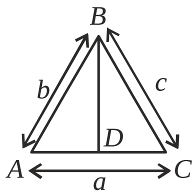
Q.1-Q. 5 carry ONE mark each.

1. Which one of the following options is the closest in meaning to the word given below?
Abrogate
(a) Freedom (b) abolish (c) begin (d) coercion

2. Choose the most appropriate word from the options given below to complete the following sentence.
Prior to liberalization _______ computer industries, the Indian Government's policy was on self reliance through import substitution.
(a) Of (b) At (c) In (d) None of the above

3. Find the missing sequence in the letter series below:
A, CD, GHI, ?, UVWXY
(a) LMN (b) MNO (c) MNOP (d) NOPQ

4. In a triangle ABC, BD is bisector of $\angle ABC$ and $\angle DBC = 60^\circ$. What is the length of BD?



(a) $\frac{c+b}{cb}$ (b) $\frac{cb}{b+c}$ (c) $\sqrt{c^2+b^2}$ (d) $\frac{(b+c)^2}{bc}$

5. X is 1 km northeast of Y. Y is the 1km southest of Z. W is 1 km west of Z. P is 1km south of W. Q is 1km east of P. What is the distance between X and Q in km?
(a) 2 (b) 1 (c) $\sqrt{3}$ (d) $\sqrt{2}$

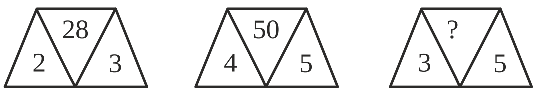
Q.6-Q. 10 carry TWO marks each.

6. The study and collection of coins, bank notes and medals is called
(a) philately (b) numismatics (c) connoisseur (d) pedagogy

7. Which of the following options is the closest in meaning to the word below- "Circuitous"
(a) Cyclic (b) Indirect (c) Confusing (d) Crooked

8. A reduction of 21% in the price of wheat enables a person to buy 10.5 kg. more for Rs. 100. What is the reduced price per kg?
(a) Rs. 2 (b) Rs. 2.25 (c) Rs. 2.30 (d) Rs. 2.50

9. Find the missing number:



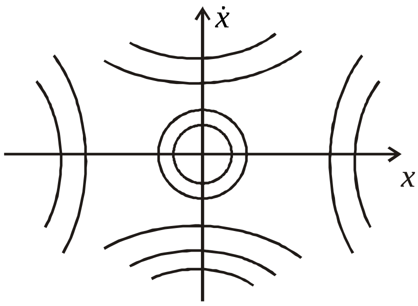
(a) 35 (b) 40 (c) 49 (d) 53

10. In a group of 15 people, 7 read French, 8 read english while 3 of them read none of these two. How many of them read French and english both?
(a) 0 (b) 3 (c) 4 (d) 5

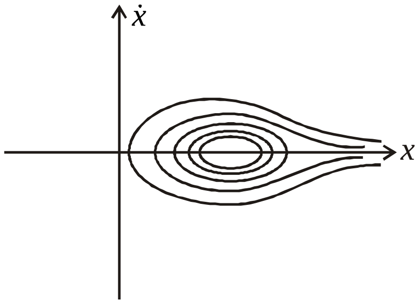
Q.11-Q.35 carry one mark each.

11. Which of the following phase space plots is correct for the potential $U(x) = -\frac{1}{3}x^3$?

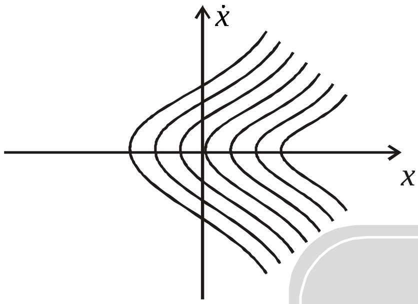
(a)



