



# PHYSICS

## BOOKS - KCET PREVIOUS YEAR PAPERS

### SOLVED PAPER 2011

Physics

1. If  $C$  be the capacitance and  $V$  be the electric potential, then the dimensional formula of  $CV^2$  is

A.  $M^1 L^2 T^{-2} A^0$

B.  $M^1 L^1 T^{-2} A^{-1}$

C.  $M^0 L^1 T^{-2} A^0$

D.  $M^1 L^{-3} T^1 A^{-1}$

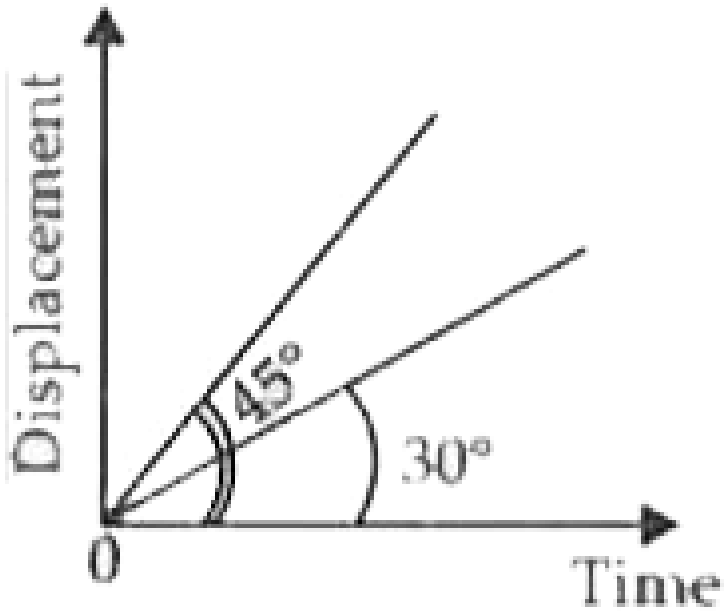
**Answer: A**



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2. The displacement-time graphs of two moving particles makes angles of  $30^\circ$  and  $45^\circ$

with the X-axis. The ratio of their velocities is



A.  $\sqrt{3}:2$

B.  $1:1$

C.  $1:2$

D.  $1:\sqrt{3}$

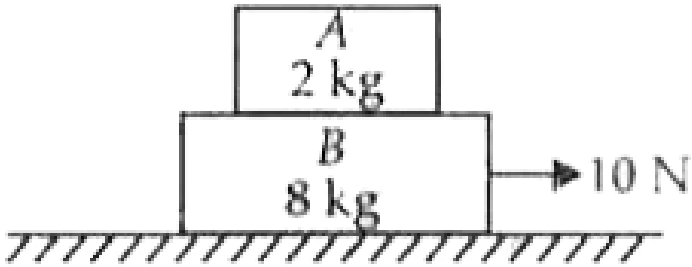
**Answer: D**



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3. Block A of mass 2 kg is placed over block B of mass 8 kg .The combination is placed over a rough horizonatal surface .Coefficient of friction between B and the floor is 0.5 .Coefficient of friction between A and B is 0.4 .A horizontal force of 10 N is applied on block B .The force of friction between A and B is

$(g=10 \text{ m s}^{-2})$



A. 100N

B. 40N

C. 50N

D. zero

**Answer: D**



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4. The height  $y$  and the distance  $x$  along the horizontal plane of a projectile on a certain planet (with no surrounding atmosphere) are given by  $y=8t-5t^2$  meter and  $x=6t$  meter, where  $t$  is in seconds. The velocity with which the projectile is projected is

(Acceleration due to gravity  $=9.8 \text{ m s}^{-2}$ )

A.  $6 \text{ m s}^{-1}$

B.  $8 \text{ m s}^{-1}$

C.  $10 \text{ m s}^{-1}$

D.  $14 \text{ m s}^{-1}$

**Answer: C**



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5. A body of mass 5 kg is thrown vertically up with a kinetic energy of 490 J. The height at which the kinetic energy of the body becomes half of the original value is

