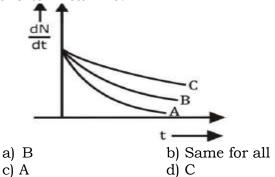
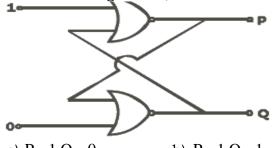
## **KCET 2019 PHYSICS QUESTION PAPER**

1. Which one of the following nuclei has shorter mean life?



- 2. The conductivity of semiconductor increases with increase in temperature because
  - a) Relaxation time increases
  - b) Number density of current carriers increases, relaxation time decreases but effect of decreases in relaxation time is much less than increases in number density
  - c) Number density of charges carriers increases
  - d) Both number density of charge carriers and relaxation time increase
- 3. For a transistor amplifier, the voltage gain
  - a) Is high at high and low frequencies and constant in the middle frequency range
  - b) Constant at high frequencies and low at low frequencies
  - c) Remains constant for all frequencies
  - d) Is low at high and low frequencies and constant at mid frequencies.
- 4. In the following circuit, what are P and Q?

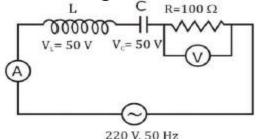


- a) P = 1, Q = 0
- b) P = 1, Q = 1
- c) P = 0, Q = 0
- d) P = 0, O = 1

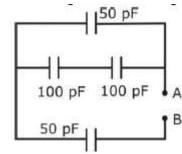
- 5. An antenna uses electromagnetic waves of frequency 5 MHz. for proper working the wave of the antenna should be
  - a) 300 m
- b) 3 km
- c) 15 m
- d) 15 km
- 6. A magnetic needle has a magnetic moment of  $5\times10^{-2} Am^2$  and moment of inertia  $8\times10^{-6} kgm^2$ . It has period of oscillation of 2s in a magnetic field B. The magnitude of magnetic field is approximately
  - a)  $0.4 \times 10^{-4}$  T
- b)  $0.8 \times 10^{-4}$  T
- c)  $1.6 \times 10^{-4}$  T
- d)  $3.2 \times 10^{-4}$  T
- 7. A toroid has 500 turns per meter length. If it carriers a current of 2A, the magnetic energy density inside the toroid is
  - a)  $0.314 \text{ J/m}^3$
- b)  $3.14 \text{ J/m}^3$
- c)  $0.628 \text{ J/m}^3$
- d)  $6.28 \text{ J/m}^3$
- 8. Consider the situation given in figures. The wire AB is slid on the fixed rails with a constant velocity. If the wire AB is replaced by a semicircular wire, the magnitude of the induced current will

- a) Remain same
- b) Increase or decrease depending on whether the semicircle bulges towards the resistance or away from it
- c) Increase
- d) Decrease
- 9. The frequency of an alternating current is 50 Hz. What is the minimum time taken by current to reach its peak value from rms value?
  - a)  $2.5 \times 10^{-3}$  s
- b)  $10 \times 10^{-3}$  s
- c)  $5 \times 10^{-3}$  s
- d) 0.22 s

- 10. Two metal plates are separated by 2 cm. the potentials of the plates are 10 V and + 30 V. The electric field between the two plates is
  - a) 1000 V/m
- b) 3000 V/m
- c) 500 V/m
- d) 2000 V/m
- 11. The readings of ammeter and voltmeter in the following circuit are respectively

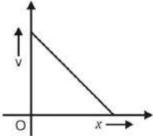


- a) 1.5 A, 100 V
- b) 2.2 A, 220 V
- c) 1.2 A, 120 V
- d) 2.7 A, 220 V
- 12. The equivalent capacitance between A and B is