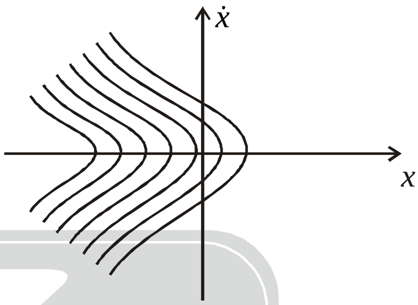
(b)



(c)



(d)



12. A particle moves relative to O' with a constant velocity of $\frac{c}{2}$ in the $x'y'$-plane such that its trajectory makes an angle of 60° with the x'-axis. If the velocity of O' with respect to O is 0.6c along the x–x' axis, the equations of motion of the particle as determined by O are

(a) $x = 0.74ct,\ y = 0.30ct$ (b) $x = 0.60ct,\ y = 0.70ct$

(c) $x = 0.37ct,\ y = 0.15ct$ (d) $x = 0.90ct,\ y = 0.45ct$

13. Consider two ultra-high speed drag racers. One drag racer has a red stripe on the side and overtaken the other drag racer at a relative speed of $\sqrt{3}c/2$. If the red stripe has wavelength 635 nm, then the wavelength of the stripe as observed by the other drag racer is _____ nm. (correct up to one decimal places)

14. The moment of inertia of a uniform elliptical plate of mass 4 units having semi-major axis 5 units and semi-minor axis 1 unit, about an axis passing through its centre of mass and perpendicular to its plane is _____________ units.

15. Light of wavelength 4300Å is incident on a nickel surface of work function 5 electron volts and a potassium surface work function 2.3 electron volts. If the electron will be emitted, then max velocity of Ni and K is

(a) 0, 1.423×10^5 m/s (b) 3.2×10^5 m/s, 0

(c) 3.2×10^5 m/s, 1.423×10^5 m/s (d) In both cases electron will not be emitted.

16. If 15 electron in system of P.E. $V(x,y)$, where $V(x,y) = \frac{1}{2}mw^2\left(x^2+y^2\right)$. The degeneracy of most energetic electron is __________________

17. Consider a system of two ising spin S_1 and S_2 taking value ±1 with interaction energy, $\in = -JS_1S_2$ in thermal equilibrium at temperature T. The number of configurations corresponding to ground state energy of the system is _____________.

18. For vaporization among the following which option is correct?
(a) Entropy and specific heat at constant pressure are discontinuous at transition point.
(b) Entropy and isothermal compressibility are discontinuous at transition point.
(c) Entropy, specific heat at constant and isothermal compressibility are discontinuous at transition point.
(d) Specific heat at constant pressure, isothermal compressibility and coefficient of volume expansion at constant pressure all are infinite at transition point.

19. For case of $n=2,\ \ell=1,\ m=0$ the value of r at which the radial probability density of the hydrogen atom reaches its maximum is _____ a_0. $\left(\text{Given } R_{2},(r)=\frac{1}{\left(2\sqrt{6}\,a_0^{5/2}\right)}re^{-r/2a_0}\right)$

20. Consider a particle of mass m, moving in one-dimension whose wavefunction is given as following:

$$\psi(x)=\begin{cases}2\alpha^{3/2}xe^{-\alpha x} & \text{for } x>0\\ 0 & \text{for } x<0\end{cases}$$

The most probable position of the particle will be

(a) α (b) $\frac{1}{\alpha}$ (c) $\frac{1}{\sqrt{\alpha}}$ (d) 0

21. Let P be an n×n matrix with integral entries and $Q=P+\frac{1}{2}I$, where I denotes the $n\times n$ identity matrix, then Q is
(a) idempotent (b) invertiple (c) nilpotent (d) unipotent

22. In the Laurent series expansion of $f(t)=\frac{1}{z-1}-\frac{1}{z-2}$ valid in the region $z>2$, the coefficient of $\frac{1}{z^2}$ is _________________(answer should be integer).