A. 5m

B. 2.5 m

C. 10m

D. 12.5 m

**Answer: A**



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6. A solid sphere of mass  $m$  rolls down an inclined plane without slipping from rest at the top of an inclined plane. The linear speed of the sphere at the bottom of the inclined



plane is  $v$ . The kinetic energy of the sphere at the bottom is

A.  $\frac{1}{2}mv^2$

B.  $\frac{5}{3}mv^2$

C.  $\frac{2}{5}mv^2$

D.  $\frac{7}{10}mv^2$

**Answer: D**



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7. Two satellites of mass  $m$  and  $9m$  are orbiting a planet in orbits of radius  $R$ . Their periods of revolution will be in the ratio of

A. 9 : 1

B. 3 : 1

C. 1 : 1

D. 1 : 3

**Answer: C**



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8. The following four wires of length  $L$  and radius  $r$  are made of the same material. Which of these will have the largest extension, when the same tension is applied?

A.  $L=100$  cm,  $r=0.2$  mm

B.  $L=200$  cm,  $r=0.4$  mm

C.  $L=300$  cm,  $r=0.6$  mm

D.  $L=400$  cm,  $r=0.8$  mm

**Answer: A**



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9. The resultant of two forces acting an angle of  $120^\circ$  is 10 kg wt and is perpendicular to one of the forces .That force is

A.  $1 - \sqrt{3}$  kg wt

B.  $20\sqrt{3}$  kg wt

C. 10 kg wt

D.  $\frac{10}{\sqrt{3}}$  kgwt

**Answer: D**



10. Eight equal drops of water are falling through air with a steady velocity of  $10 \text{ cm s}^{-1}$ . If the drops combine to form a single drop big in size, then the terminal velocity of this big drop is

A.  $40 \text{ cm s}^{-1}$

B.  $10 \text{ cm s}^{-1}$

C.  $30 \text{ cm s}^{-1}$

D.  $80 \text{ cm s}^{-1}$

**Answer: A**



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**11.** Two capillary tubes of different diameters are dipped in water. The rise of water is

- A. The same in both tubes
- B. Greater in the tube of larger diameter
- C. Greater in the tube of smaller diameter
- D. Independent of the diameter of the tube

**Answer: C**



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**12.** A perfect gas at  $27^{\circ}C$  is heated at constant pressure so as to double its volume. The increase in temperature of the gas will be

A.  $600^{\circ}C$

B.  $327^{\circ}C$

C.  $54^{\circ}C$

D.  $300^{\circ}C$

**Answer: D**



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**13.** Three identical rods A,B and C are placed end to end. A temperature difference is maintained between the free ends of A and C. The thermal conductivity of B is *thrice* that of C and *half* of that of A. The effective thermal conductivity of the system is ..... ( $K_A$  is the thermal conductivity of rod A).



A.  $\frac{1}{3}K_A$

B.  $3K_A$

C.  $2K_A$

D.  $\frac{2}{3}K_A$

**Answer: A**



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**14.** The quantities of heat required to raise the temperatures of two copper spheres of radii  $r_1$   $r_2$  ( $r_1 = 1.5r_2$ ) through 1 K are in the ratio of

