PAPER : IIT-JAM 2018

PHYSICS-PH

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1. **Section-A contains 30 Multiple Choice Questions (MCQ). Each question has 4 choices (a), (b), (c) and (d), for its answer, out of which ONLY ONE is correct. From Q.1 to Q.10 carries 1 Marks and Q.11 to Q.30 carries 2 Marks each.**

2. **Section-B contains 10 Multiple Select Questions(MSQ). Each question has 4 choices (a), (b), (c) and (d) for its answer, out of which ONE or MORE than ONE is/are correct. For each correct answer you will be awarded 2 marks.**

3. **Section-C contains 20 Numerical Answer Type (NAT) questions. From Q.41 to Q.50 carries 1 Mark each and Q.51 to Q.60 carries 2 Marks each. For each NAT type question, the value of answer in between 0 to 9.**

4. **In all sections, questions not attempted will result in zero mark. In Section–A (MCQ), wrong answer will result in negative marks. For all 1 mark questions, 1/3 marks will be deducted for each wrong answer. For all 2 marks questions, 2/3 marks will be deducted for each wrong answer. In Section–B (MSQ),there is no negative and no partial marking provisions. There is no negative marking in Section–C (NAT) as well.**

SECTION-A

Multiple Choice Questions (MCQ)

Q.1 – Q.10 carry one mark each.

1. Let T_g and T_e be the kinetic energies of the electron in the ground and the third excited states of a hydrogen atom, respectively. According to the Bohr model, the ratio $\frac{T_g}{T_e}$ is

(a) 3 (b) 4 (c) 9 (d) 16

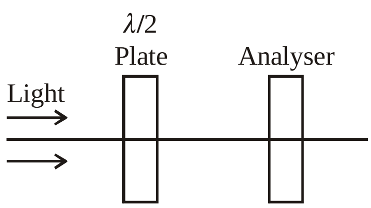
2. Three infinite plane sheets carrying uniform charge densities $-\sigma, 2\sigma, 3\sigma$ are placed parallel to the *xz*-plane at $y = a, 3a, 4a$ respectively. The electric field at the point $(0, 2a, 0)$ is

(a) $\frac{4\sigma}{\varepsilon_0}\hat{j}$ (b) $-\frac{3\sigma}{\varepsilon_0}\hat{j}$ (c) $-\frac{2\sigma}{\varepsilon_0}\hat{j}$ (d) $\frac{\sigma}{\varepsilon_0}\hat{j}$

3. There are three planets in circular orbits around a star at distance a, $4a$ and $9a$, respectively. At time $t = t_0$, the star and the three planets are in a straight line. The period of revolution of the closest planet is *T*. How, long after t_0 will they again be in the same straight line ?

(a) 8 *T* (b) 27 *T* (c) 216 T (d) 512 *T*

4. Which one of the following arrangements of optical components can be used to distinguish between an unpolarized light and a circularly polarized light ?

(a)


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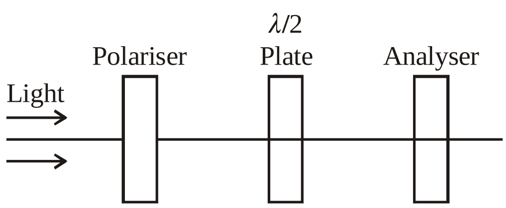
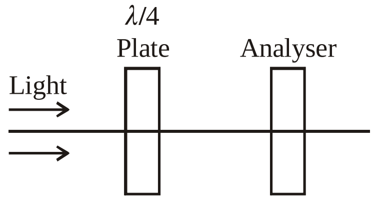
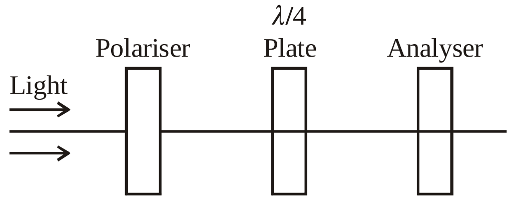
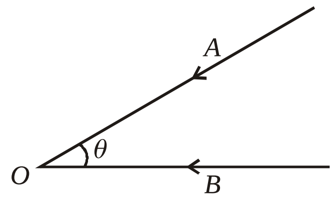


(c) 

(d) 

5. Two vehicles A and B are approaching an observer O at rest with equal speed as shown in the figure. Both vehicles have identical sirens blowing at a frequency f_s. The observer hears these sirens at frequency f_A and f_B, respectively from the two vehsicles. Which one of the following is correct ?

