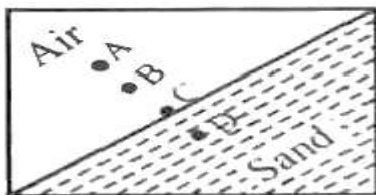


KCET 2016 PHYSICS QUESTION PAPER

- A body falls freely for 10 sec. Its average velocity during this journey (take $g = 10 \text{ ms}^{-2}$)
 - 100 ms^{-1}
 - 10 ms^{-1}
 - 50 ms^{-1}
 - 5 ms^{-1}
- Three projectiles A, B and C are projected at an angle of $30^\circ, 45^\circ, 60^\circ$ respectively. If R_A, R_B and R_C are range of A, B and C respectively, then (Velocity of projection is same for A, B & C).
 - $R_A = R_B = R_C$
 - $R_A = R_B > R_C$
 - $R_A < R_B < R_C$
 - $R_A < R_C < R_B$
- The component of a vector \vec{r} along x - axis have a maximum value if
 - \vec{r} is along +ve x - axis
 - \vec{r} is along +ve y - axis
 - \vec{r} is along -ve y - axis
 - \vec{r} makes an angle of 45° with the x - axis
- Maximum acceleration of the train in which a 50 kg box lying on its floor with remain stationary (Given: co-efficient of static friction between the box and the trains floor is 0.3 and $g = 10 \text{ ms}^{-2}$)
 - 5.0 ms^{-2}
 - 3.0 ms^{-2}
 - 1.5 ms^{-2}
 - 15.0 ms^{-2}
- A 12 kg bomb at rest explodes into two pieces of 4 kg and 8 kg piece is 20 Na, the kinetic energy of the 8 kg piece is
 - 25 J
 - 20 J
 - 50 J
 - 40 J
- Which of the points is likely position of the centre of mass of the system shown in the figure?



- A
- D
- B
- C

- Three bodies a ring (R), a solid cylinder (C) and solid sphere (S) having same mass and same radius roll down the inclined plane without slipping. They start from rest if V_R, V_C and V_S are velocities of respective bodies on reaching the bottom of the plane, then
 - $V_R = V_C = V_S$
 - $V_R > V_C > V_S$
 - $V_R, V_C < V_S$
 - $V_R = V_C > V_S$
- Variation of acceleration due to gravity (g) with distance x from the centre of the earth is best represented by ($R \rightarrow$ Radius of the earth)



- A spring is stretched by applying load to its free end. The strain produced in the spring is
 - Volumetric
 - Shear
 - Longitudinal & Shear
 - Longitudinal
- An ideal fluid flow through a pipe of a circular cross section with diameters 5 cm and 10 cm as shown. The ratio of velocities of fluid at A and B is



- 4:1
 - 1:4
 - 2:1
 - 1:2
- A pan filled with hot food from 94°C to 86°C in 2 minutes. When the room temperature is 20°C . How long will it cool from 74°C to 66°C ?
 - 2 minutes
 - 2.8 minutes
 - 2.5 minutes
 - 1.8 minutes

12. Four rods with different radii r and length ℓ are used to connect to heat reservoirs at different temperature. Which one will conduct most heat?

- a) $r = 1 \text{ cm}, \ell = 2 \text{ m}$
 b) $r = 1 \text{ cm}, \ell = \frac{1}{2} \text{ m}$
 c) $r = 1 \text{ cm}, \ell = 2 \text{ m}$
 d) $r = 2 \text{ cm}, \ell = \frac{1}{2} \text{ m}$

13. A Carnot engine working between 300 K and 400 K has 800 J of useful work. The amount of heat energy supplied to the engine from the source is –

- a) 2400 J b) 3200 J
 c) 1200 J d) 3600 J

14. A particle executing SHM has a maximum speed of 0.5 ms^{-1} and maximum acceleration of 1.0 ms^{-2} . The angular frequency of oscillation is

