CODE C-4

KCET – 2016 TEST PAPER WITH ANSWER KEY (HELD ON THURSDAY 5th MAY, 2016)

PHYSICS

1. A galvanometer coil has a resistance of 50 Ω and the meter shows full scale deflection for a current of 5 mA. This galvanometer is converted into voltmeter of rance 0 - 20 V by connecting
(1) 4050 Ω in parallel with galvanometer
(2) 3950 Ω in parallel with galvanometer
(3) 4050 Ω in series with galvanometer
(4) 3950 Ω in series with galvanometer

Ans: (4)

2. For what distance is ray optics is good approximation when the aperture is 4 mm and the wavelength of light is 400 η m?
(1) 30 m (2) 18 m
(3) 40 m (4) 24 m

Ans: (3)

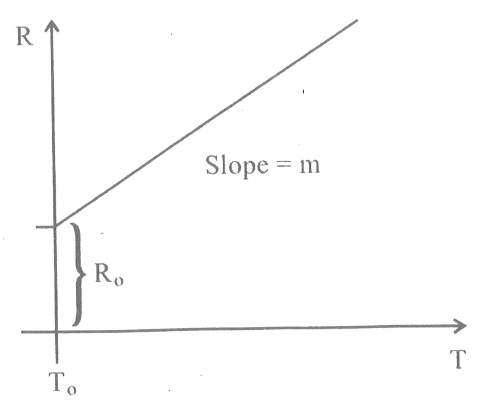
3. In the cyclotron, as radius of the circular path of the charged particle increases (ω = angular velocity, v = linear velocity)
(1) v increases, ω decreases
(2) v increases, ω remains constant
(3) ω only increases, v remains constant
(4) both ω and v increases

Ans: (2)

4. Focal length of a convex lens is 20 cm and its RI is 1.5. it produces and erect, enlarged image if the distnace of the object from the lens is
(1) 20 cm (2) 15 cm
(3) 30 cm (4) 40 cm

Ans: (2)

5. Variation of resistnace of the conductor with temperature is as shown



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

(1) $\frac{m}{R_0}$ (2) m^2R_0
(3) mR_0 (4) $\frac{R_0}{m}$

Ans: (1)

6. The rms value of current in a 50 Hz AC circuit is 6A. The average value of AC current over a cycle is
(1) $\frac{6}{\pi\sqrt{2}}$ (2) Zero
(3) $\frac{3}{\pi\sqrt{2}}$ (4) $6\sqrt{2}$

Ans: (2)

7. The componenet of a vector $\vec{r}$ along x - axis will have a maximum value if
(1) $\vec{r}$ makes an angle of 45° with the x - axis
(2) $\vec{r}$ is along - ve y - axis
(3) $\vec{r}$ is along +ve y - axis
(4) $\vec{r}$ is along +ve x - axis

Ans: (4)

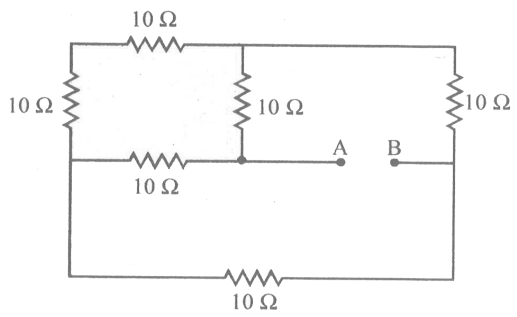
8. If $\vec{E}_{ax}$ and $\vec{E}_{eq}$ represents electric field at a point on the axial and equatorial line of a dipole. If points are at a distance r from the centre of the dipole, for r>>a
(1) $\vec{E}_{eq} = 2\vec{E}_{ax}$ (2) $\vec{E}_{ax} = -2\vec{E}_{eq}$
(3) $\vec{E}_{ax} = -\vec{E}_{eq}$ (4) $\vec{E}_{ax} = \vec{E}_{eq}$

Ans: (2)

9. A spring is stretched by applying a load to its free end. The strain produced in the spring is
(1) Longitudinal (2) Longitudinal & Shear
(3) Shear (4) Volumetric

Ans: (2)