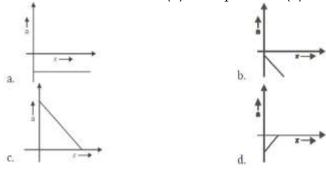


- a)  $\frac{100}{3}$  pF
- b) 300 pF
- c) 50 pF
- d) 150 pF
- 13. A capacitor of capacitance C, charged by an amount Q is connected in parallel with an unchanged capacitor of capacitance 2C. The final charges on the capacitors are
  - a)  $\frac{Q}{4}$ ,  $\frac{3Q}{4}$
- b)  $\frac{Q}{5}, \frac{4Q}{5}$
- c)  $\frac{Q}{2}$ ,  $\frac{Q}{2}$
- d)  $\frac{Q}{3}, \frac{2Q}{3}$
- 14. Though the electron drift velocity in small and electron charge is very mall, a conductor can carry an appreciably large current because
  - a) Drift velocity of electron is very large
  - b) Relaxation time is small
  - c) Electron number density is very large
  - d) Electron number density depends on temperature

- 15. Masses of three wires of copper are in the ratio 1:3:5 and their lengths are in the ratio 5:3:1. The ratio of their electrical resistance are
  - a) 5:3:1
- b) 125:15:1
- c) 1:3:5
- d) 1:15:125
- 16. If P, Q and R are physical quantities having different dimensions, which of the following combinations can never be a meaningful quantity?
  - a) PQ-R
- b)  $\frac{PR Q^2}{R}$
- c)  $\frac{P-Q}{R}$
- d)  $\frac{PQ}{R}$
- 17. The given graph shows the variation of velocity (v) with positions (x) for a particle moving along a straight line.



Which of the following graph shows the variation of acceleration (a) with position (x)?



18. The trajectory of a projectile projected from origin is given by the equation  $y = x - \frac{2x^2}{5}$ .

The initial velocity of the projectile is?

- a)  $5 \text{ ms}^{-1}$
- b)  $\frac{5}{2} \text{ ms}^{-1}$
- c)  $\frac{2}{5} \text{ ms}^{-1}$
- d) 25 ms<sup>-1</sup>

- 19. An object with mass 5 kg is acted upon by a force,  $\vec{F} = \left(-3\hat{i} + 4j\right) \text{N}$ . If it's initial velocity at t = 0 is  $\vec{v} = \left(6\vec{i} 12\vec{j}\right) \text{ms}^{-1}$ , the time at which it will just have a velocity along y axis is
  - a) 10 s

b) 15 s

c) 5 s

- d) 2 s
- 20. During inelastic collision between two objects, which of the following quantity always remains conserved?
  - a) Total mechanical energy
  - b) Speed of each body
  - c) Total kinetic energy
  - d) Total linear momentum
- 21.In Rutherford experiment, for head on collision of  $\alpha$ -particles with a gold nucleus, the impact parameter is
  - a) Of the order of  $10^{-14}$  m
  - b) Of the order of  $10^{-16}$  m
  - c) Zero
  - d) Of the order of  $10^{-10}$  m
- 22. Frequency of revolution of an electron revolving in  $n^{th}$  orbit of H atom is proportional to
  - a) n

b)  $\frac{1}{n^3}$ 

c)  $\frac{1}{n^2}$ 

d) n independent of

n

- 23.A hydrogen atom in ground state absorbs 10.2 eV of energy. The orbital angular momentum of the electron is increased by
  - a)  $2.11 \times 10^{-34}$  Js
- b)  $4.22 \times 10^{-34} \text{Js}$
- c)  $1.05 \times 10^{-34} \text{Js}$
- d)  $3.16 \times 10^{-34} \text{Js}$
- 24.The end product of decay of  $_{90} {\rm Th}^{232}$  is  $_{82} {\rm Pb}^{208}$  . The number of  $\alpha$  and  $\beta$  particles emitted are respectively
  - a) 6, 4

