Studentpad

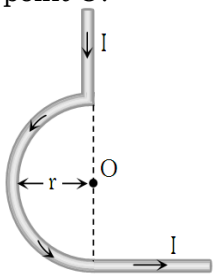
K-CET PHYSICS PAPER 2022-23

Time : 120 Min	Phy : Full Portion Paper	Marks : 60

01) A glass hemisphere of radius 0.04 m and R.I. of the material 1.6 is placed centrally over a cross mark on a paper (i) with the flat face; (ii) with the curved face in contact with the paper. In each case the cross mark is viewed directly from above. The position of the images will be
A) (i) At the same position of the cross mark; (ii) 0.025 m below the flat face
B) (i) 0.025 m from the flat face; (ii) 0.04 m from the flat face
C) (i) 0.04 m from the flat face; (ii) 0.025 m from the flat face
D) For both (i) and (ii) 0.025 m from the highest point of the hemisphere

02) An ammeter of 5 ohm resistance can read 5 mA. If it is to be used to read 100 volts, how much resistance is to be connected in series?
A) $19995\,\Omega$
B) $1999.95\,\Omega$
C) $199.995\,\Omega$
D) $19.9995\,\Omega$

03) In the figure, what is the magnetic field at the point O?

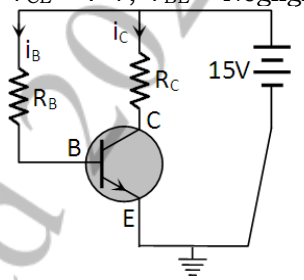


A) $\frac{\mu_0 I}{4\pi r}+\frac{\mu_0 I}{2\pi r}$
B) $\frac{\mu_0 I}{4\pi r}$
C) $\frac{\mu_0 I}{4r}-\frac{\mu_0 I}{4\pi r}$
D) $\frac{\mu_0 I}{4r}+\frac{\mu_0 I}{4\pi r}$

04) _____ is the magnetic Lorentz force experienced by a charge q, entering a magnetic field $\vec{B}$ with a velocity $\vec{v}$.
A) $q\left(\vec{B}\times\vec{v}\right)$
B) $\sqrt{q}\left(\vec{B}\times\vec{v}\right)$
C) $q\left(\vec{v}.\vec{B}\right)$
D) $q\left(\vec{v}\times\vec{B}\right)$

05) The ratio of the shortest wavelength of the Balmer series to the shortest wavelength of the Lyman series is
A) 5 : 9
B) 4 :9
C) 4 : 3
D) 4 : 1

06) In the given common emitter circuit if $\beta=100$, V_{CE} = 7 V, V_{BE} = Negligible, R_C = 2 kΩ , then I_B =?



A) 0.04 mA
B) 0.03 mA
C) 0.02 mA
D) 0.01 mA

07) An infinite number of charges, each of charge 1 μC, are placed on the x-axis with co-ordinates x = 1, 2, 4, 8, ...∞. If a charge of 1 C is kept at the origin, then what is the net force acting on 1 C charge?
A) 36000 N
B) 24000 N
C) 12000 N
D) 9000 N

08) A series LCR circuit is connected to an ac source of variable frequency. When the frequency is increased continuously, starting from a small value, what happen with the power factor?
A) It goes on decreasing continuously
B) It goes on increasing continuously
C) It becomes maximum at a particular frequency
D) It remains constant

09) A group of electric lamps having a total power rating of 1000 watt is supplied by an ac voltage $E=200\sin(310t+60^\circ)$. Then the r. m. s. value of the circuit current is
A) 10 A
B) 20 A

C) $10\sqrt{2}$ A

D) $20\sqrt{2}$ A

10) The potential difference V and the current i flowing through an instrument in an ac circuit of frequency f are given by $V = 5\cos\omega t$ volts and $I = 2\sin\omega t$ amperes (where $\omega = 2\pi f$). The power dissipated in the instrument is
A) 2.5 W
B) 5 W
C) 10 W
D) Zero

11) In a radioactive reaction, ${}_{92}X^{232} \rightarrow {}_{82}Y^{204}$, the number of $\alpha-$particles emitted is
A) 4
B) 5
C) 6
D) 7

12) The foundations of dimensional analysis were laid down by
A) Fourier.
B) Joule.
C) Gallileo.
D) Newton.