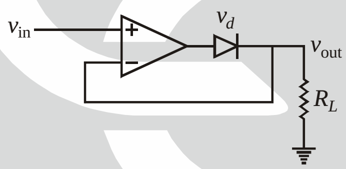


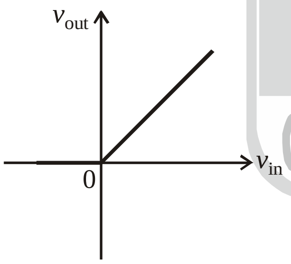
(a) $f_A = f_B < f_s$ (b) $f_A = f_B > f_s$ (c) $f_A > f_B > f_s$ (d) $f_A < f_B < f_s$

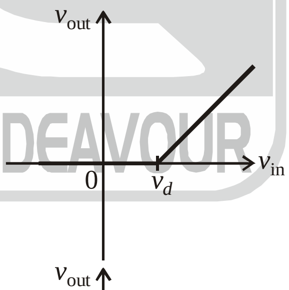
6. A current I is flowing through the sides of an equilateral triangle of side a. The magnitude of the magnetic field at the centroid of the triangle is

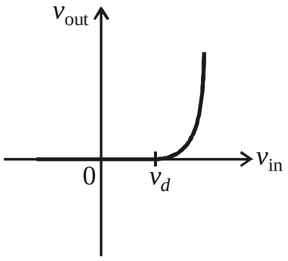
(a) $\dfrac{9\mu_0 I}{2\pi a}$ (b) $\dfrac{\mu_0 I}{\pi a}$ (c) $\dfrac{3\mu_0 I}{2\pi a}$ (d) $\dfrac{3\mu_0 I}{\pi a}$

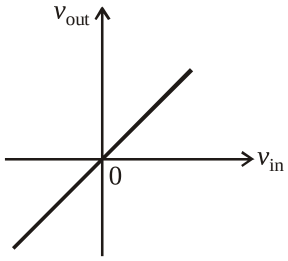
7. Which one of the following graphs shows the correct variations of v_o with v_i ? Here, v_d is the voltage drop across the dipole and the Op-Amp is assumed to be ideal.



(a) 

(b) 

(c) 

(d) 

8. Two boxes A and B contain an equal number of molecules of the same gas. If the volumes are V_A and V_B, and λ_A and λ_B denote respective mean free paths, then

(a) $\lambda_A = \lambda_B$ (b) $\dfrac{\lambda_A}{V_A} = \dfrac{\lambda_B}{V_B}$ (c) $\dfrac{\lambda_A}{V_A^{1/2}} = \dfrac{\lambda_B}{V_B^{1/2}}$ (d) $\lambda_A V_A = \lambda_B V_B$

9. Let $f(x, y) = x^3 - 2y^3$. The curve along which $\nabla^2 f = 0$ is

(a) $x = \sqrt{2}y$ (b) $x = 2y$ (c) $x = \sqrt{6}y$ (d) $x = -\dfrac{y}{2}$

10. A curve is given by $\vec{r}(t) = t\hat{i} + t^2\hat{j} + t^3\hat{k}$. The unit vector of the tangent to the curve at $t = 1$ is