A.  $\frac{27}{8}$

B.  $\frac{9}{4}$

C.  $\frac{3}{2}$

D. 1

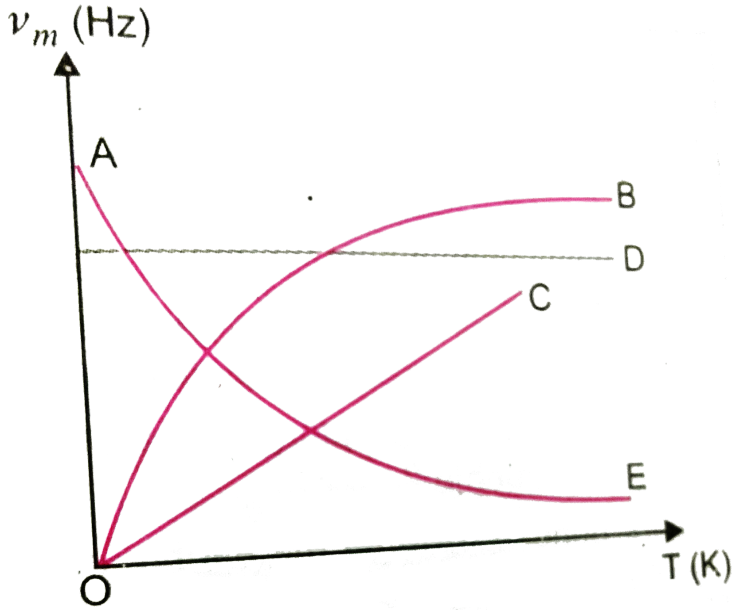
**Answer: A**



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15. Which one of the following is  $\nu_m - T$  graph for perfectly black body ?  $\nu_m$  is the frequency of radiation with maximum intensity.

T is the absolute temperature



A. A

B. B

C. C

D. D

**Answer: C**



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**16.** A particle executing a simple harmonic motion has a period of 6 sec. The time taken by the particle to move from the mean position to half the amplitude is

A.  $\frac{3}{2}$  sec

B.  $\frac{1}{2}$  sec

C.  $\frac{3}{4}$  sec

D.  $\frac{1}{4}$  sec

**Answer: B**



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**17.** The equation of a wave is given by

$$y = 10 \sin\left(\frac{2\pi}{45}t + \alpha\right)$$

If the displacement is 5 cm at  $t=0$ , then the total phase at  $t=7.5$  sec is

A.  $\frac{\pi}{3}$

B.  $\frac{\pi}{2}$

C.  $\frac{\pi}{6}$

D.  $\pi$

**Answer: B**



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**18.** Two tuning forks, A and B produce notes of frequencies 258 Hz and 262 Hz. An unknown note sounded with A produces certain beats. When the same note is sounded with B

,th beat frequency gets doubled. The unknown frequency

A. 250 Hz

B. 252 Hz

C. 254 Hz

D. 256 Hz

**Answer: C**



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**19.** A wire under tension vibrates with a fundamental frequency of 600 Hz. If the length of the wire is doubled, the radius is halved and the wire is made to vibrate under one-ninth the tension. Then the fundamental frequency will become

A. 200 Hz

B. 300 Hz

C. 600 Hz

D. 400 Hz



**Answer: A**



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**20. Faintest stars are called**

- A. Zero magnitude stars
- B. Second magnitude stars
- C. Sixth magnitude stars
- D. Dwarfs

**Answer: C**



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21. Wavelength of given light waves in air and in a medium are  $6000 \text{ \AA}$  and  $4000 \text{ \AA}$  respectively the critical angle is

A.  $\tan^{-1} \left( \frac{2}{3} \right)$

B.  $\tan^{-1} \left( \frac{3}{2} \right)$

C.  $\sin^{-1} \left( \frac{2}{3} \right)$

D.  $\sin^{-1} \left( \frac{3}{2} \right)$

**Answer: C**



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22. The time required for the light to pass through a glass slab (refractive index=1.5) of thickness 4 mm is

( $C=3 \times 10^8 \text{ m s}^{-1}$ , speed of light in free space)

A.  $10^{-11} \text{ sec}$

B.  $2 \times 10^{-11} \text{ sec}$

C.  $2 \times 10^{+11} \text{ sec}$

D.  $2 \times 10^{-5} \text{ sec}$

**Answer: B**



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**23.** A prism having refractive index 1.414 and refracting angle  $30^\circ$  has one of the refracting surfaces silvered. A beam of light incident on the other refracting surface will retrace its path, if the angle of incidence is

A.  $0^\circ$

B.  $30^\circ$

C.  $60^\circ$

D.  $45^\circ$

**Answer: D**



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**24.** A planoconvex lens has a maximum thickness of 6 cm. When placed on a horizontal table with the curved surface in contact with the table surface, the apparent depth of the bottommost point of the lens is

found to be 4 cm. If the lens is inverted such that the plane face of the lens is in contact with the surface of the table, the apparent depth of the center of the plane face is found to be  $\left(\frac{17}{4}\right) \text{ cm}$ . The radius of curvature of the lens is.....