13) Four charges +Q, - Q, +Q, - Q are placed at the corners of a square taken in order. At the centre of the square
A) $E = 0, V \neq 0$
B) $E \neq 0, V = 0$
C) $E \neq 0, V \neq 0$
D) E = 0, V = 0

14) A charge q is placed at the center of the open end of cylindrical vessel. The flux of the electric field through the surface of the vessel is
A) $\frac{2q}{\varepsilon_0}$
B) $\frac{q}{2\varepsilon_0}$
C) $\frac{q}{\varepsilon_0}$
D) Zero

15) In Bohr model of hydrogen atom, the ratio of periods of revolution of an electron in $n = 2$ and $n = 1$ orbits is
A) 16 : 1
B) 8 : 1
C) 4 : 1
D) 2 : 1

16) What is the escape speed of a body from the surface of earth (radius of earth $= R_E$)?
A) $\sqrt{gR_E}$
B) $\sqrt{\frac{gR_E}{2}}$
C) gR_E
D) $\sqrt{2gR_E}$

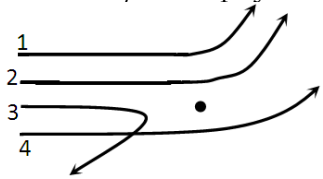
17) The frequency of light ray having the wavelength 3000 Å is
A) 90 cycles/s
B) 3000 cycles/s
C) 9×10^{13} cycles/s
D) 10^{15} cycles/s

18) The force between two charges 0.06 m apart is 5 N. If each charge is moved towards the other by 0.01 m, then the force between them will become
A) 45.00 N
B) 22.50 N
C) 11.25 N
D) 7.20 N

19) If n is the orbit number of the electron in a hydrogen atom, find the correct statement.
A) Electron energy increase as n increases
B) Hydrogen emits infrared rays for the electron transition from $n = \infty$ and $n = 1$
C) Electron energy varies as n^2
D) Electron energy is zero for $n = 1$

20) An uniform magnetic field B is acting from south to north and is of magnitude 1.5 Wb/m^2. If a proton having mass $= 1.7\times10^{-27}$ kg and charge $= 1.6\times10^{-19}$ C moves in this field vertically downwards with energy 5 MeV, then the force acting on it will be
A) 7.4×10^{-19} N
B) 7.4×10^{19} N
C) 7.4×10^{-12} N
D) 7.4×10^{12} N

21) The diagram shows the path of four α-particles of the same energy being scattered by the nucleus of an atom simultaneously. Which of these are/is not physically possible?



A) 1 and 4
B) 2 and 3
C) 3 and 4
D) 4 only

22) The cathode rays have particle nature because of the fact that
A) they cast shadows.
B) they produced fluorescence.
C) they are deflected by electric and magnetic fields.
D) they can propagate in vacuum.

23) In Young's double slit experiment, we get 60

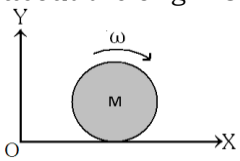
fringes in the field of view of monochromatic light of wavelength 4000 Å. If we use monochromatic light of wavelength 6000 Å, then the number of fringes obtained in the same field of view is
A) 1.5
B) 40
C) 60
D) 90

24) The value of the horizontal component of the earth's magnetic field and angle of dip are 1.8×10^{-5} Weber / m^2 and 30° respectively at some place. The total intensity of earth's magnetic field at that place will be
A) 5.0×10^{-5} Weber / m^2
B) 3.67×10^{-5} Weber / m^2
C) 3.18×10^{-5} Weber / m^2
D) 2.08×10^{-5} Weber / m^2

25) The second's hand of a watch has length 6 cm. Speed of end point and magnitude of difference of velocities at two perpendicular positions will be
A) 6.28 and 0 mm/s
B) 6.28 and 8.88 mm/s
C) 8.88 and 4.44 mm/s
D) 8.88 and 6.28 mm/s

26) The average translational energy and the r. m. s. speed of molecules in a sample of oxygen gas at 300 K are 6.21×10^{-21} J and 484 m/s respectively. The corresponding values at 600 K are nearly (assuming ideal gas behavior)
A) 12.42×10^{21} J, 684 m / s
B) 12.42×10^{21} J, 968 m / s
C) 8.78×10^{21} J, 684 m / s
D) 6.21×10^{21} J, 968 m / s

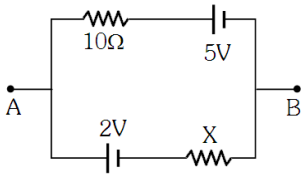
27) A disc of mass M and radius R is rolling with angular speed ω on a horizontal plane as shown. The magnitude of angular momentum of the disc about the origin O is



A) $MR^2\omega$
B) $\frac{1}{2}MR^2\omega$
C) $2\,MR^2\omega$
D) $\frac{3}{2}MR^2\omega$

28) A nichrome wire 50 cm long and 1 mm^2 in cross-section carries a current of 4 A when connected to a 2 V storage battery. What is the resistivity of nichrome?
A) $5\times10^{7}\ \Omega\,m$
B) $4\times10^{-7}\ \Omega\,m$
C) $2\times10^{-7}\ \Omega\,m$
D) $1\times10^{-6}\ \Omega\,m$