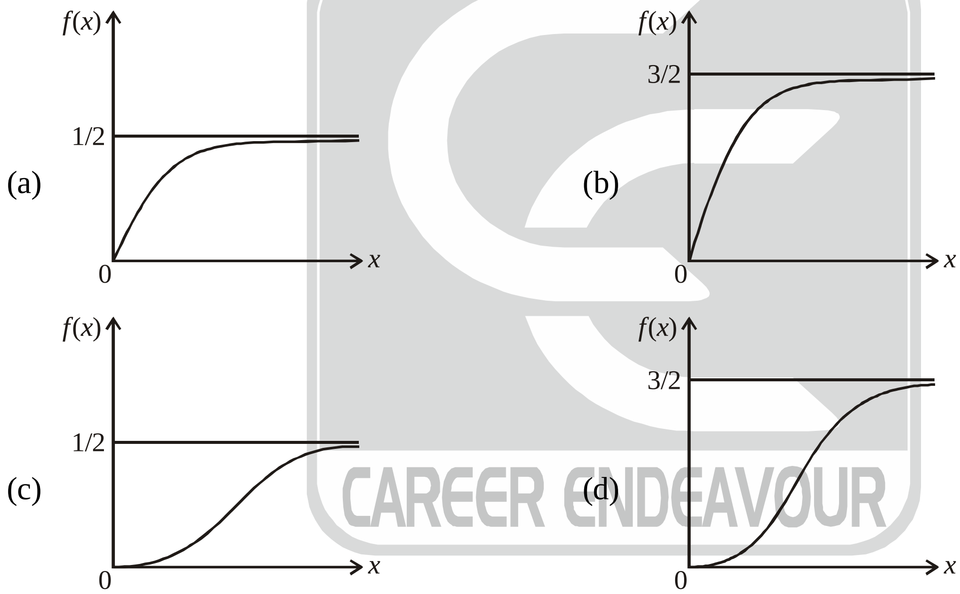
(a) $\dfrac{\hat{i}+\hat{j}+\hat{k}}{\sqrt{3}}$ (b) $\dfrac{\hat{i}+\hat{j}+2\hat{k}}{\sqrt{6}}$ (c) $\dfrac{\hat{i}+2\hat{j}+2\hat{k}}{3}$ (d) $\dfrac{\hat{i}+2\hat{j}+3\hat{k}}{\sqrt{14}}$

Q.11 – Q.30 carry two marks each.

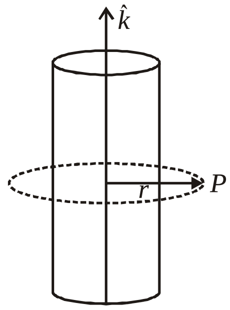
11. A raindrop falls under gravity and captures water molecules from atmosphere. Its mass changes at the rate $\lambda m(t)$, where λ is a positive constant and $m(t)$ is the instantaneous mass. Assume that acceleration due to gravity is constant and water molecules are at rest with respect to earth before capture. Which of the following statements is correct ?

(a) The speed of the raindrop increases linearly with time.
(b) The speed of the raindrop increases exponentially with time.
(c) The speed of the raindrop approaches a constant value when $\lambda t \gg 1$.
(d) The speed of the raindrop approaches a constant value when $\lambda t \ll 1$.

12. Which one of the following curves correctly represents (schematically) the solution for the equation $\dfrac{df}{dx} + 2f = 3;\ f(0) = 0$?



13. A long solenoidal is carrying a time depends current such that the magnetic field inside has the form $\vec{B}(t) = B_0 t^2 \hat{k}$, where $\hat{k}$ is along the axis of the solenoid. The displacement current at the point P on a circle of radius r in a plane perpendicular to the axis



(a) is inversely proportional to r and radially outward.
(b) is inversely proportional to r and tangential.
(c) increases linearly with time and is tangential.
(d) is inversely proportional to r^2 and tangential.

14. The mean momentum $\vec{p}$ of a nucleon in a nucleus of mass number A and atomic number Z depends on A, Z as

(a) $\vec{p} \propto A^{1/3}$ (b) $\vec{p} \propto Z^{1/3}$ (c) $\vec{p} \propto A^{-1/3}$ (d) $\vec{p} \propto (AZ)^{-2/3}$

15. An infinitely long solenoid, with its axis along $\hat{k}$, carries a current I. In addition there is a uniform line charge density λ along the axis. If $\vec{S}$ is the energy flux in cylindrical coordinates $(\hat{\rho}, \hat{\phi}, \hat{k})$, then

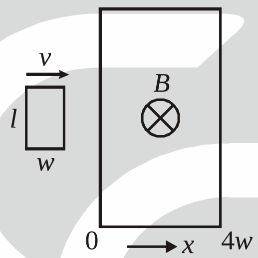
(a) $\vec{S}$ is along $\hat{\rho}$

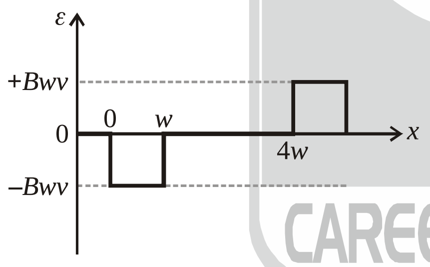
(b) $\vec{S}$ is along $\hat{k}$

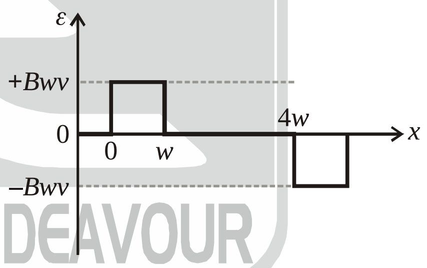
(c) $\vec{S}$ has non zero components along $\hat{\rho}$ and $\hat{k}$