23. Consider a parallel plate capacitor of capacitance C. If a very thin conducting plated is inserted parallely in halfway between the plates, then the capacitance will be

(a) $2C$ (b) $\frac{C}{2}$ (c) C (d) zero

24. A thin circular disc of radius a having surface charge density σ on it. If $V(x)$ is the electrostatic potential at an axial point P at a distance x from the centre of the disc, then the value of $\left.\frac{d^2V(x)}{dx^2}\right|_{x=0}$ is

(a) $\frac{\sigma}{2\varepsilon_0 a}$ (b) $\frac{\sigma}{2\varepsilon_0}$ (c) $-\frac{\sigma}{2\varepsilon_0}$ (d) infinity

25. Which of the following nuclear reactions is not forbidden?

(a) $\Sigma^+ + n\to\Sigma^- + p$ (b) $\pi^+ + n\to k^+ + k^+$

(c) $\Lambda^0\to p+e^- +\overline{v}_e$ (d) $\mu^-\to e^- +\overline{v}_e+\overline{v}_\mu$

26. A pion decays from rest to give a muon of 3.57 MeV energy in a reaction, $\pi^+\to\mu^+ + v_\mu$. The kinetic energy of the associated neutrino is ___________MeV (upto two decimal places)

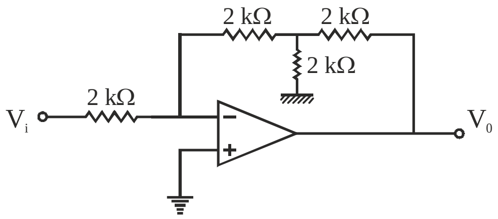
[Given : $m_{\pi^+}=273\,m_e, m_{\mu^+}=207\,m_e$ and $m_e=0.51\,MeV/c^2$]

27. A positive point charged particle moves with uniform velocity $\bar{v} = 4\hat{i}\ m/\sec$ in a region where $\vec{E} = 20\ \hat{j}\ V/m$ and $\vec{B} = B_0\hat{k}\ Wb/m^2$. The value of B_0 for which the velocity of the particle remains constant is _______________ Wb/m^2 (answer should be an integer).

28. A uniform charged sphere of radius a and carrying the charge density ρ and spinning at a constant angular velocity ω about *z*-axis. The current density at any point (r, θ, ϕ) inside the sphere is given by

(a) $\rho\omega r\hat{\phi}$ (b) $\rho\omega r\sin\theta\hat{\phi}$ (c) $\rho\omega r\cos\theta\hat{\phi}$ (d) $\rho\omega\cos\theta\hat{\phi}$

29. The gain of the circuit is _________________ (upto first decimal places)



30. In a 4-bit D/A converter the full scale output voltage is 5V. Its resolution is approximately

(a) 0.3 V (b) 1.25 V (c) 0.5 V (d) 2.5 V

31. In carbon atoms which of the following terms will have minimum energy

(a) ${}^1D_2$ (b) ${}^3P_2$ (c) ${}^3P_0$ (d) ${}^1S_0$

32. Which of the following molecule is rotational, vibrational, Raman and NMR active?

(a) ${}^{12}C{-}{}^{16}O$ (b) ${}^1H{-}{}^1H$ (c) ${}^1H{-}{}^{35}Cl$ (d) ${}^6C{-}{}^{16}N$

33. A two-dimensional lattice has basis vectors, $a = 2\hat{i}$ and $b = \hat{i} + 2\hat{j}$. The basis vectors of the receiprocal lattice

(a) $a^* = \pi\hat{i} - \frac{\pi}{2}\hat{j}$ and $b^* = \pi\hat{j}$ (b) $a^* = \pi\hat{i} + \frac{\pi}{2}\hat{j}$ and $b^* = \pi\hat{j}$

(c) $a^* = \pi\hat{i} - \frac{\pi}{2}\hat{j}$ and $b^* = -\pi\hat{j}$ (d) $a^* = \pi\hat{i} + \frac{\pi}{2}\hat{j}$ and $b^* = \frac{\pi}{2}\hat{j}$