- a) 2 rad s^{-1} b) 0.5 rad s^{-1}
 c) $2\pi \text{ rad s}^{-1}$ d) $0.5\pi \text{ rad s}^{-1}$

15. A source of sound is moving with a velocity of 50 ms^{-1} towards stationary observer. The observer measures the frequency of sound as 500 Hz. The apparent frequency of sound as heard by the observer when source is moving away from him with the same speed is (Speed of sound at room temperature 350 ms^{-1} –)

- a) 400 Hz b) 666 Hz
 c) 375 Hz d) 177.5 Hz

16. If there are only one type of charge in the universe, then

($\vec{E} \rightarrow$ Electric Field, $\vec{ds} \rightarrow$ Area vector)

- a) $\oint \vec{E} \cdot \vec{ds} \neq 0$ on any surface.
 b) $\oint \vec{E} \cdot \vec{ds}$ could not be defined.
 c) $\oint \vec{E} \cdot \vec{ds} = \infty$ if charge is inside
 d) $\oint \vec{E} \cdot \vec{ds} = 0$ If charge is outside, inside
 $= \frac{q}{\epsilon_0}$ if charge is

17. An electron of mass m , charge e falls through h meter in a uniform electric field E . Then time of fall –

- a) $t = \sqrt{\frac{2hm}{eE}}$ b) $t = \frac{2hm}{eE}$
 c) $t = \sqrt{\frac{2eE}{hm}}$ d) $t = \frac{2eE}{hm}$

18. If \vec{E}_{ax} and \vec{E}_{eq} represents electric field at a point on the axial and equatorial line of a dipole. If points are at a distance r from the centre of the dipole, the $r \gg a$ –

- a) $\vec{E}_{ax} = \vec{E}_{eq}$ b) $\vec{E}_{ax} = -\vec{E}_{eq}$
 c) $\vec{E}_{ax} = -2\vec{E}_{eq}$ d) $\vec{E}_{ax} = 2\vec{E}_{eq}$

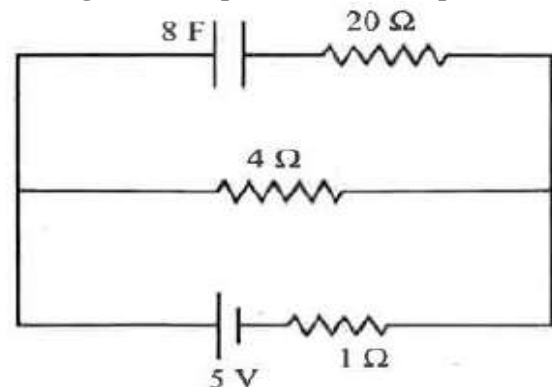
19. Nature of equipotential surface for a point charge is –

- a) Ellipsoid with charge at foci.
 b) Sphere with charge at the center of the sphere
 c) Sphere with charge on the surface of the sphere
 d) Plane with charge on the surface

20. A particle of mass 1 gm and charge $1 \mu\text{C}$ is held at rest on a frictionless horizontal surface at distance 1 m from the fixed charge 2 mC. If the particle is released, it will be repelled. The speed of the particle when it is a distance of 10 m from the fixed charge –

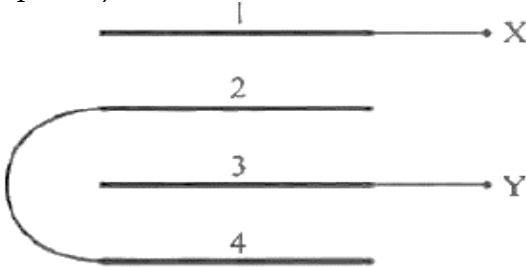
- a) 60 ms^{-1} b) 100 ms^{-1}
 c) 90 ms^{-1} d) 180 ms^{-1}