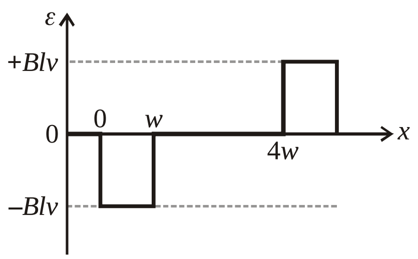
(d) $\vec{S}$ is along $\hat{\rho} \times \hat{k}$

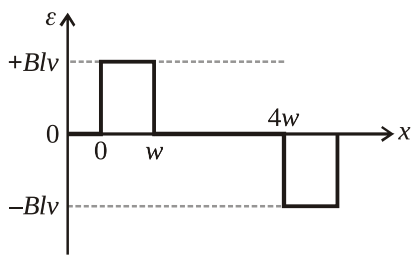
16. A rectangular loop of dimension l and w moves with a constant speed of v through a region containing a uniform magnetic field B directed into the paper and extending a distance of $4w$. Which of the following figures correctly represents the variation of e.m.f. (ε) with the position (x) of the front end of the loop ?



(a)


(b)


(c)


(d)


17. A 2π periodic function $f(x) = \begin{cases} x, & -\pi < x < 0 \\ -\pi, & 0 < x < \pi \end{cases}$ is expanded as a Fourier series of the form

$$a_0 + \sum_{n=1}^{\infty} a_n \cos(nx) + \sum_{n=1}^{\infty} b_n \sin(nx)$$

Which of the following is TRUE ?

(a) $a_0 \neq 0, b_n = 0$ (b) $a_0 \neq 0, b_n \neq 0$ (c) $a_0 = 0, b_n = 0$ (d) $a_0 = 0, b_n \neq 0$

18. Consider the transformation to a new set of coordinates (ξ, η) from rectangular Cartesian coordinates (x, y), where $\xi = 2x + 3y$ and $\eta = 3x - 2y$. In the (ξ, η) coordinates system, the area element $dx\,dy$ is

(a) $\frac{1}{13} d\xi\, d\eta$ (b) $\frac{2}{13} d\xi\, d\eta$ (c) $5 d\xi\, d\eta$ (d) $\frac{3}{5} d\xi\, d\eta$

19. Consider two waves $y_1 = a\cos(\omega t - kz)$ and $y_2 = a\cos[(\omega + \Delta\omega)t - (k + \Delta k)z]$. The group velocity of the superposed wave will be $(\Delta\omega \ll \omega$ and $\Delta k \ll k)$

(a) $\frac{(\omega - \Delta\omega)}{(k - \Delta k)}$ (b) $\frac{(2\omega - \Delta\omega)}{(2k + \Delta k)}$ (c) $\frac{\Delta\omega}{\Delta k}$ (d) $\frac{(\omega + \Delta\omega)}{(k + \Delta k)}$

20. Given a spherically symmetric charge density $\rho(r) = \begin{cases} kr^2 & ; \quad r < R \\ 0 & ; \quad r > R \end{cases}$, ($k$ being a constant), the electric field for $r < R$ is (take the total charge as Q)

(a) $\frac{Qr^3}{4\pi\varepsilon_0 R^5}\hat{r}$ (b) $\frac{3Qr^2}{4\pi\varepsilon_0 R^4}\hat{r}$ (c) $\frac{5Qr^3}{8\pi\varepsilon_0 R^5}\hat{r}$ (d) $\frac{Q}{4\pi\varepsilon_0 r^2}\hat{r}$

21. Consider an ensemble of thermodynamic system, each of which is characterized by the same number of particles, pressure and temperature. The thermodynamic function describing the ensemble is

