coulomb's inverse square law of charge q, with the former being related to the field produced by a scalar source, Idl while the latter being produced by a vector source, q. In light of above statements choose the most appropriate answer from the options given below:

A) Both Statement I and Statement II are incorrect B) Statement I is correct and Statement II is incorrect

C) Statement I is incorrect and Statement II is correct D) Both Statement I and Statement II are correct

79. A long solenoid of $50\,cm$ length having 100 turns carries a current of $2.5\ A$. The magnetic field at the centre of the solenold is ..... $\times 10^{-5}\ T$
$\left(\mu_0 = 4\pi \times 10^{-7}\,T\,m\,A^{-1}\right)$

A) 3.14 B) 62.8 C) 31.4 D) 6.28

80. An electron is moving in a circular path under the influence of a transverse magnetic field of $3.57 \times 10^{-2}\ T$. If the value of e/m is $1.76 \times 10^{11}\ C/kg$, the frequency of revolution of the electron is

A) $62.8\,MHz$ B) $6.28\,MHz$ C) $1\,GHz$ D) $100\,MHz$

81. A metallic rod of mass per unit length $0.5\ kg\ m^{-1}$ is lying horizontally on a smooth inclined plane which makes an angle of 30^o with the horizontal. The rod is not allowed to slide down by flowing a current through it when a magnetic field of induction $0.25\ T$ is acting on it in the vertical direction. The current flowing in the rod to keep it stationary is.....A

A) 7.14 B) 5.98 C) 11.32 D) 14.76

82. An iron bar of length L has magnetic moment M. It is bent at the middle of its length such that the two arms make an angle 60° with each other. The magnetic moment of this new magnet is :

A) $\frac{M}{2}$ B) $2M$ C) $\frac{M}{\sqrt{3}}$ D) M

83. A bar magnet is hung by a thin cotton thread in a uniform horizontal magnetic field and is in equilibrium state. The energy required to rotate it by 60^o is W. Now the torque required to keep the magnet in this new position is

A) $\frac{\sqrt{3}W}{2}$ B) $\frac{2W}{\sqrt{3}}$ C) $\frac{W}{\sqrt{3}}$ D) $\sqrt{3}W$

84. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then the true angle of dip θ is given by

A) $\cot^2\theta = \cot^2\theta_1 + \cot^2\theta_2$ B) $\tan^2\theta = \tan^2\theta_1 + \tan^2\theta_2$ C) $\cot^2\theta = \cot^2\theta_1 - \cot^2\theta_2$ D) $\tan^2\theta = \tan^2\theta_1 - \tan^2\theta_2$

85. Match List–I with List–II.

List–I (Material)	**List–II (Magnetic Susceptibility (χ))**
(A) Diamagnetic	(I) $\chi = 0$
(B) Ferromagnetic	(II) $0 > \chi \geq -1$
(C) Paramagnetic	(III) $\chi \gg 1$
(D) Non-magnetic	(IV) $0 < \chi < \epsilon$ (a small positive number)

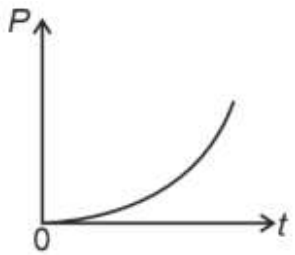
Choose the correct answer from the options given below:

A) $A-II, B-I, C-III, D-IV$ B) $A-III, B-II, C-I, D-IV$

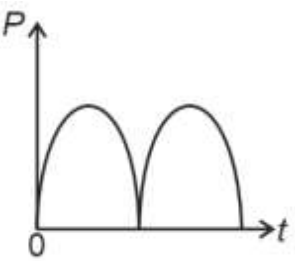
C) $A-IV, B-III, C-II, D-I$ D) $A-II, B-III, C-IV, D-I$

86. A conducting loop of finite resistance lies on the x – y plane. There is a constant magnetic field in the z direction. The area of the loop varies with time t, as $A = A_0(1+\sin t)$ in appropriate units. The figure that correctly indicates the qualitative behaviour of the power P dissipated in the loop as a function of time is:

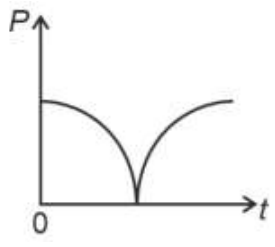
A)



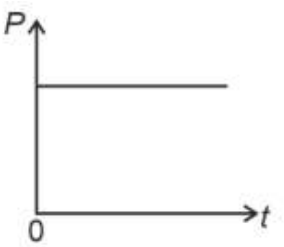
B)