21. A capacitor of 8F is connected as shown. Charge on the plates of the capacitor –



- a) 32 C b) 40 C
c) 0 C d) 80 C

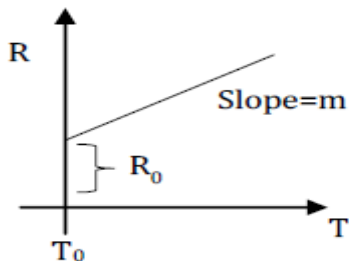
22. Four metal plates are arranged as shown. Capacitance between X and Y (A → area of each plate, d → distance between the plates)



- a) $\frac{3\epsilon_0 A}{2d}$ b) $\frac{2\epsilon_0 A}{d}$
c) $\frac{2\epsilon_0 A}{3d}$ d) $\frac{3\epsilon_0 A}{d}$

23. Mobility of free electrons in a conductor is
a) Directly proportional to electron density
b) Directly proportional to relaxation time.
c) Inversely proportional to electron density
d) Inversely proportional to relaxation time

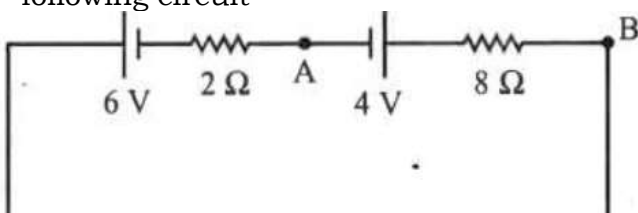
24. Variation of resistance of the conductor with temperature is as shown



The temperature co-efficient (α) of the conductor is –

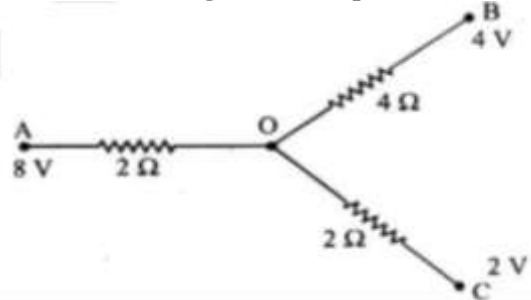
- a) $\frac{R_0}{m}$ b) mR_0
c) $m^2 R_0$ d) $\frac{R_0}{m}$

25. Potential difference between A and B in the following circuit –



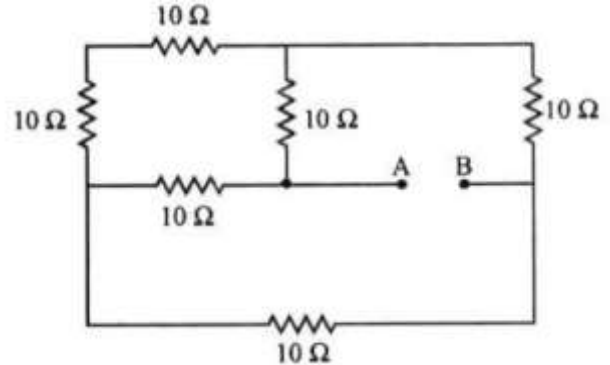
- a) 4 V b) 5.6 V
c) 2.8 V d) 6 V

26. In the following network potential at 'O'



- a) 4 V b) 3 V
c) 6 V d) 4.8 V

27. Effective resistance between A and B in the following circuit



- a) 10 Ω b) 20 Ω
c) 5 Ω d) $\frac{20}{3}$ Ω

28. Two heating coils of resistances 10 Ω and 20 Ω are connected in parallel and connected to a battery of emf 12 V and internal resistance 1 Ω. The power consumed by them are in the ratio –