34. According Josephson effect if we applied a static potential V_0 across the junction it leads to production of alterneting current. If the value of V_0 is 10 mvolt. The frequency of the current will be ______________ $\times 10^{12}$ Hz (answer should be upto second decimal place)

35. The length element *ds* of an arc is given by

$$(ds)^2 = 3(dx^1)^2 + (dx^2)^2 + \sqrt{5}(dx^1)(dx^2)$$

The metric tensor g_{ij} is

(a) $\begin{bmatrix} 3 & \sqrt{5} \\ \sqrt{5} & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 3 & \sqrt{5/4} \\ \sqrt{5/4} & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 3 & 0 \\ 0 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 3 & \sqrt{5/2} \\ \sqrt{5/2} & 1 \end{bmatrix}$

Q.36-Q.65 carry TWO marks each.

36. The Lagrangian of a system is given by

$$L=\frac{m}{2}\left(\dot{r}^2+4c^2r^2\dot{r}^2+r^2\omega^2\right)-mgcr^2$$

Where c, ω, m, g are constants. The equation of motion of the system is

(a) $\ddot{r}-\dot{r}^2\left(4c^2r\right)+r\left(2gc-\omega^2\right)=0$
(b) $\ddot{r}\left(1+4c^2r^2\right)-\dot{r}^2\left(4c^2r\right)+r\left(2gc-\omega^2\right)=0$
(c) $\ddot{r}\left(1+4c^2r^2\right)+\dot{r}^2\left(4c^2r\right)+r\left(2gc-\omega^2\right)=0$
(d) $\ddot{r}+\dot{r}^2\left(4c^2r\right)+r\left(2gc-\omega^2\right)=0$

37. A particle of mass m moves in one dimension under the influence of a force, $F(x,t)=\frac{k}{x^2}e^{-(t/\tau)}$

Where k and τ are positive constants. Then

(a) Hamiltonian is not equal to the total energy and the total energy is not conserved.
(b) Hamiltonian is equal to the total energy and the total energy is not conserved.
(c) Hamiltonian is equal to the total energy and the total energy is conserved.
(d) Hamiltonian is not equal to the total energy and the total energy is conserved.

38. A particle (mass m = 2 kg) at rest is attracted toward a center of force $F=-\frac{mk^2}{x^3}$, where $k=1\,\text{m}^2\text{s}^{-1}$. The time required to reach the force center from a distance 4 m is _______________ *s*.

39. Spacecraft A is moving at 0.90*c* with respect to the earth. If another spacecraft B is to pass A at a relative speed of 0.50*c* in the same direction, then the speed B must have (in units of *c*) with respect to the earth is _____________ *c* (up to two decimal places).

40. In a one dimentional potential box of potential energy

$$V(x)=\begin{cases}0 & -\frac{a}{4}<x<\frac{3a}{4}\\ \infty & \text{otherwise}\end{cases}$$

If its energy is $\frac{2\pi^2\hbar^2}{ma^2}$ exist. Then the correct statement is

(a) $\langle x\rangle=0,\langle p\rangle=0$
(b) $\langle x\rangle=\frac{a}{2},\langle p\rangle=0$
(c) $\langle x\rangle=\frac{a}{4},\langle p\rangle=0$
(d) none of these

41. A particle is described by a wavefunction

$$\psi(x,\phi)=A\,e^{-r^2/2\Delta^2}\left(\frac{r}{\Delta}\cos\phi+\sin\phi\right)$$

If L_z is measured with result $-\hbar$, then the corresponding probability is ___________________

42. The Yukawa potential, $V(r)=g\frac{e^{-\mu_r r}}{r}$ with total energy E, where $g=ze^2$ at $\theta=\frac{\pi}{2}$ and $\mu_0=0$. The differential scattering cross-section _______________________ $\frac{\left(ze^2\right)^2}{\left(16E^2\right)}$.