A. 68 cm

B. 75cm

C. 128 cm

D. 34 cm

**Answer: D**



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**25.** Two thin lenses have a combined power of +9 D. When they are separated by a distance of 20 cm.

Their equivalent power becomes  $+\frac{27}{5}D$ . Their individual powers (in diopters) are

A. 1, 8

B. 2, 7

C. 3, 6

D. 4, 5

**Answer: C**



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**26.** Wavefront is the locus of all points, where the particles of the medium vibrate with the same

A. Phase



B. Amplitude

C. Frequency

D. Period

**Answer: A**



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27. Two monochromatic light waves of amplitudes  $3A$  and  $2A$  interfering at a point have a phase difference of  $60^\circ$ . The intensity at that point will be proportional to

A.  $5A^2$

B.  $13A^2$

C.  $7A^2$

D.  $19A^2$

**Answer: D**



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**28.** Consider the following statements in case of young's double slit experiment.

(1) A slit S is necessary if we use an ordinary

extended source of light.

(2) A slit S is not needed if we use an ordinary but well collimated beam of light.

(3) A slit S is not needed if we use a spatially coherent source of light. Which of the above statements are correct?

A. (1),(2) and (3)

B. (1) and (2)

C. (2) and (3)

D. (1) and (3)

**Answer: A**



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29. A parallel beam of light of wavelength  $6000 \text{ \AA}$  gets diffracted by a single slit of width  $0.3 \text{ mm}$ . The angular position of the first minima of diffracted light is

A.  $2 \times 10^{-3} \text{ rad}$

B.  $3 \times 10^{-3} \text{ rad}$

C.  $1.8 \times 10^{-3} \text{ rad}$

D.  $6 \times 10^{-3} \text{ rad}$

**Answer: A**



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**30.** The critical angle of a certain medium is

$$\sin^{-1}\left(\frac{3}{5}\right)$$

The polarizing angle of the medium is

A.  $\sin^{-1}\left(\frac{4}{5}\right)$

B.  $\tan^{-1}\left(\frac{5}{3}\right)$

C.  $\tan^{-1}\left(\frac{3}{4}\right)$

$$D. \tan^{-1} \left( \frac{4}{3} \right)$$

**Answer: B**



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**31.** Two identical charged spheres of material density  $\rho$ , suspended from the same point by inextensible strings of equal length make an angle  $\theta$  between the string. When suspended in a liquid of density  $\sigma$  the angle  $\theta$  remains the same. The dielectric constant  $K$  of the liquid is

A.  $\frac{\rho}{\rho - \sigma}$

B.  $\frac{\rho - \sigma}{\rho}$

C.  $\frac{\rho}{\rho + \sigma}$

D.  $\frac{\rho + \sigma}{\rho}$

**Answer: A**



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**32.** The electric field at a point due to an electric dipole, on an axis inclined at an angle  $\theta (< 90^\circ)$

to the dipole axis, is perpendicular to the dipole axis, if the angle  $\theta$  is

A.  $\tan^{-1}(2)$

B.  $\tan^{-1}\left(\frac{1}{2}\right)$

C.  $\tan^{-1}(\sqrt{2})$

D.  $\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$

**Answer: C**



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33. In the circuit shown, the currents  $i_1$  and  $i_2$  are