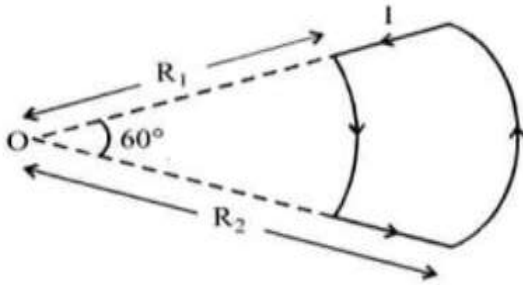
- a) 1:4 b) 1:3
c) 2:1 d) 4:1

29. A portion is projected with a uniform velocity 'v' along the axis of a current carrying solenoid then –

- a) The proton will be accelerated along the axis.
b) The proton path will be circular about the axis
c) The proton moves along helical path
d) The proton will continue to move with velocity 'v' along the axis

30. In the cyclotron, as radius of the circular path of the charged particle increases (ω = angular velocity, v = linear velocity)
- Both ω and v increases
 - ω only increases v remains constant
 - v increases, ω remains constant
 - v increases, ω decreases

31. A conducting wire carrying current is arranged as shown. The magnetic field at 'O'



- $\frac{\mu_0 i}{12} \left[\frac{1}{R_1} - \frac{1}{R_2} \right]$
- $\frac{\mu_0 i}{12} \left[\frac{1}{R_1} + \frac{1}{R_2} \right]$
- $\frac{\mu_0 i}{6} \left[\frac{1}{R_1} - \frac{1}{R_2} \right]$
- $\frac{\mu_0 i}{6} \left[\frac{1}{R_1} + \frac{1}{R_2} \right]$

32. The quantity of a charge that will be transferred by a current flow of 20 A over 1 hour 30 minutes period is
- $10.8 \times 10^3 \text{ C}$
 - $10.8 \times 10^4 \text{ C}$
 - $5.4 \times 10^3 \text{ C}$
 - $1.8 \times 10^4 \text{ C}$

33. A galvanometer coil has a resistance of 50Ω and the meter shows full scale deflection for a current of 5 mA. This galvanometer is converted into voltmeter of range 0 – 20 V by connecting.
- 3950Ω in series with galvanometer
 - 4050Ω in series with galvanometer
 - 3950Ω in parallel with galvanometer
 - 4050Ω in parallel with galvanometer

34. x_1 and x_2 are susceptibility of a paramagnetic material at temperature $T_1 \text{ K}$ and $T_2 \text{ K}$ respectively then
- $x_1 = x_2$
 - $x_1 T_1 = x_2 T_2$
 - $x_1 T_2 = x_2 T_1$
 - $x_1 \sqrt{T_1} = x_2 \sqrt{T_2}$

35. At certain place, the horizontal component of earth's magnetic field is 3.0 G and the

angle dip at the place is 30° . The magnetic field of earth at that location

- 4.5 G
- 5.1 G
- 3.5 G
- 6.0 G

36. The process of super imposing message signal on high frequency carrier wave is called –

- Amplification
- Demodulation
- Transmission
- Modulation

37. A long solenoid with 40 turns per cm carries a current of 1 A. The magnetic energy stored per unit volume

- _____ is J/m^2
- 3.2π
 - 32π
 - 1.6π
 - 6.4π

38. A wheel with 10 spokes each of length 'L' m is rotated with a uniform angular velocity ' ω ' in a plane normal to the magnetic field. 'B'. The emf induced between axle and the rim of the wheel.

- $\frac{1}{2} N \omega B L^2$
- $\frac{1}{2} \omega B L^2$
- $\omega B L^2$
- $N \omega B L^2$

39. The rms value of current in a 50 Hz AC circuit is 6 A. The average value of AC current over a cycle is –

- $6\sqrt{2}$
- $\frac{3}{\pi\sqrt{2}}$
- zero
- $\frac{6}{\pi\sqrt{2}}$

40. A capacitor of capacitance $10 \mu\text{F}$ is connected to an AC source and an AC ammeter. If the source voltage varies as $V = 50\sqrt{2} \sin 100 t$, the reading of the ammeter is –

- 50 mA
- 70.7 mA
- 5.0 mA
- 7.07 mA

41. In a series L.C.R circuit, the potential drop across L, C and R respectively are 40 V, 120 V and 60 V. Then the source voltage is –