(a) Enthalpy (b) Helmholtz free energy

(c) Gibbs free energy (d) Entropy

22. An ideal gas consists of three dimensional polyatomic molecules. The temperature is such that only one vibrational mode is excited. If R denotes the gas constant, then the specific heat at constant volume of one mole of the gas at this temperature is

(a) $3R$ (b) $\frac{7}{2}R$ (c) $4R$ (d) $\frac{9}{2}R$

23. The equation of state for one mole of a non-ideal gas is given by $PV = A\left(1 + \frac{B}{V}\right)$, where the coefficients A and B are temperature dependent. If the volume changes from V_1 and V_2 in an isothermal process, the work done by the gas is

(a) $AB\left(\frac{1}{V_1} - \frac{1}{V_2}\right)$ (b) $AB\ln\left(\frac{V_2}{V_1}\right)$

(c) $A\ln\left(\frac{V_2}{V_1}\right) + AB\left(\frac{1}{V_1} - \frac{1}{V_2}\right)$ (d) $A\ln\left(\frac{V_2 - V_1}{V_1}\right) + B$

24. Consider a convex lens of focal length f. A point object moves towards the lens along its axis between $2f$ and f. If the speed of the object is V_0, then its image would move with speed V_I. Which of the following is correct ?

(a) $V_I = V_0$; the image moves away from the lens.

(b) $V_I = -V_0$; the image moves towards the lens.

(c) $V_I > V_0$; the image moves away from the lens.

(d) $V_I < V_0$; the image moves away from the lens.

25. A particle of mass m in a one dimensional potential $V(x)=\begin{cases}0 & ; \quad 0<x<L \\ \infty & ; \quad \text{otherwise}\end{cases}$. At some instant its wave function is given by $\psi(x)=\frac{1}{\sqrt{3}}\psi_1(x)+i\sqrt{\frac{2}{3}}\psi_2(x)$ and $\psi_2(x)$ are the ground and the first excited state, respectively. Identify the correct statement.

(a) $\langle x\rangle=\frac{L}{2};\langle E\rangle=\frac{\hbar^2}{2m}\frac{3\pi^2}{L^2}$

(b) $\langle x\rangle=\frac{2L}{3};\langle E\rangle=\frac{\hbar^2}{2m}\frac{\pi^2}{L^2}$

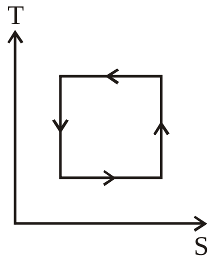
(c) $\langle x\rangle=\frac{L}{2};\langle E\rangle=\frac{\hbar^2}{2m}\frac{8\pi^2}{L^2}$

(d) $\langle x\rangle=\frac{2L}{3};\langle E\rangle=\frac{\hbar^2}{2m}\frac{4\pi^2}{3L^2}$

26. The plane of polarisation of a plane polarized light rotates by 60º after passing through a wave plate. The pass-axis of the wave plate is at an angle a with respect to the plane of polarisation of the incident light. The wave plate and a are

(a) $\frac{\lambda}{4}$, 60º (b) $\frac{\lambda}{2}$, 30º (c) $\frac{\lambda}{2}$, 120º (d) $\frac{\lambda}{4}$, 30º

27. Which one of the figures correctly represents the T-S diagram of a Carnot engine ?

(a)


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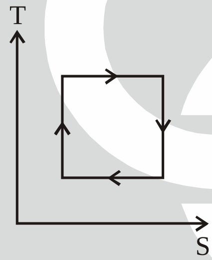

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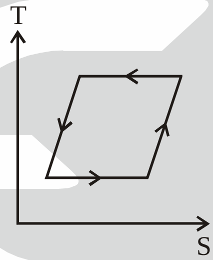

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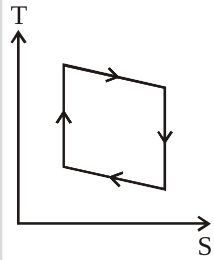
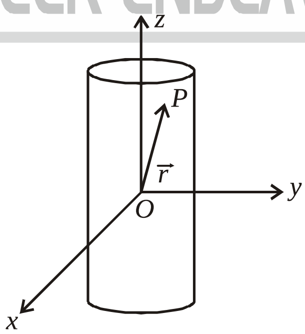


28. A particle P of mass m is constrained to move on the surface of a cylinder under a force $-k\vec{r}$ as shown in figure (k is the positive constant). Which of the following statements is correct ? (Neglect friction).