b) 4, 6

c) 3, 3

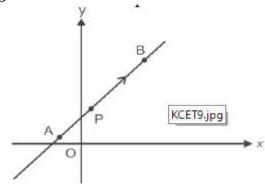
d) 6, 0

- 25. Two protons are kept at a separation of 10 nm. Let  $F_n$  and  $F_e$  be the nuclear force and the electromagnetic force between them
  - a)  $F_e \gg F_n$
  - b)  $F_e$  and  $F_n$  differ only slightly
  - c)  $F_e = F_n$
  - d)  $F_e \ll F_n$
- 26. Two particles which are initially at rest move towards each other under the action of their mutual attraction. If their speeds are v and 2v at any instant, then the speed of center of mass of the system is
  - a) Zero

b) v

c) 2V

- d) 1.5 v
- 27.A particle is moving uniformly along a straight line as shown in the figure. During the motion of the particle from A to B, the angular momentum of the particle about 'O'



- a) Decreases
- b) First increases then decreases
- c) Increases
- d) Remains constant
- 28.A satellite is orbiting close to the earth and has a kinetic energy K. The minimum extra kinetic energy required by it to just overcome the gravitation pull of the earth is
  - a) 2K

b)  $2\sqrt{2}K$ 

c) K

- d)  $\sqrt{3}$ K
- 29.A wire is stretched such that it's volume remains constant. The Poisson's ratio of the material of the wire is
  - a) -0.50
- b) -0.25

c) 0.50

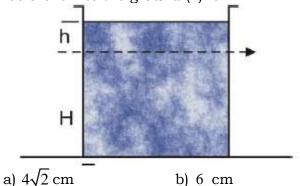
d) 0.25

- 30.In Young's double slit experiment, using monochromatic light of wavelength  $\lambda$ , the intensity of light at a point on the screen where path difference is  $\lambda$  is K units. The intensity of light at a point where path difference is  $\frac{\lambda}{3}$  is
  - a)  $\frac{K}{4}$

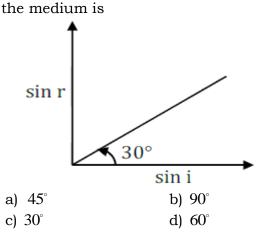
b) 2K

c) K

- d) 4K
- 31.A cylindrical container containing water has a small hole of height of H = 8 cm from the bottom and at a depth of 2 cm from the top surface of the liquid. The maximum horizontal distance travelled by the water before it hits the ground (x) is



- c) 8 cm
- d) 4 cm
- 32.A transparent medium shows relation between i and r as shown. If the speed of light in vaccum is c, the Brewster angle for



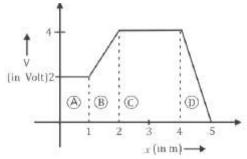
- 33. Due to Doppler's effect, the shift in wavelength observed is 0.1 A for a star producing wavelength 6000 A. Velocity of recession of the star will be
  - a) 10 km/s
- b) 20 km/s
- c) 25 km/s
- d) 5 km/s

- 34.An electron is moving with an initial velocity  $\vec{V} = V_0 \hat{i}$  and is in a uniform magnetic field  $\vec{B} = B_0 \hat{j}$ . Then it's de Broglie wavelength
  - a) Increases with time
  - b) Increases and decreases periodically
  - c) Remains constant
  - d) Decreases with time
- 35.Light of certain frequency and intensity incident on a photosensitive material causes photoelectric effect. If both the frequency and intensity are doubled. The photoelectric saturation current becomes.
  - a) Doubled
- b) Unchanged
- c) Quadrupled
- d) Halved
- 36.A certain charge 2Q is divided at first two parts  $q_1$  and  $q_2$ . Later, the charges are placed at a certain distance. If the force of interaction between two charges is maximum then  $\frac{Q}{q}$ 
  - a) 2

b) 0.5

c) 4

- d) 1
- 37.A particle of mass m and charge q is placed at rest in uniform electric field E and then released. The kinetic energy attained by the particle after moving a distance y is
  - a)  $qE^2y$
- b) q<sup>2</sup>Ey
- c) qEy<sup>2</sup>
- d) qEy
- 38.An electric dipole is kept in non uniform electric field. It generally experiences
  - a) A force but not a torque
  - b) Neither a force nor a torque
  - c) A force and torque
  - d) A torque but not a force
- 39. The figure gives the electric potential V as a function of distance through four regions on x axis. Which of the following is true for the magnitude of the electric field E in these regions?