C)



D)



87. A rectangular wire loop of sides 8 cm and 3 cm with a small cut, is moving out of a region of uniform magnetic field of magnitude 0.3 T directed normal to the plane of the loop. The emf developed across the cut, if the velocity of the loop is $2cms^{-1}$, in a direction normal to the shorter side of the loop, will be :

A) 4.8×10^{-4} volt B) 1.2×10^{-4} volt C) 1.3×10^{-4} volt D) 1.8×10^{-4} volt

88. Which of the following acts as a circuit protection device?

A) conductor B) inductor C) switch D) fuse

89. A $12\,V, 60\,W$ lamp is connected to the secondary of a step down transformer, whose primary is connected to ac mains of $220\,V$. Assuming the transformer to be ideal, ... A is the current in the primary winding.

A) 0.37 B) 0.27 C) 2.7 D) 3.7

90. A small signal voltage $V(t) = V_0\ sin\omega\, t$ is applied across an ideal capacitor C

A) Over a full cycle the capacitor C does not consume any energy from the voltage source.

B) Current $I(t)$ is in phase with voltage $V(t)$.

C) Current $I(t)$ leads voltage $V(t)$ by180^o.

D) Current $I(t)$ lags voltage $V(t)$ by 90^o.

91. To an ac power supply of 220 V at 50 Hz , a resistor of 20Ω, a capacitor of reactance 25Ω and an inductor of reactance 45Ω are connected is series. The corresponding current in the circuit and the phase angle between the current and the voltage is, respectively-

A) 7.8 A and 30° B) 7.8 A and 45°

C) 15.6 and 30° D) 15.6 and 45°

92. Given below are two statements :
Statement$-I$:In an ac circuit, the current through a capacitor leads the voltage across it.
Statement$-II$: In a.c. circuits containing pure capacitance only, the phase difference between the current and the voltage is π
In the light of the above statements, choose the most appropriate answer from the options given below

A) Both statement$-I$ and statement$-II$ are correct B) Both statement$-I$ and statement$-II$ are incorrect

C) Statement$-I$ is correct but statement$-II$ is incorrect D) Statement$-I$ is incorrect but statement$-II$ is correct

93. An inductor 20 mH, a capacitor $100\,\mu F$ and a resistor 50 Ω are connected in series across a source of emf, $V = 10sin314\,t$. The power loss in the circuit is .....W

A) 0.79 B) 0.43 C) 1.13 D) 2.74

94. A parallel plate capacitor of capacitance 20 μF is being charged by a voltage source whose potential is changing at therate of 3 V/s. The conduction current through the connecting wires, and the displacement current through the plates of the capacitor, would be, respectively

A) $0\ \mu$A, $60\ \mu$A B) $60\ \mu$A, $60\ \mu$A C) $60\ \mu$A, $0\ \mu$A D) $0\ \mu$A, $0\ \mu$A

95. The magnetic field of a plane electromagnetic wave is given by $\overrightarrow{B} = 3 \times 10^{-8} \cos\left(1.6 \times 10^3 x + 48 \times 10^{10} t\right) \hat{j}$, then the associated electric field will be :

A) $3 \times 10^{-8} \cos\left(1.6 \times 10^3 x + 48 \times 10^{10} t\right) \hat{i}$ V/m B) $3 \times 10^{-8} \sin\left(1.6 \times 10^3 x + 48 \times 10^{10} t\right) \hat{i}$ V/m

C) $9 \sin\left(1.6 \times 10^3 x - 48 \times 10^{10} t\right) \hat{k}\, V/m$ D) $9 \cos\left(1.6 \times 10^3 x + 48 \times 10^{10} t\right) \hat{k}\, V/m$

96. In an electromagnetic wave in free space the root mean square value of the electric field is $E_{rms} = 6\,Vm^{-1}$ The peak value of the magnetic field is

A) $2.83 \times 10^{-9}\,T$ B) $4.83 \times 10^{-8}\,T$ C) $8.83 \times 10^{-8}\,T$ D) $2.83 \times 10^{-8}\,T$