A.  $i_1 = 1.5 \text{ A}, i_2 = 0.5 \text{ A}$

B.  $i_1 = 0.5 \text{ A}, i_2 = 1.5 \text{ A}$

C.  $i_1 = 1 \text{ A}, i_2 = 3 \text{ A}$

D.  $i_1 = 3 \text{ A}, i_2 = 1 \text{ A}$

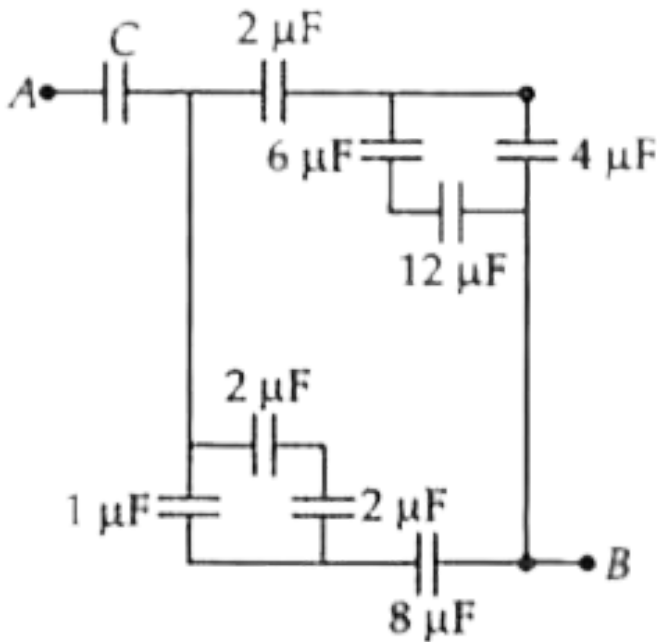
**Answer: B**



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34. In the given network, the value of  $C$ , so that an equivalent capacitance between  $A$  and  $B$  is

$3 \mu F$ , is



A.  $\frac{1}{5} \mu F$

B.  $\frac{31}{5} \mu F$

C.  $48\mu F$

D.  $36\mu F$

**Answer: C**



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**35.** A conductor wire having  $10^{29}$  free electrons/ $m^3$  carries a current of 20 A. If the cross-section of the wire is  $1\text{ mm}^2$ , then the drift velocity of electrons will be (e =  $1.6 \times 10^{-19}\text{ C}$ )

A.  $1.25 \times 10^{-4} \text{ms}^{-1}$

B.  $1.25 \times 10^{-3} \text{mS}^{-1}$

C.  $1.25 \times 10^{-5} \text{ms}^{-1}$

D.  $6.25 \times 10^{-3} \text{ms}^{-1}$

**Answer: B**



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**36.** A resistor has a colour code of green ,blue,brown and silver .What is its resistance?

A.  $56 \Omega \pm 5\%$

B.  $560 \Omega \pm 10\%$

C.  $560 \Omega \pm 5\%$

D.  $5600\Omega \pm 10\%$

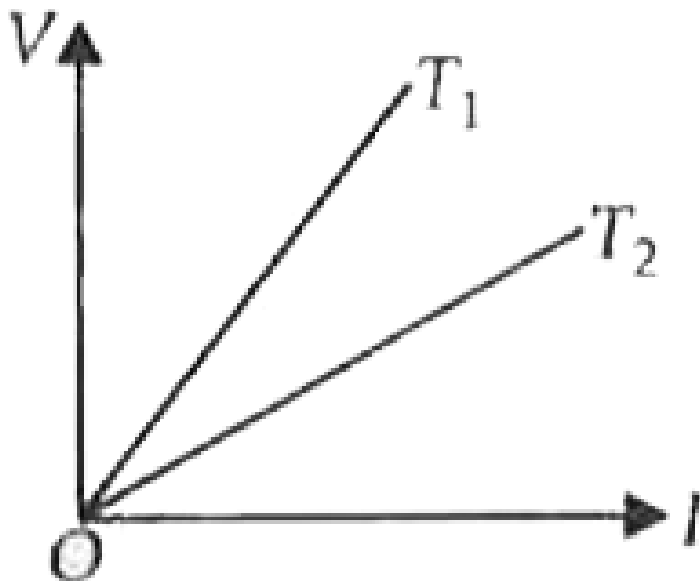
**Answer: B**



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**37.** The voltage  $V$  and current  $I$  graphs for a conductor at two different temperatures  $T_1$  and  $T_2$  are shown in the figure .The relation