10. Effective resistnace between A and B in the following circuit



(1) $\frac{20}{3}\Omega$ (2) 5Ω

(3) 20Ω (4) 10Ω

Ans: (4)

11. At certain place, the horizontal component of earth's magnetic field is 3.0 G and the angle dip at that place is 30°. The magnetic field of earth at that location

(1) 6.0 G (2) 3.5 G

(3) 5.1 G (4) 4.5 G

Ans: (2)

12. Maximum acceleration of the train in which a 50 kg box lying on its floor will remain stationary (Given : Co - efficient of static friction between the box and the train's floor is 0.3 and g = 10 ms^{-2})

(1) $15ms^{-2}$ (2) $1.5ms^{-2}$

(3) $3.0ms^{-2}$ (4) $5.0ms^{-2}$

Ans: (3)

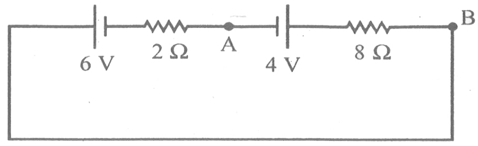
13. A capacitor of capacitance $10\mu F$ is connected to an AC Source and an AC Ammeter. If the source voltage varies as $V = 50\sqrt{2}$ sin 100 t, the reading of the ammeter is

(1) 7.07 mA (2) 5.0 mA

(3) 70.7 mA (4) 50 mA

Ans: (4)

14. Potential difference between A and B in the following circuit



(1) 6V (2) 2.8 V

(3) 5.6 V (4) 4 V

Ans: (3)

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

(1) Violet (2) Green

(3) Yellow (4) Red

Ans: (1)

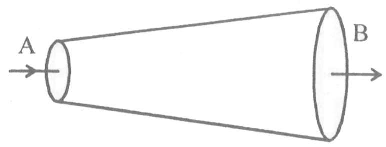
16. In a series L.C.R cirucit, the potential drop across L, C and R respectively are 40 V, 120 V and 60 V. Then the source voltage is

(1) 100 V (2) 180 V

(3) 160 V (4) 220 V

Ans: (1)

17. An ideal fluid flows through a pipe of circular cross section with diameters 5 cm and 10 cm as shown. The ratio of velocities of fluid at A and B is



(1) 1 : 2 (2) 2 : 1

(3) 1 : 4 (4) 4 : 1

Ans: (4)

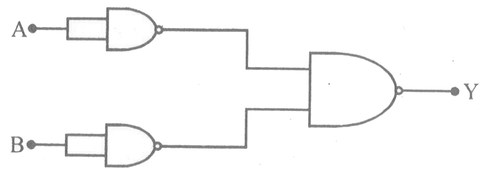
18. A body falls freely for 10 sec. Its average velocity during this journey (take g = 10 ms^{-2})

(1) 5 ms^{-1} (2) 50 ms^{-1}

(3) 10 ms^{-1} (4) 100 ms^{-1}

Ans: (2)

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



(1) OR (2) NOR

(3) NAND (4) AND

Ans: (1)

20. 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

(1) K = + 10.2 eV U = - 13.6 eV

(2) K = -6.8 eV U = + 3.4 eV

(3) K = 3.4 eV U = - 6.8 eV

(4) K = -3.4 eV U = -6.8 eV

Ans: (3)

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

(1) 50° (2) 60°

(3) 45° (4) 30°

Ans: (3)

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

(1) 180 ms^{-1} (2) 90 ms^{-1}

(3) 100 ms^{-1} (4) 60 ms^{-1}

Ans: (1)

23. Two heating coils of resistnaces 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

(1) 4 : 1 (2) 2 : 1

(3) 1 : 3 (4) 1 : 4

Ans: (2)

24. A radio - active sample of half - life 10 days contains 1000 x nuclei. Number of original nuclei present after 5 days is

(1) 250 x (2) 500 x

(3) 750 x (4) 707 x

Ans: (4)

25. 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

(1) No interference

(2) Alternate dark & yellow fringes

(3) Alternate dark & pink fringes

(4) Alternate red & blue fringes

Ans: (1)

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

(1) 100 (2) 99

(3) 150 (4) 49

Ans: (4)

27. 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 the axle and the rim of the wheel

(1) $N\omega BL^2$ (2) ωbL^2

(3) $\frac{1}{2}\omega BL^2$ (4) $\frac{1}{2}N\omega BL^2$

Ans: (3)

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

(1) r = 2 cm, $l = \frac{1}{2}$ m (2) r = 2 cm, l = 2 m

(3) r = 1 cm, $l = \frac{1}{2}$ m (4) r = 1 cm, l = 1m

Ans: (1)

29. Mobiity of free electrons in a conductor is

(1) Inversely proportional to relaxation time.