- 220 V
- 160 V
- 180 V
- 100 V

42. In a series L.C.R circuit an alternating emf (v) and current (i) are given by the equation

$$v = v_0 \sin \omega t, i_0 \sin \left(\omega t + \frac{\pi}{3} \right)$$

The average power dissipated in the circuit over a cycle of AC is

- a) $\frac{v_0 i_0}{2}$ 2) $\frac{v_0 i_0}{4}$
 c) $\frac{\sqrt{3}}{2} v_0 i_0$ d) Zero

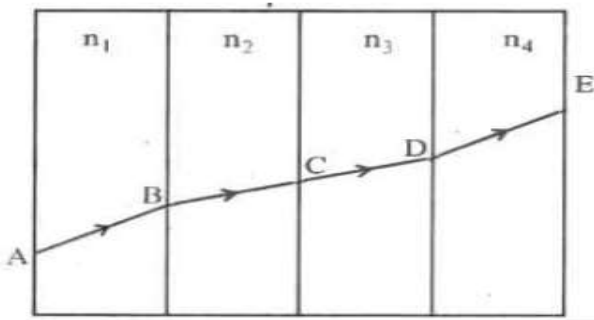
43. Electromagnetic radiation used to sterilise milk is -

- a) X - ray b) Y - ray
 c) UV ray d) Radiowaves

44. A plane glass plate is placed over a various coloured letters (violet, green, yellow, red). The letter which appears to raised more.

- a) Red b) Yellow
 c) Green d) Violet

45. A ray of light passes through four transparent media with refractive index n_1, n_2, n_3 and n_4 as shown. The surfaces of all media are parallel.



If the emergent ray DE is parallel to incident ray AB, then

- a) $n_1 = n_4$ b) $n_2 = n_4$
 c) $n_3 = n_4$ d) $n_1 \frac{n_2 + n_3 + n_4}{3}$

46. Focal length of a convex lens is 20 cm and its RI is 1.5. It produces an erect, enlarged image if the distance of the object from the lens is -

- a) 40 cm b) 30 cm
 c) 15 cm d) 20 cm

47. A ray of light suffers a minimum deviation when incident on an equilateral prism of refractive index $\sqrt{2}$. The angle of incidence is -

- a) 30° b) 45°
 c) 60° d) 50°

48. In Young's double slit experiment the source is white light. One slit is covered with red filter and the other with blue filter. There shall be -

- a) Alternate red & blue fringes.
 b) Alternate dark & pink fringes.
 c) Alternate dark & yellow fringes
 d) No interference

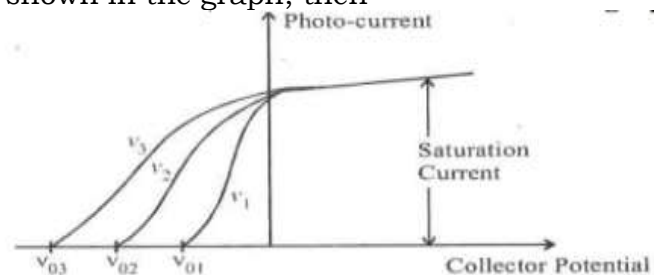
49. Light of wavelength 600 nm is incident normally on a slit of width 0.2 mm . The angular width of central maxima in the diffraction pattern is (measured from minimum to maximum)

- a) $6 \times 10^{-3} \text{ rad}$ b) $4 \times 10^{-3} \text{ rad}$
 c) $2.4 \times 10^{-3} \text{ rad}$ d) $4.5 \times 10^{-3} \text{ rad}$

50. For what distance is ray optics is good approximation when the aperture is 4 mm and the wavelength of light is 400 nm ?