between  $T_1$  and  $T_2$  is



A.  $T_1 > T_2$

B.  $T_1 < T_2$

C.  $T_1 = T_2$

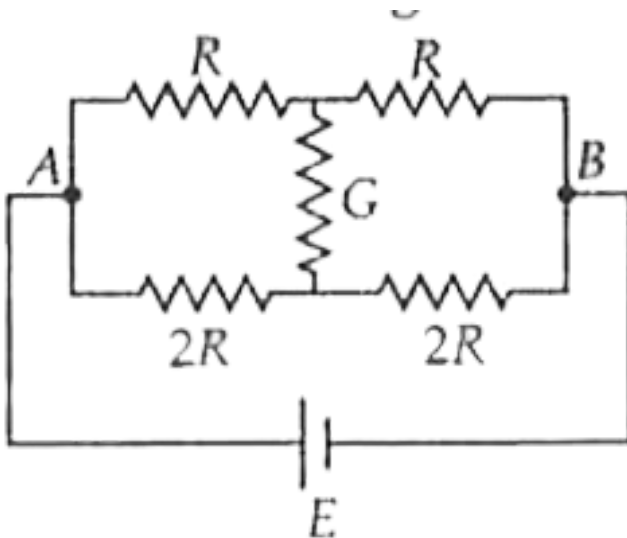
D.  $T_1 = \frac{1}{T_2}$

**Answer: A**



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**38.** Consider the following statement regarding the network shown in the figure.



(1) The equivalent resistance of the network

between points A and B independent of value of G.

(2)The equivalent resistance of the network between points A and B is  $\frac{4}{3}R$ .

(3)The current through G is zero.Which of the above statements is/are true?

A. (1)alone

B. (2)alone

C. (2) and (3)

D. (1),(2) and (3)

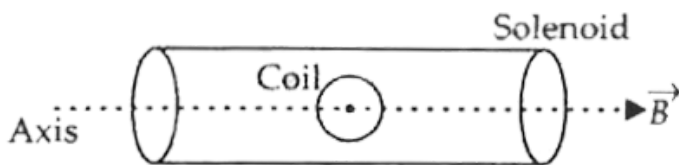
**Answer: D**





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39. The torque required to hold a small circular coil of 10 turns, area  $1 \text{ mm}^2$  and carrying a current of  $\left(\frac{21}{44}\right) \text{ A}$  in the middle of a long solenoid of  $10^3$  turns/m carrying a current of 2.5 A, with its axis perpendicular to the axis of the solenoid is



A.  $1.5 \times 10^{-6} \text{ Nm}$

B.  $1.5 \times 10^{-8} Nm$

C.  $1.5 \times 10^{+6} Nm$

D.  $1.5 \times 10^{+8} Nm$

**Answer: B**



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**40.** A particle of charge  $e$  and mass  $m$  moves with a velocity  $v$  in a magnetic field  $B$  applied perpendicular to the motion of the particle .The radius  $r$  of its path in the field is

A.  $\frac{mv}{Be}$

B.  $\frac{Be}{mv}$

C.  $\frac{ev}{Bm}$

D.  $\frac{Bv}{em}$

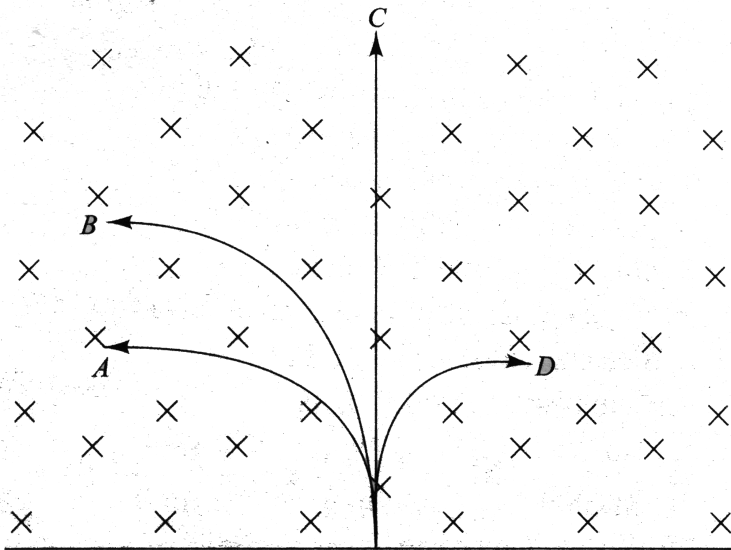
**Answer: A**



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**41.** A neutron, a proton, an electron and an  $\alpha$  – particle enter a region of uniform magnetic field with equal velocities. The

magnetic field is perpendicular to the paper and directed into it. The tracks of particles are labeled in Fig. 1.132. The neutron follows the track