29) If $V_{AB} = 4V$ in the given figure, then resistance X will be



A) 5 Ω
B) 10 Ω
C) 15 Ω
D) 20 Ω

30) The cut-in voltage for silicon diode is approximately
A) 1.4 V
B) 1.1 V
C) 0.6 V
D) 0.2 V

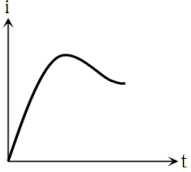
31) Which of the following is the longitudinal wave?
A) Light waves
B) Water waves
C) Waves on plucked string
D) Sound waves

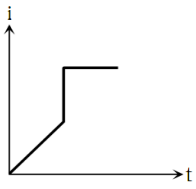
32) A charged particle of mass m and charge q travels on a circular path of radius r that is perpendicular to a magnetic field B. The time taken by the particle to complete one revolution is
A) $\frac{2\pi q^2 B}{m}$
B) $\frac{2\pi m q}{B}$
C) $\frac{2\pi m}{q B}$
D) $\frac{2\pi q B}{m}$

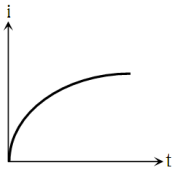
33) An under-water swimmer cannot see very clearly even in absolutely clear water due to
A) scattering of light in water
B) absorption of light in water
C) reduction of speed of light in water
D) change in the focal length of eye lens

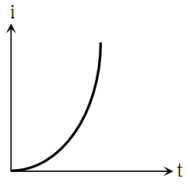
34) When a battery is connected across a series combination of self inductance L and resistance R, the variation in the current i with time t is best represented by

A)

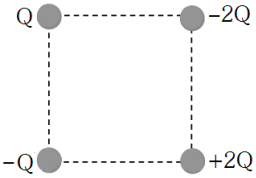


B)


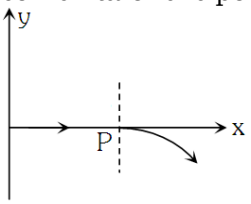
C)


D)


35) A block of mass m is placed on a smooth wedge of inclination θ. The whole system is accelerated horizontally so that the block does not slip on the wedge. The force exerted by the wedge on the block (g is acceleration due to gravity.) will be
A) mg
B) $mg\cos\theta$
C) $mg\sin\theta$
D) $mg/\cos\theta$

36) Four charges are placed on corners of a square as shown in figure having side of 5 cm. If Q is one micro-coulomb, then electric field intensity at center will be


A) 2.04 x 10^7 N/C downwards
B) 2.04 x 10^7 N/C upwards
C) 1.02 x 10^7 N/C downwards
D) 1.02 x 10^7 N/C upwards

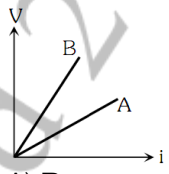
37) For a positively charged particle moving in a x-y plane initially along the x-axis, there is a sudden change in its path due to the presence of electric and/or magnetic fields beyond P. The curved path is shown in the x-y plane and is found to be non-circular. Which one of the following combinations is possible?


A) $\vec{E}=0;\vec{B}=b\hat{i}+c\hat{k}$
B) $\vec{E}=ai;\vec{B}=c\hat{k}+a\hat{i}$
C) $\vec{E}=0;\vec{B}=c\hat{j}+b\hat{k}$
D) $\vec{E}=ai;\vec{B}=c\hat{k}+b\hat{j}$

38) An air bubble in sphere having 4 cm diameter appears 1 cm from surface nearest to eye when looked along diameter. If $_a\mu_g$ = 1.5, the distance of bubble from refracting surface is
A) 1.2 cm
B) 1.6 cm
C) 2.8 cm
D) 3.2 cm

39) Light waves can be polarized as they are
A) reflected.
B) longitudinal.
C) of high frequency.
D) transverse.

40) If a piece of metal was thought to be magnet, which one of the following observations would offer conclusive evidence?
A) It repels a known magnet.
B) It attracts a known magnet.
C) It attracts a steel screw driver.
D) Neither (1) nor (2).

41) V-i graphs for parallel and series combination of two identical resistors are as shown in figure. In the figure, which graph represents parallel combination?


A) B
B) A
C) Both A and B
D) Neither A nor B

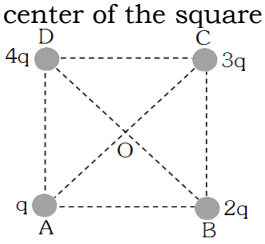
42) A physical quantity $P=\frac{\sqrt{abc^2}}{d^3}$ is determined by measuring a, b, c and d separately with the percentage error of 2%, 3%, 2% and 1% respectively. Minimum amount of error is contributed by which one of the following measurement?
A) c
B) a
C) d
D) b

43) The current in a conductor varies with time t as $I=2t+3t^2$, where I is in ampere and t in seconds. Electric charge flowing through a section of the conductor during t = 2 s to t = 3 s is
A) 44 C
B) 33 C
C) 24 C
D) 10 C

44) The composition of two simple harmonic motions of equal periods at right angle to each other and with a phase difference of π results in the displacement of the particle along
A) circle.