- a) 24 m b) 40 m
 c) 18 m d) 30 m

51. The variation of photo - current with collector potential for different frequencies of incident radiation ν_1, ν_2 and ν_3 is as shown in the graph, then -



- a) $\nu_1 = \nu_2 = \nu_3$ b) $\nu_1 > \nu_2 > \nu_3$
 c) $\nu_1 < \nu_2 < \nu_3$ d) $\nu_3 = \frac{\nu_1 + \nu_2}{3}$

52. The de Broglie wavelength of an electron accelerated to a potential of 400 V is approximately -

- a) 0.03 nm b) 0.04 nm
 c) 0.12 nm d) 0.06 nm

53. Total energy of electron in an excited state of hydrogen atom is -3.4 eV. The kinetic and potential energy of electron in this state -

- a) $K = 3.4$ eV $U = 6.8$ eV
- b) $K = 3.4$ eV $U = -6.8$ eV
- c) $K = -6.8$ eV $U = 3.4$ eV
- d) $K = 10.2$ eV $U = -13.6$ eV

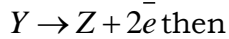
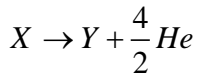
54. When electron jumps from $n = 4$ level to $n = 1$ level, the angular momentum of electron changes by

- a) $\frac{h}{2\pi}$
- b) $\frac{2h}{2\pi}$
- c) $\frac{3h}{2\pi}$
- d) $\frac{4h}{2\pi}$

55. A radio-active sample of half-life 10 days contains $1000 \times$ nuclei. Number of origin nuclei present after 5 days is -

- a) $707 \times$
- b) $750 \times$
- c) $500 \times$
- d) $250 \times$

56. An element X decays into element Z by two-step process.



- a) X & Z are isobars
- b) X & Y are isotopes
- c) X & Z are isotones
- d) X & Z are isotopes

57. A nucleus of mass 20 u emits a γ photon of energy 6 MeV. If the emission assume to occur when nucleus is free and rest, then the nucleus will have kinetic energy nearest to (Take $1\text{u} = 1.6 \times 10^{-27}$ kg)

- a) 10 KeV
- b) 1 KeV
- c) 0.1 KeV
- d) 100 KeV

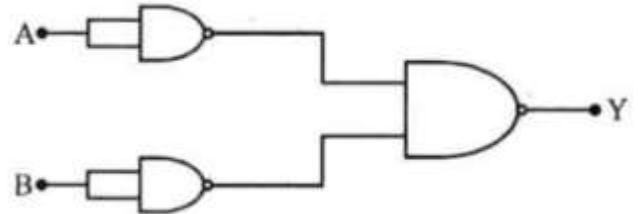
58. Constant DC voltage is required from a variable AC voltage. Which of the following is correct order of operation?

- a) Regulator, filter, rectifier
- b) Rectifier, regulator, filter
- c) Rectifier, filter, regulator
- d) Filter, regulator, rectifier

59. In a transistor, the collector current varies by 0.49 mA and emitter current varies by 0.50 mA. Current gain β measured is -

- a) 49
- b) 150
- c) 99
- d) 100

60. Identify the logic operation carried out by the following circuit



- a) AND
- b) NAND
- c) NOR
- d) OR

1. (c)	2. (d)	3. (a)	4. (b)	5. (a)	6. (b)	7. (c)	8. (d)	9. (c)	10. (a)
11. (b)	12. (d)	13. (b)	14. (a)	15. (c)	16. (G)	17. (a)	18. (c)	19. (b)	20. (d)
21. (a)	22. (c)	23. (b)	24. (d)	25. (b)	26. (d)	27. (a)	28. (c)	29. (d)	30. (c)
31. (a)	32. (b)	33. (a)	34. (b)	35. (c)	36. (d)	37. (a)	38. (b)	39. (b)	40. (a)
41. (d)	42. (b)	43. (c)	44. (d)	45. (a)	46. (c)	47. (b)	48. (d)	49. (a)	50. (abcd)
51. (c)	52. (d)	53. (b)	54. (c)	55. (a)	56. (d)	57. (b)	58. (c)	59. (a)	60. (d)

ANSWER KEYS