A. A

B. B

C. C

D. D

**Answer: D**



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**42.** The deflection in a moving coil galvanometer is reduced to half when it is shunted with a  $40\ \Omega$  coil. The resistance of the galvanometer is

A.  $80\Omega$

B.  $40\Omega$

C.  $20\Omega$

D.  $15\Omega$

**Answer: B**



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43. A current of  $\left(\frac{2}{\sqrt{3}}\right)$  A produces a deflection of  $60^\circ$  in a tangent

galvanometer. The reduction factor is

A.  $\left(\frac{2}{\sqrt{3}}\right)A$

B.  $\left(\frac{2}{3}\right)A$

C.  $2A$

D.  $\left(\frac{3}{2}\right)A$

**Answer: B**



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**44.** In an A.C. Circuit ,V and I are given by  $V=150 \sin (150t)$  volt and  $I=150 \sin \left(150t + \frac{\pi}{3}\right)$  ampere.The power dissipated in the circuit is

- A. 106 W
- B. 150 W
- C. 5625 W
- D. zero

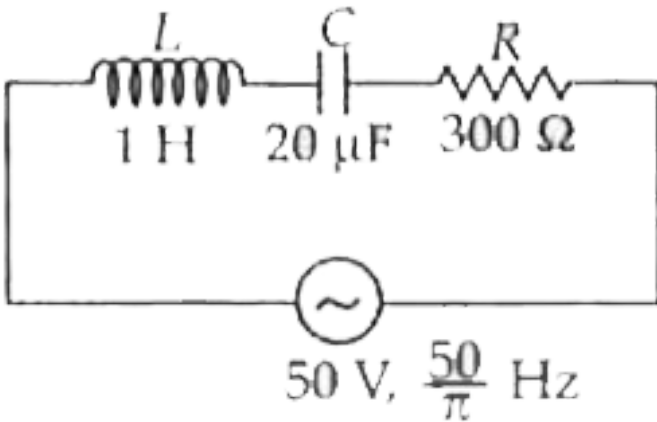
**Answer: C**



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45. In the series L-C-R circuit shown, the impedance is



- A.  $200\ \Omega$
- B.  $100\ \Omega$
- C.  $300\ \Omega$
- D.  $500\ \Omega$

**Answer: D**



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**46.** The energy stored in an inductor of self-inductance  $L$  henry carrying a current of  $I$  ampere is

A.  $\frac{1}{2}L^2 I$

B.  $\frac{1}{2}LI^2$

C.  $LI^2$

D.  $L^2 I$

**Answer: B**



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**47.** A transformer works on the principle of

A. Self induction

B. Electrical inertia

C. Mutual induction

D. Magnetic effect of the electrical current

**Answer: C**



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**48.** Flash spectrum confirms a/an

- A. Total solar eclipse
- B. lunar eclipse
- C. Earthquake
- D. Magnetic storm

**Answer: A**



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49. The photoelectric threshold wavelength for silver is  $\lambda_0$ . The energy of the electron ejected from the surface of silver by an incident wavelength  $\lambda$  ( $\lambda < \lambda_0$ ) will be

A.  $hc(\lambda_0 - \lambda)$

B.  $\frac{hc}{\lambda - \lambda_0}$

C.  $\frac{h}{c} \left( \frac{\lambda_0}{\lambda} \right)$

D.  $hc \frac{\lambda_0 - \lambda}{\lambda \lambda_0}$

**Answer: D**



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50. Rutherford's atomic model could account for

A. Stability of atoms

B. Origin of spectra

C. The positively charged central core of an atom

D. Concept of stationary orbits

**Answer: C**



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51. When an electron jumps from the orbit  $n=2$  to  $n=4$ , then wavelength of the radiations absorbed will be