(a) Total energy of the particle is not conserved.
(b) The motion along z direction is simple harmonic.
(c) Angular momentum of the particle about O increases with time.
(d) Linear momentum of the particle is conserved.

29. The Boolean expression $(\overline{AB})\,(\overline{A}+B)\,(A+\overline{B})$ can be simplified to

(a) $A+B$ (b) $\overline{A}B$ (c) $\overline{A+B}$ (d) AB

30. A disc of radius R_1 having uniform surface density has a concentric hole of radius $R_2 < R_1$. If its mass is M, the principal moments of inertia are

(a) $\frac{M\left(R_1^2 - R_2^2\right)}{2}, \frac{M\left(R_1^2 - R_2^2\right)}{4}, \frac{M\left(R_1^2 - R_2^2\right)}{4}$

(b) $\frac{M\left(R_1^2 + R_2^2\right)}{2}, \frac{M\left(R_1^2 + R_2^2\right)}{4}, \frac{M\left(R_1^2 + R_2^2\right)}{4}$

(c) $\frac{M\left(R_1^2 + R_2^2\right)}{2}, \frac{M\left(R_1^2 + R_2^2\right)}{4}, \frac{M\left(R_1^2 + R_2^2\right)}{8}$

(d) $\frac{M\left(R_1^2 - R_2^2\right)}{2}, \frac{M\left(R_1^2 - R_2^2\right)}{4}, \frac{M\left(R_1^2 - R_2^2\right)}{8}$

SECTION-B

Multiple Select Questions (MSQ)

Q.1 – Q.10 carry TWO marks each.

1. Which of the following relations is (are) true for the thermodynamics variables?

(a) $TdS = C_V dT + T\left(\frac{\partial P}{\partial T}\right)_V dV$ (b) $TdS = C_V dT - T\left(\frac{\partial V}{\partial T}\right)_P dP$

(c) $dF = -SdT + PdV$ (d) $dG = -SdT + VdP$

2. Consider a convex lens of focal length f. The lens is cut along a diameter in two parts. The two lens parts and an object are kept as shown in the figure. The images are formed at following distances from the object

(a) $2f$ (b) $3f$ (c) $4f$ (d) ∞

3. Two beams of light in visible range (400 nm – 700 nm) interfere with each other at a point. The optical path difference between them is 5000 nm. Which of the following wavelength will interfere constructively at the given point?

(a) 416.67 nm (b) 555.55 nm (c) 625 nm (d) 666.66 nm

4. Which of the combinations of crystal structure and their coordination number is(are) correct?

(a) body centered cubic – 8 (b) tape centered cubic – 6

(c) diamond – 4 (d) hexagonal closed packed – 12

5. In a pn junction, dopant concentration on the p-side is higher than that on the n-side. Which of the following statement(s) is(are) correct, when the junction is unbiased?

(a) The width of the depletion layer is larger on the n-side

(b) At thermal equilibrium the Fermi energy is higher on the p-side

(c) In the depletion region, number of negative charges per unit area on the p-side is equal to number of positive charges per unit area on the n-side

(d) The value of the built-in potential barrier depends on the dopant concentration

6. In presence of a magnetic field $B\,\hat{j}$ and an electric field $(-E)\hat{k}$, a particle moves undeflected. Which of the following statements is(are) correct?

(a) The particle has positive charge, velocity$=-\dfrac{E}{B}\hat{i}$

(b) The particle has positive charge, velocity$=\dfrac{E}{B}\hat{i}$

(c) The particle has negative charge, velocity$=-\dfrac{E}{B}\hat{i}$

(d) The particle has negative charge, velocity$=\dfrac{E}{B}\hat{i}$

7. Two projectiles of identical mass are projected from the ground with same initial angle (α) with respect to earth surface and smae initial (u) in the same plane. They collide at the highest point of their trajectories and stick to each other. Which of the following stsatements is(are) correct?