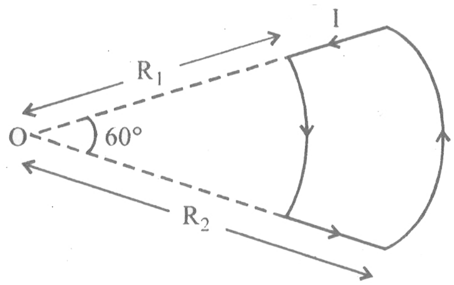
(2) Inversely proportional to electron density

(3) Directly proportional to relaxation time

(4) Directly proportional to electron density

Ans: (3)

30. A conducting write carrying current is arranged as shown. The magnetic field at 'O'



(1) $\frac{\mu_0 i}{6}\left[\frac{1}{R_1}+\frac{1}{R_2}\right]$ (2) $\frac{\mu_0 i}{6}\left[\frac{1}{R_1}-\frac{1}{R_2}\right]$

(3) $\frac{\mu_0 i}{12}\left[\frac{1}{R_1}+\frac{1}{R_2}\right]$ (4) $\frac{\mu_0 i}{12}\left[\frac{1}{R_1}-\frac{1}{R_2}\right]$

Ans: **(4)**

31. A proton is porjected with a uniform velocity 'v' along the axis of a current carrying solenoid, then

(1) The proton will continue to move with velocity 'v' along the axis.

(2) The proton move along helical path

(3) The proton path will be circular about the axis

(4) The proton will be accelerated along the axis

Ans: **(1)**

32. In a series L.C.R circuit an alternating emf (v) and current (i)) are given by the equation v = v_0 $\sin\omega t, i = i_0 \sin\left(\omega t + \frac{\pi}{3}\right)$

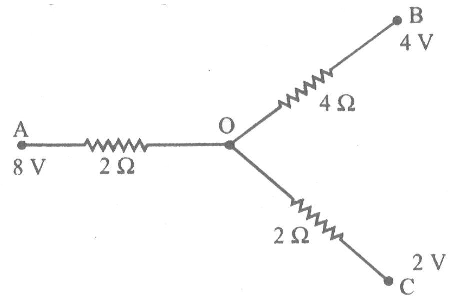
The average power discipated in the circuit over a cycle of AC is

(1) Zero (2) $\frac{\sqrt{3}}{2} v_0 i_0$

(3) $\frac{v_0 i_0}{4}$ (4) $\frac{v_0 i_0}{2}$

Ans: **(3)**

33. In the following network potential at 'O;



(1) 4.8 V (2) 6 V

(3) 3 V (4) 4 V

Ans: **(1)**

34. Electromagnetic radiation used to sterilise milk is

(1) Radiowaves (2) UV rays

(3) γ - ray (4) X - ray

Ans: **(2)**

35. x_1 and x_2 are susceptibility of a paramagnetic material at temperatures T_1K and T_2K respectively, then

(1) $x_1\sqrt{T_1} = x_2\sqrt{T_2}$ (2) $x_1T_2 = x_2T_1$

(3) $x_1T_1 = x_2T_2$ (4) $x_1 = x_2$

Ans: **(3)**

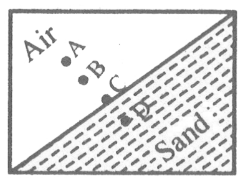
36. A nucleus of mass 20 u emits a γ photon of energy 6 MeV. If the emission assume to occur when nucleus is free and rest, then the nucleus will have kinetic energy nearest to (take 1 u = 1.6 $\times$ 10 $^{-27}$ kg)