( $R$  is Ryberg's constant)

A.  $\frac{16}{3R}$

B.  $\frac{16}{5R}$

C.  $\frac{5R}{16}$

D.  $\frac{3R}{16}$

**Answer: A**



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52. The thermonuclear reaction of hydrogen inside the stars is taking place by a cycle of operations. The particular element which acts as catalyst is

A. Nitrogen

B. Oxygen

C. helium



D. Carbon

**Answer: D**



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**53.** The ration of minimum wavelengths of Lyman and Balmer series will be

A. 1.25

B. 0.25

C. 5

D. 10

**Answer: B**



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**54.** The fraction of the initial number of radioactive nuclei which remain undercayed after half of a half-life of the radioactive sample is

A.  $\frac{1}{4}$

B.  $\frac{1}{2\sqrt{2}}$

C.  $\frac{1}{2}$

D.  $\frac{1}{\sqrt{2}}$

**Answer: D**



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**55.** 1 curie represents

A.  $3.7 \times 10^7$  disintegrations per second

B.  $3.7 \times 10^{10}$  disintegrations per second

C.  $10^6$  disintegrations per second

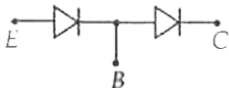
D. 1 disintergration per second

**Answer: B**



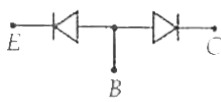
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**56.** An n-p-n transistor can be considered to be equivalent to two diodes, connected. Which of the following figures is the correct one ?

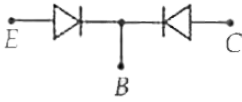


**A.**

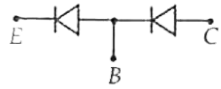
B.



C.



D.



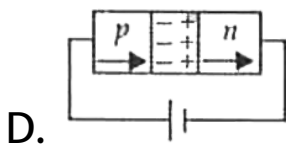
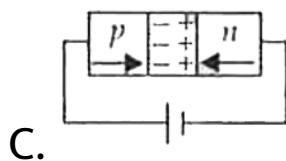
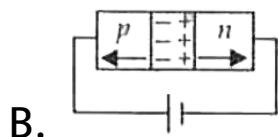
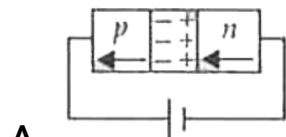
**Answer: B**



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57. In the case of forward biasing of  $PN$ -junction, which one of the following figures

correctly depicts the direction of flow of carriers?



**Answer: D**



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58. An electron of mass  $m_e$  and a proton of mass  $m_p$  are moving with the same speed. The ratio of their de-Broglie's wavelengths  $\frac{\lambda_e}{\lambda_p}$  is

A. 1

B. 1836

C.  $\frac{1}{1836}$

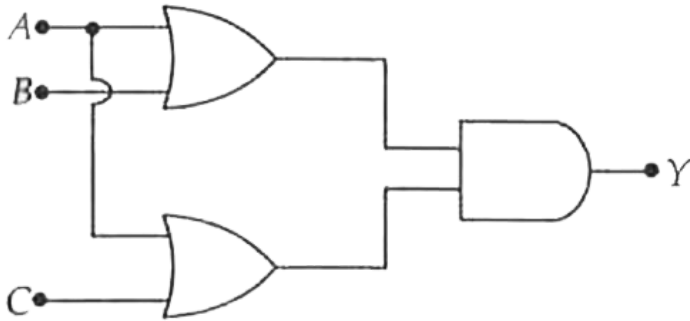
D. 918

**Answer: B**



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59. The output of given logic circuit is



A.  $A(B+C)$

B.  $A(B.C)$

C.  $(A+B).(A+C)$

D.  $A+B+C$



**Answer: C**



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**60.** If the scattering intensity of a liquid is 8 units at a wavelength of 500 nm, then the scattering intensity at a wavelength of 400 nm will be approximately

A. 13 units

B. 16 units

C. 20 units

D. 24 units

**Answer: C**



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