(a) The momentum of the combined object immediately after the collision is zero
(b) Kinetic energy is conserved in the collision
(c) The combined object moves vertically downward
(d) The combined object moves in a parabolic path

8. Let $f(x)=3x^6-2x^2-8$. Which of the following statements is(are) true?

(a) The sum of all its roots is zero
(b) The product of its roots is $-\dfrac{8}{3}$
(c) the sum of all its roots is $\dfrac{2}{3}$
(d) Complex roots are conjugates of each other

9. Let matrix $M=\begin{pmatrix}4 & x\\ 6 & 9\end{pmatrix}$. If det (M) = 0, then

(a) M is symmetric
(b) M is invertible
(c) One eigenvalue is 13
(d) Its eigenvectors are orthogonal.

10. Let the electric field in some region R be given by $\vec{E}=e^{-y^2\hat{i}+e^{-x^2}\hat{j}}$. From this we may conclude that
(a) R has a non-uniform charge distribution
(b) R has no charge distribution
(c) R has a dependent magnetic field
(d) The energy flux in R is zero everywhere

SECTION-C

Numerical Answer Type (NAT)

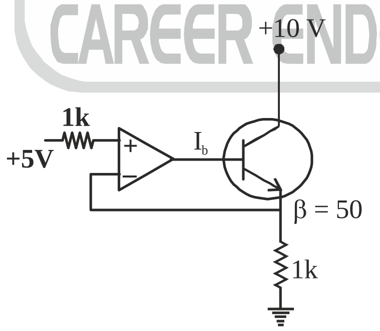
Q.1 – Q.10 carry ONE mark each.

1. Consider an electromagnetic plane wave $\vec{E} = E_0\left(\hat{i} + b\hat{j}\right)\cos\left[\frac{2\pi}{\lambda}\left\{ct - \left(x - \sqrt{3}y\right)\right\}\right]$, where λ is the wavelength, c is the speed of light b is a constant. The value of b is __________(Specify your answer upto two digits after the decimal point).

2. A particle of mass m moving along the positive x direction under a potential $V(x) = \frac{1}{2}kx^2 + \frac{1}{2x^2}$ (k and λ are positive constants). If the particle is slightly displaced from its equilibrium position, it oscillates with an angular frequency (ω)_________. (Specify your answer in units of $\sqrt{\frac{k}{m}}$ as an integer)

3. In a grating with grating constant $d = a + b$, where a is the slit width and b is the separation between the slits, the diffraction pattern has the fourth order missing. The value of $\frac{b}{a}$ is ______________(Specify your answer as an integer)

4. For the given circuit, value of the base current (I_b) of the npn transistor will be _____________mA. (β is the current gain and assume Op-Amp as ideal). (Specify your answer in mA upto two digits after the decimal point)



5. Consider the first order phase transition of the sublimation of zinc. Assume the vapor to be an ideal gas and the molar volume of solid to be negligible. Experimentally, it is found that $\log_{10}(P) = -\frac{C_1}{T} + C_2$, where P is the vapor pressure in Pascal, T is in K, C_1 = 6790 K and C_2 = 9. The latent heate of sublimation of zinc from the Clausius-Clapeyron equation is _______________kJ/mole. (R = 8.314 J/mole K) (Specify your answer in kJ/mole upto one digit after the decimal point)

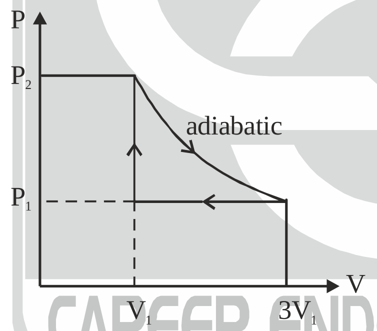
6. A system of 8 non-interacting electrons is confined by a three dimensional potential $V(r)=\frac{1}{2}m\omega^2 r^2$. The ground state energy of the system in units of $\hbar\omega$ is ________(Specify your answer as an integer)

7. A planet has average density same as that of the earth but it has only 1/8 of the mass of the earth. If the acceleration due to gravity at the surface is g_p and g_e fo rthe planet and earth, respectively, then $\frac{g_p}{g_e}=$ ______________

8. The coefficient of x^3 in the Taylor expansion of $\sin(\sin x)$ around $x = 0$ is ____________(Specify your answer upto one digit after the decimal point)

9. The lattice consatant of unit cell of NaCl crystal is 0.563 nm. X-rays of wavelength 0.141 nm are diffracted by this crystal. The angle at which the first order maximum occurs is __________degrees. (Specify your answer in degrees upto two digits after the decimal point)

10. Consider a monoatomic ideal gas operating in a closed cycle as shown in the P-V diagram given below. The ratio $\frac{P_1}{P_2}$ is ______________________



(Specify your answer upto two digits after the decimal point)

Q.11 – Q.20 carry TWO marks each.