(1) 100 KeV (2) 0.1 KeV

(3) 1 KeV (4) 10 KeV

Ans: **(3)**

37. Which of the points is likely position of the centre of mass of the system shown in the figure



(1) C (2) B

(3) D (4) A

Ans: **(3)**

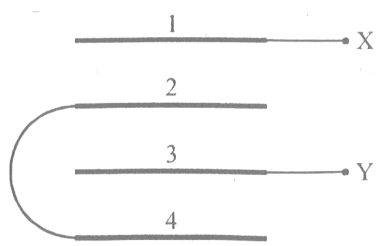
38. The de Broglie wavelength of an electron accelerated to a potential of 400 V is approximately

(1) 0.06 nm (2) 0.12 nm

(3) 0.04 nm (4) 0.03 nm

Ans: (1)

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



(1) $\frac{3 \in_0 A}{d}$ (2) $\frac{2}{3}\frac{\in_0 A}{d}$

(3) $\frac{2 \in_0 A}{d}$ (4) $\frac{3}{2}\frac{\in_0 A}{d}$

Ans: (2)

40. A 12 kg bomb at rest explodes into two pieces of 4 kg and 8 kg. If the momentum of 4 kg piece is 20 Ns, the kinetic energy of the 8 kg piece is

(1) 40 J (2) 50 J

(3) 20 J (4) 25 J

Ans: (4)

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

($\vec{E}$ → Electric field, $\vec{ds}$ → Area vecotr)

(1) $\oint E.ds = 0$ if cahrge is outside $= \frac{q}{\in_0}$ if charge is inside

(2) $\oint E.ds = \infty$ if charge is inside

(3) $\oint \vec{E}.\vec{ds}$ could not be defined

(4) $\oint \vec{E}.\vec{ds} \neq 0$ on any surface

Ans: (1)

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

(1) $\frac{4h}{2\pi}$ (2) $\frac{3h}{2\pi}$

(3) $\frac{2h}{2\pi}$ (4) $\frac{h}{2\pi}$

Ans: (2)

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

(1) Filter, regulator, rectifier

(2) Rectifier, filter, regulator

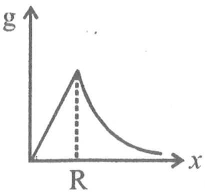
(3) Rectifier, regulator, filter

(4) Regulator, filter, rectifier

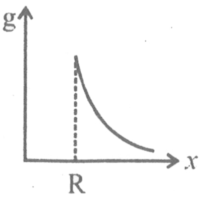
Ans: (2)

44. Variation of acceleration due to gravity (g) with distance x from the centre of the earth is best represented by (R → Radius of the earth)

(1)



(2)



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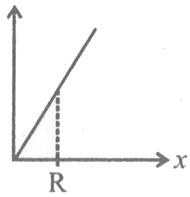

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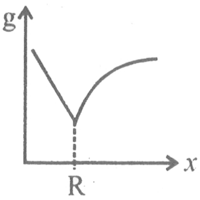


Ans: (1)

45. 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

(1) $0.5\pi \, rad \, s^{-1}$ (2) $2\pi \, rad \, s^{-1}$

(3) $0.5 \, rad \, s^{-1}$ (4) $2 \, rad \, s^{-1}$

Ans: (4)

46. A source of sound is moving with a velocity of 50 ms^{-1} towards a 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})

(1) 177.5 Hz (2) 375 Hz

(3) 666 Hz (4) 400 Hz

Ans: (2)

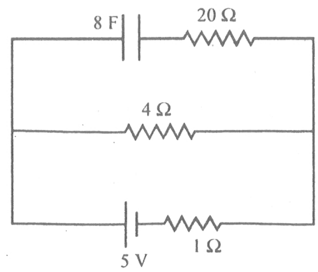
47. An electron of mass m, charge e falls through a distance h meter in a uniform electric field E. Then time of fall

(1) $t \quad \frac{2eE}{hm}$ (2) $t \quad \sqrt{\frac{2eE}{hm}}$

(3) $t \quad \frac{2hm}{eE}$ (4) $t \quad \sqrt{\frac{2hm}{eE}}$

Ans: (4)