97. The E.M. wave with shortest wavelength among the following is,

A) Microwaves B) Ultraviolet rays C) X-rays D) Gamma-rays

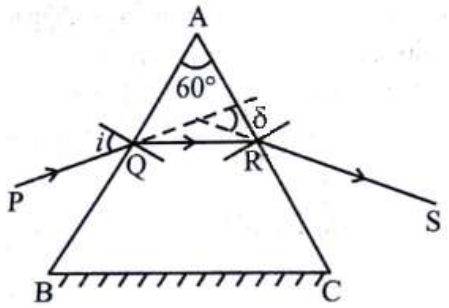
98. A double convex lens has focal length $25\ \text{cm}$. The radius of curvature of one of the surfaces is double of the other. Find the radii If the refractive index of the material of the lens is 1.5

A) $100\ \text{cm}, 50\ \text{cm}$ B) $25\ \text{cm}, 50\ \text{cm}$ C) $18.75\ \text{cm}, 37.5\ \text{cm}$ D) $50\ \text{cm}, 100\ \text{cm}$

99. Two identical glass $(\mu_g = 3/2)$ equiconvex lenses of focal length f each are kept in contact. The space between the two lenses is filled with water $(\mu_w = 4/3)$. The focal length of the combination is

A) $\frac{4f}{3}$ B) $\frac{3f}{4}$ C) $\frac{f}{3}$ D) f

100. A ray of monochromatic light is passing through an equilateral prism (ABC) as shown in the figure. The refracted ray (QR) is parallel to its base (BC) and the angle of incidence (i) is 50°. Then the angle of deviation (δ) is :



A) 45° B) 35° C) 40° D) 55°

101. A lens of large focal length and large aperture is best suited as an objective of an astronomical telescope since :

A) a large aperture contributes to the quality and visibility of the images.

B) a large area of the objective ensures better light gathering power.

C) a large aperture provides a better resolution.

D) all of the above.

102. For Young's double slit experiment, two statements are given below :
Statement I : If screen is moved away from the plane of slits, angular separation of the fringes remains constant.
Statement II : If the monochromatic source is replaced by another monochromatic source of larger wavelength, the angular separation of fringes decreases.
In the light of the above statements, choose the correct answer from the options given below :

A) Statement I is false but Statement II is true B) Both Statement I and Statement II are true

C) Both Statement I and Statement II are false D) Statement I is true but Statement II is false

103. In a double slit experiment, when light of wavelength $400\ nm$ was used, the angular width of the first minima formed on a screen placed $1\ \text{m}$ away, was found to be 0.2°. What will be the angular width of the first minima, if the entire experimental apparatus is immersed in water.....^{o} $(\mu_{water} = 4/3)$

A) 0.266 B) 0.15 C) 0.05 D) 0.1

104. Two polaroids P_1 and P_2 are placed with their axis perpendicular to each other. Unpolarised light I_0 is incident on P_1. A third polaroid P_3 is kept in between P_1 and P_2 such that its axis makes an angle 45^o with that of P_1 .The intensity of transmitted light through P_2 is

A) $\frac{I_0}{4}$ B) $\frac{I_0}{8}$ C) $\frac{I_0}{16}$ D) $\frac{I_0}{2}$

105. An unpolarized light beam travelling in air is incident on a medium of refractive index 1.73 at Brewster's angle. Then -

A) reflected light is completely polarized and the angle of reflection is close to 60°

B) reflected light is partially polarized and the angle of reflection is close to 30°

C) both reflected and transmitted light are perfectly polarized with angles of reflection and refraction close to 60° and 30°, respectively

D) transmitted light is completely polarized with angle of refraction close to 30°

106. Light of frequency 1.5 times the threshold frequency Is incident on a photosensitive material. What will be the photoelectric current if the frequency is halved and intensity is doubled?

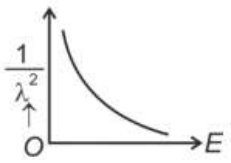
A) 0 B) doubled C) four times D) one-fourth

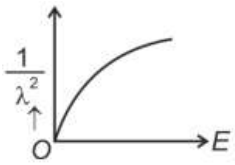
107. A ray of light with wavelength λ is incident on three different photoelectric cells namely 1, 2 and 3. The threshold wavelength of these photoelectric cells are λ_1, λ_2, and λ_3, respectively and the magnitude of stopping potentials of these cells are V_1, V_2 and V_3, r respectively. The relation between λ and threshold wavelengths are $\lambda_1 < \lambda, \lambda_2 > \lambda$ and $\lambda_3 \gg \lambda$. The correct option is:

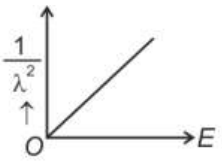
A) $V_1 < V_2, V_3 = 0$ B) $V_1 = 0, V_2 < V_3$