B) straight line.
C) figure of eight.
D) both (1) and (2).

45) Charges q, 2q, 3q and 4q are placed at the corners A, B, C and D of a square as shown in the following figure. The direction of electric field at the center of the square is along



A) CB
B) AB
C) AC
D) BD

46) Maximum density of H_2O is at the temperature
A) 4 °F
B) 32 °F
C) 39.2 °F
D) 42 °F

47) An aeroplane flies 400 m north and 300 m south and then flies 1200 m upwards, then net displacement is
A) 1200 m
B) 1300 m
C) 1350 m
D) 1500 m

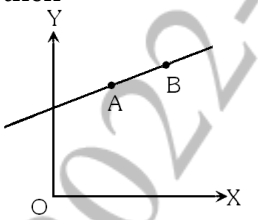
48) A nucleus of mass 218 amu in free state decays to emit an α-particle. Kinetic energy of the α-particle emitted is 6.7 MeV. The recoil energy (in MeV) of the daughter nucleus is
A) 0.125
B) 0.25
C) 0.5
D) 1.0

49) Work done per mol in an isothermal change is
A) $RT \log_e \frac{V_1}{V_2}$
B) $RT \log_e \frac{V_2}{V_1}$
C) $RT \log_{10} \frac{V_1}{V_2}$
D) $RT \log_{10} \frac{V_2}{V_1}$

50) An electron moving with the speed 5×10^6 per second is shot parallel to the electric field of intensity 1×10^3 N / C. Field is responsible for the retardation of motion of electron. Now evaluate the distance traveled by the electron before coming to rest for an instant (Mass of $e = 9\times10^{-31}$ Kg. and Charge $=1.6\times10^{-19}$C)
A) 0.7 mm
B) 7 cm
C) 0.7 cm
D) 7 m

51) 62.5×10^{18} electrons per second are flowing through a wire of area of cross-section 0.1 m^2, the value of current flowing will be
A) 0.11 A
B) 10 A
C) 0.1 A
D) 1 A

52) A particle of mass m moves in the XY plane with a velocity V along the straight line AB. If the angular momentum of the particle with respect to origin O is L_A when it is at A and L_B when it is at B, then



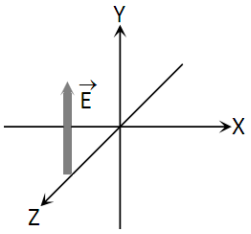
A) $L_A = L_B$
B) $L_A > L_B$
C) $L_A < L_B$
D) The relationship between L_A and L_B depends upon the slope of the line AB.

53) The isothermal elasticity of a gas is equal to
A) pressure.
B) density.
C) volume.
D) specific heat.

54) A sample of metal weighs 210 gm in air, 180 gm in water and 120 gm in liquid. Then relative density (RD) of
A) liquid is $\frac{1}{3}$.
B) liquid is 3.
C) metal is 7.
D) Both (2) and (3).

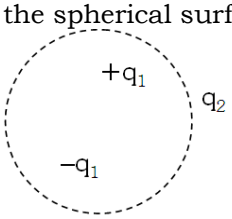
55) A small coil of N turns has area A and a current I flows through it. The magnetic dipole moment of this coil will be
A) NIA
B) NI^2A
C) N^2AI
D) NI / A

56) The following figure gives the electric field of an EM wave at a certain point and a certain instant. The wave is transporting energy in the negative z direction. What is the direction of the magnetic field of the wave at that point and instant?



A) Towards - Z direction
B) Towards + Z direction
C) Towards - X direction
D) Towards + X direction

57) Consider the charge configuration and spherical Gaussian surface as shown in the figure. When calculating the flux of the electric field over the spherical surface the electric field will be due to



A) $+q_1$ and $-q_1$.
B) q_2.
C) only the positive charges.
D) all the charges.

58) The formula for induced e.m.f. in a coil due to change in magnetic flux through the coil is
(Here, A = area of the coil, B = magnetic field)

A) $e = -A.\frac{dB}{dt}$

B) $e = -B.\frac{dA}{dt}$

C) $e = -\frac{d}{dt}(A.B)$

D) $e = -\frac{d}{dt}(A \times B)$

59) A bomb of 12 kg divides in two parts whose ratio of masses is 1 : 3. If kinetic energy of smaller part is 216 J, then momentum of bigger part in kg-m/s will be
A) 108
B) 72
C) 36
D) Data is incomplete.

60) Energy generation in stars is mainly due to
A) fusion of heavy nuclei.
B) fusion of light nuclei.
C) fission of heavy nuclei.
D) chemical reactions.