- a)  $E_A = E_C$  and  $E_B < E_D$
- b)  $E_A < E_B < E_C < E_D$
- c)  $E_A > E_B > E_C > E_D$
- d)  $E_B = E_D$  and  $E_A < E_C$
- 40.A system of two charges separated by a certain distance apart stores electrical potential energy. If the distance between them is increased, the potential energy of the system,
  - a) Decrease in any case
  - b) Remains the same
  - c) Increase in any case
  - d) May increase or decrease
- 41. In a cyclotron, a charged particle
  - a) Speeds up between the dees because of the magnetic field
  - b) Slows down with in a dee and speeds up between dees
  - c) Undergoes acceleration all the time
  - d) Speeds up in dee
- 42. The number of turns in a coil of Galvanometer is tripled, then
  - a) Voltage sensitivity remains constant and current sensitivity increases 3 times
  - b) Both voltage and current sensitivity decreases by 33%
  - c) Voltage sensitivity increases 3 times and current sensitivity remains constant
  - d) Both voltage and current sensitivity remains constant
- 43. A circular current loop of magnetic moment M is in an arbitrary orientation in an external uniform magnetic field  $\overrightarrow{B}$ . The work done to rotate the loop by 30° about an axis perpendicular to its plane is
  - a)  $\sqrt{3} \frac{\text{MB}}{2}$
- b) Zero

c) MB

d)  $\frac{MI}{2}$ 

- 44.In a permanent magnet at room temperature
  - a) The individual molecules have nonzero magnetic moment which are all perfectly aligned.
  - b) Domains are all perfectly aligned
  - c) Magnetic moment of each molecule is zero
  - d) Domains are partially aligned
- 45. Coersivity of a magnet where the ferromagnet gets completely demagnetized is  $3\times10^3$  Am<sup>-1</sup>. The minimum current required to be passed in a solenoid having 1000 turns per metre, so that the magnet gets completely demagnetized when placed inside the solenoid is
  - a) 60 mA
- b) 6A
- c) 30 mA
- d) 3 A
- 46. An inductor of inductance L and resistor R are joined together in series and connected by a source of frequency  $\omega$ . The power dissipated in the circuit is

a) 
$$\frac{V^2R}{R^2 + \omega^2L^2}$$

b) 
$$\frac{V^2R}{\sqrt{R^2 + \omega^2L^2}}$$

c) 
$$\frac{R^2 + \omega^2 L^2}{V}$$

d) 
$$\frac{V}{R^2 + \omega^2 L^2}$$

- 47.An electromagnetic wave is travelling in x direction with electric field vector given by  $\vec{E}_v = E_0 \sin(kx \omega t)\hat{j}$ . The correct expression for magnetic field vector is
  - a)  $\vec{B}_z = E_0 C \sin(kx \omega t) k$

b) 
$$\vec{B}_z = \frac{E_0}{C} \sin(kx - \omega t)k$$

c) 
$$\vec{B}_y = E_0 C \sin(kx - \omega t) \hat{j}$$

d) 
$$\vec{B}_y = \frac{E_0}{C} \sin(kx - \omega t)\hat{j}$$

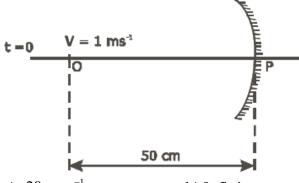
- 48. The phenomenon involved in the reflection of radio waves by ionosphere is similar to
  - a) Total internal reflection of light in air during a mirage
  - b) Scattering of light by air particles

- c) Reflection of light by plane mirror
- d) Dispersion of light by water molecules during the formation of a rainbow
- 49.A certain prism is found to produce a minimum deviation of 38°. It produces a deviation of 44° when the angle of incidence is either 42° or 62°. What is the angle of incidence when it is undergoing minimum deviation?
  - a)  $40^{\circ}$