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

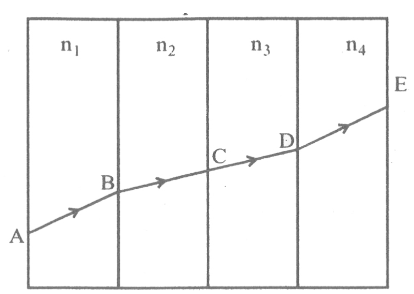


(1) 80 C (2) 0 C

(3) 40 C (4) 32 C

Ans: (4)

49. 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

(1) $n_1 \quad \frac{n_2 \quad n_3 \quad n_4}{3}$ (2) $n_3 \quad n_4$

(3) $n_2 \quad n_4$ (4) $n_1 \quad n_4$

Ans: (4)

50. Three bodies a ring (R), a solid cylinder (C) and a 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

(1) $v_R \quad v_C \quad v_S$ (2) $v_R \quad v_C \quad v_S$

(3) $v_R \quad v_C \quad v_S$ (4) $v_R \quad v_C \quad v_S$

Ans: (2)

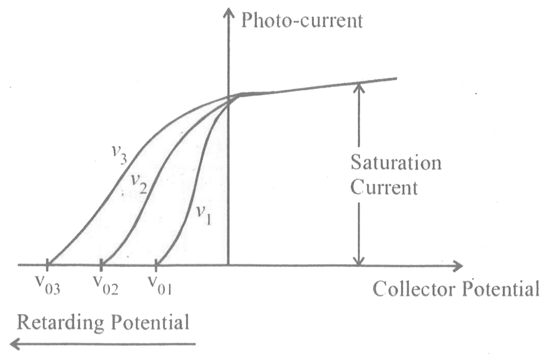
51. A Carnot engine working between 300 K and 400 K has 800 J of useful work. The amount of heat energy supplied to the engine from the source is

(1) 3600 J (2) 1200 J

(3) 3200 J (4) 2400 J

Ans: (3)

52. The variation of photo-current with collector potential for different frequencies of incident radiation v_1, v_2 and v_3 is as shown in the graph, then



(1) $\nu_3 \quad \frac{\nu_1 + \nu_2}{2}$ (2) $\nu_1 < \nu_2 < \nu_3$

(3) $\nu_1 > \nu_2 > \nu_3$ (4) $\nu_1 = \nu_2 = \nu_3$

Ans: (2)

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

(1) Modulation (2) Transmission

(3) Demodulation (4) Amplification

Ans: (1)

54. Nature of equipotential surface for a point charge is

(1) Plane with charge on the surface.

(2) Sphere with charge on the surface of the sphere.

(3) Sphere with charge at the centre of the sphere.

(4) Ellipsoid with charge at foci.

Ans: (3)

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

$X \rightarrow Y \quad {}_2^4He$

$Y \rightarrow Z \quad 2\bar{e}$ then

(1) X & Z are isotopes. (2) X & Z are isotones.

(3) X & Y are isotopes. (4) X & Z are isobars.

Ans: (1)

56. Light of wavelength 600 ηm 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 minimum)

(1) 4.5×10^{-3} rad (2) 2.4×10^{-3} rad

(3) 4×10^{-3} rad (4) 6×10^{-3} rad

Ans: (4)

57. A long solenoid with 40 turns per cm carries a current of 1 A. The magnetic energy stored per unit volume is_________J/m^3.

(1) 6.4π (2) 1.6π

(3) 32π (4) 3.2π

Ans: (4)

58. A pan filled with hot food cools 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 ?

(1) 1.8 minutes (2) 2.5 minutes

(3) 2.8 minutes (4) 2 minutes

Ans: (3)

59. Three projectiles A, B and C are projected at an angle of 30°, 45°, 60° respectively. If R_A, R_B and R_C are ranges of A, B and C respectively, then (velocity of projection is same for A, B & C)

(1) $R_A = R_C < R_B$ (2) $R_A < R_B < R_C$

(3) $R_A = R_C > R_B$ (4) $R_A = R_B = R_C$

Ans: (1)

60. The quantity of a charge that will be transferred by a current flow of 20 A over 1 hour 30 minutes period is

(1) 1.8×10^4 C (2) 5.4×10^3 C

(3) 10.8×10^4 C (4) 10.8×10^3 C

Ans: (3)