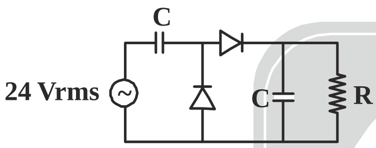
11. A body of mass 1 kg is moving under a central force in an elliptic orbit with semi major axis 1000 m and semi minor axis 100m. The orbital angular momentum of the body is 100 kg m^2s^{-1}. The time period of motion of the body is ________________hours. (Specify your answer in hours upto two digits after the decimal point).

12. A particle of mass m is moving in a circular orbit given by $x = R\cos(\omega t)$; $y = R\sin(\omega t)$, as observed in an inertial frame S_1. Another inertial frame S_2 moves with uniform velocity $\vec{v} = \omega R\hat{i}$ with respect to S_1. S_1 and S_2 are related by Galilean transformation, such that the origins coincide at t = 0. The magnitude of the angular momentum of the particle at $t=\frac{2\pi}{\omega}$, as observed in S_2 about its origin, is expressed as $(mR^2\omega)x$. Then x is _______________ (Specify your answer upto two digits after the decimal point).

13. Rod R_1 has a rest length 1 m and rod R_2 has as rest length of 2m. R_1 and R_2 are moving with respect to the laboratory frame with velocities $+v\hat{i}$ and $-v\hat{i}$, respectively. If R_2 has a length of 1m in the rest frame of R_1, $\frac{v}{c}$ is given by ____________
(Specify your answer upto two digits after the decimal point)

14. The moon moves around the earth in a circular orbit with a period of 27 days. The radius of the earth (R) is 6.4×10^6m and the acceleration due to gravity on the earth surface is 9.8 ms^{-2}. If D is the distance of the moon from the centre of the earth, the value of D/R will be __________
(Specify your answer upto one digit after the decimal point).

15. In the following circuit, the time constant RC is much greater than the period of the input signal. Assume diode as ideal and resistance R to be large. The dc output voltage across resistance R will be ____________V.
(Specify your answer in volts upto one digit after the decimal point)



16. A syringe is used to exert 1.5 atmospheric pressure to release water horizontally. The speed of water immediately after ejection is _______________. (take 1 atmospheric pressure = 10^5 Pascal, density of water = 10^3 kg m^{-3})

17. For a metal, the electron density is 6.4×10^{28} m^{-3}. The Fermi energy is _____________eV.
$\left(h = 6.626\times10^{-34}\ Js, m_e = 9.11\times10^{-31}\ kg, 1eV = 1.6\times10^{-19}\ J\right)$
(Specify your answer in electron volts (eV) upto one digit after the decimal point)

18. Two events E_1 and E_2 take place in an inertial frame S with respective time-space coordinates (in SI units) : $E_1\left(t_1 = 0.\vec{r}_1 = 0\right)$ and $E_2\left(t_2 = 0, x_2 = 10^8, y_2 = 0, z_2 = 0\right)$. Another inertial frame S' is moving with respect to S with a velocity $\vec{v} = 0.8c\hat{i}$. The time difference $\left(t'_2 - t'_1\right)$ as observed in S' is _________________s. $\left(c = 3\times10^8\ ms^{-1}\right)$
(Specify your answers upto two digits after the decimal point)

19. Consider a slit of wdith 18 μm which is being illuminated simultaneously with light of organe colour (wavelength 600 nm) and of blue color (wavelength 450 nm). The diffraction pattern is observed on a screen kept at a distance in front of the slit. The smallest angle at which only the orange color is observed is θ_1 and the smallest angle at which only the blue color is observed is θ_2. The angular difference $\theta_2 - \theta_1$ (in degrees) is ________________
(Specify your answers upto two digits after the decimal point)

20. For the following circuit, the collector voltage with respect to ground will be ________V. (Emitter diode voltage is 0.7V and β_{DC} of the transistor is large)
(Specifcy your answer in volts upto one digit after the decimal point)