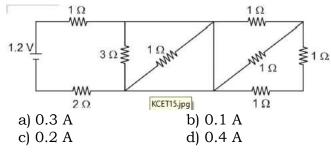
b) 60°

c) 30°

- d) 49°
- 50. A point object is moving uniformly towards the pole of concave mirror of focal length 25 cm along it's axis shown below. The speed of the object is  $1\,\mathrm{ms}^{-1}$ . At t=0, the distance of the object from the mirror is 50 cm. The average velocity of the image formed by the mirror between time t=0 and  $t=0.25\,\mathrm{s}$  is:

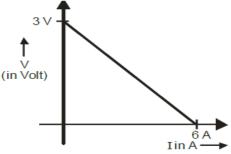


- a)  $20 \,\mathrm{cm \, s^{-1}}$
- b) Infinity
- c)  $40 \, \text{cm s}^{-1}$
- d) Zero
- 51. In the given circuit, the current through  $2\Omega$  resistor is



- 52. Kirchhoff's junction run is a reflection of
  - a) Conservation of energy
  - b) Conservation of charges
  - c) Conservation of current density vector
  - d) Conservation of momentum

53. The variation of terminal potential difference (V) with current flowing through a cell is as shown



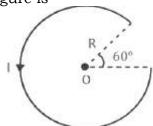
The emf and internal resistance of the cell are

- a)  $3V, 0.5 \Omega$
- b)  $6V, 0.5 \Omega$
- c)  $3V, 2\Omega$
- d)  $6V, 2\Omega$
- 54.In a potentiometer experiment, the balancing point with a cell is at length 240 cm. On shunting the cell with a resistance of  $2\Omega$ , the balancing length becomes 120 cm. The internal resistance of the cell is
  - a)  $2\Omega$

b)  $0.5\Omega$ 

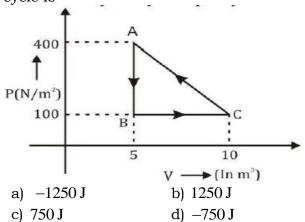
c) 4Ω

- d)  $1\Omega$
- 55. The magnetic field at the centre 'O' in the given figure is



- a)  $\frac{5}{12} \frac{\mu_0 I}{R}$
- b)  $\frac{\mu_0 I}{12R}$
- c)  $\frac{7}{14} \frac{\mu_0 I}{R}$
- d)  $\frac{3}{10} \frac{\mu_0 I}{R}$
- 56. An aluminium sphere is dipped into water. Which of the following is true?
  - a) Buoyancy will be more in water at  $0^{\circ}$  than that in water at  $4^{\circ}$  C
  - b) Buoyancy may be more or less in water at 4°C depending on the radius of the sphere
  - c) Buoyancy will be less in water at  $0^{\circ}$ C than water at  $4^{\circ}$ C
  - d) Buoyancy in water at 0°C will be same as that in water at 4°C

57.A thermodynamic system undergoes a cyclic process ABC as shown in the diagram. The work done by the system per cycle is



- 58.One mole of O<sub>2</sub> gas is heated at constant pressure starting at 27°C. How much energy must be added to the gas as heat to double it's volume?
  - a) 450 R
- b) 1050 R

c) Zero

- d) 750 R
- 59. A piston is performing S.H.M in the vertical direction with a frequency of 0.5 Hz. A block of 10 kg is placed on the piston. The maximum amplitude of the system such that the block remains in contact with the piston is
  - a) 0.5 m
- b) 0.1 m

c) 1 m

- d) 1.5 m
- 60. The equation of a stationary wave is  $y = 2\sin\left(\frac{\pi x}{15}\right)\cos\left(48\pi t\right).$  The distance

between a node and it's next antinode is

- a) 1.5 units
- b) 30 units
- c) 7.5 units
- d) 22.5 units

## **ANSWER KEYS**

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