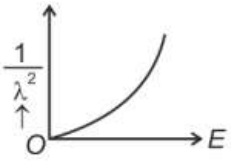
C) $V_1 = 0, V_2 > V_3$ D) $V_1 > V_2, V_3 = 0$

108. The graph which shows the variation of $\left(\frac{1}{\lambda^2}\right)$ and its kinetic energy, E is (where λ is de Broglie wavelength of a free particle):

A) 

B) 

C) 

D) 

109. A photon and an electron (mass m) have the same energy E. The ratio ($\lambda_{\text{photon}} / \lambda_{\text{electron}}$) of their de Broglie wavelengths is: (c is the speed of light)

A) $\sqrt{\mathrm{E}/2\ \mathrm{m}}$ B) $\mathrm{c}\sqrt{2\mathrm{mE}}$ C) $\mathrm{c}\sqrt{\frac{2\ \mathrm{m}}{\mathrm{E}}}$ D) $\frac{1}{\mathrm{c}}\sqrt{\mathrm{E}/2\mathrm{m}}$

110. When an $\alpha-$particle of mass m moving with velocity v bombards on a heavy nucleus of charge Z_e , its distance of closest approach from the nucleus depends on m as

A) $\frac{1}{m^2}$ B) m C) $\frac{1}{m}$ D) $\frac{1}{\sqrt{m}}$

111. The radius of inner most orbit of hydrogen atom is $5.3 \times 10^{-11}\ m$.....$\mathring{A}$ is the radius of third allowed orbit of hydrogen atom.

A) 4.77 B) 0.53 C) 1.06 D) 1.59

112. The total energy of an electron in an atom in an orbit is $-3.4\ eV$. Its kinetic and potential energies are, respectively

A) $-3.4\ eV, -3.4\ eV$ B) $-3.4\ eV, -6.8\ eV$ C) $3.4\ eV, -6.8\ eV$ D) $3.4\ eV, 3.4\ eV$

113. The ratio of wavelengths of the last line of Balmer series and the last line of Lyman series is

A) 1 B) 4 C) 0.5 D) 2

114. A nucleus of mass number 189 splits into two nuclei having mass number 125 and 64 . The ratio of radius of two daughter nuclei respectively is:

A) $4:5$ B) $5:4$ C) $25:16$ D) $1:1$

115. What happens to the mass number and atomic number of an element when it emits γ-radiation?

A) Mass number increases by four and atomic number increases by two.

B) Mass number decreases by four and atomic number decreases by two.

C) Mass number and atomic number remain unchanged.

D) Mass number remains unchanged while atomic number decreases by one.

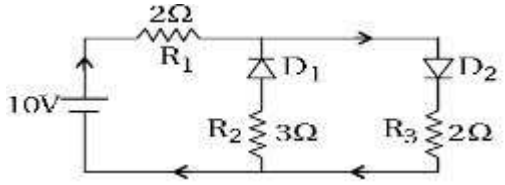
116. The half-life of a radioactive substance is 30 minutes. The times (in minutes) taken between 40% decay and 85% decay of the same radioactive substance is

A) 45 B) 60 C) 15 D) 30

117. The half life of a radioactive sample undergoing α - decay is 1.4×10^{17} s. If the number of nuclei in the sample is 2.0×10^{21}, the activity of the sample is nearly

A) $10^3\ Bq$ B) $10^4\ Bq$ C) $10^5\ Bq$ D) $10^6\ Bq$

118. The given circuit has two ideal diodes connected as shown in the figure. The current flowing through the resistance R_1 will be.....A



A) 1.43 B) 3.13 C) 2.5 D) 10

119. For transistor action, which of the following statements is correct?

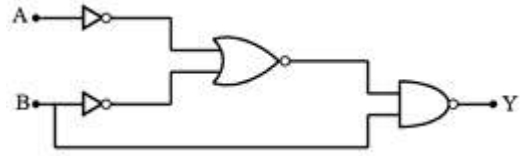
A) The base region must be very thin and lightly doped.

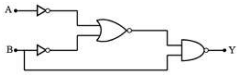
B) Base, emitter and collector regions should have same doping concentrations.

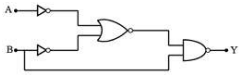
C) Base, emitter and collector regions should have same size.

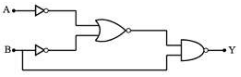
D) Both emitter junction as well as the collector Junction are forward biased.

120. From the circuit of the following Logic gates, the basic logic gate obtained is



A) AND GATE 

B) OR GATE 

C) NOT GATE 

D) $NAND$ GATE 