43. For a particle of mass m moving in the potential $V(x)=\frac{1}{2}m\omega^2x^2$, a small perturbation only for positive x, $H_p=\lambda x$ is applied with $\lambda>0$ constant. The first order correction to ground state energy is

(a) 0 (b) $\frac{\lambda}{2}\left(\frac{\hbar}{m\omega}\right)^{1/2}$ (c) $\frac{\lambda}{2}\left(\frac{\hbar}{\pi m\omega}\right)^{1/2}$ (d) $\lambda\left(\frac{\hbar}{m\omega}\right)^{1/2}$

44. A spin state precesses in a magnetic field same way as the classical magnetic dipole precesses in magnetic field with lasmor frequency given by $\omega_L=-\gamma\vec{B}$. consider the Hamiltonian $\left(\gamma=g\frac{e}{2m}\right)$

$$\hat{H}=\frac{1}{2}\hbar\omega_0\begin{pmatrix}4 & 2+i\\ 2-i & 0\end{pmatrix}$$

Calculate $|\vec{\omega}_L|$ of the larmor frequency

(a) ω_0 (b) 0 (c) $2\omega_0$ (d) $3\omega_0$

45. Two identical bodies have internal energy $U = NCT$, with a constant C. The values of N and C are same for each body. The initial temperatures of the bodies are T_1 and T_2, and they are used a source of work by connecting them to a Carnot heat engine and bringing them to a common final temperature T_f. The work delivered is

(a) $W=NC(T_1+T_2)^2$ (b) $W=NC(T_1-T_2)^2$

(c) $W=NC\left(\sqrt{T_1}-\sqrt{T_2}\right)^2$ (d) 0

46. The thermodynamics of a classical paramagnetic system are expressed by the variables: magnetization M, magnetic field B, and absolute temperature T. The equation of state is $M=\frac{CB}{T}$, where C = Curie constant.

The system's internal energy is:
U = -MB
The increment of the work done by the system upon the external environment is
$dW = MdB$. The entropy of the system is given by

(a) $S=S_0-\frac{M^2}{2C}$ (b) $S=S_0-\frac{M}{C}$ (c) $S=S_0-2MC$ (d) $S=S_0$

47. Two thermally isolated identical systems have heat capacities which vary as $C_V=\beta T^3$ (where $\beta>0$). Initially one system is at 300K and the other at 400 K. The systems are then brought into thermal contact and the combined system is allowed to reach thermal equilibrium. The final temperature of the combined system is __________________K.

48. The entropy of a gas containing N particles enclosed in a volume V is given by $S = Nk_B \ln\left(\frac{aVE^{3/2}}{N^{5/2}}\right)$, where E is the total energy, a is constant and k_B is Boltzmann constant. The chemical potential μ of the system at a temperature T is

(a) $\mu = -k_B T\left[\ln\left(\frac{aVE^{3/2}}{N^{5/2}}\right)\right]$ (b) $\mu = -k_B T\left[\ln\left(\frac{aVE^{3/2}}{N^{5/2}}\right) - \frac{5}{2}\right]$

(c) $\mu = k_B T\left[\ln\left(\frac{aVE^{3/2}}{N^{5/2}}\right) + \frac{5}{2}\right]$ (d) $\mu = k_B T\left[\ln\left(\frac{aVE^{3/2}}{N^{5/2}}\right)\right]$

49. A 100 ohm resistor is held at a constant temperature of 300K. A current of 10 amperes is passed through the resistor for 300 sec. The change in entropy of the resistor is ________________(J/K).

50. If $y = \phi(x)$ is a particular solution of $y'' + \sin x(y') + 2y = e^x$ and $y = \psi(x)$ is a particular solution of $y'' + \sin x(y') + 2y = \cos 2x$ then a particular solution of $y'' + \sin x(y') + 2y = e^x + 2\sin^2 x$ is given by

(a) $\phi(x) - \psi(x) + \frac{1}{2}$ (b) $\psi(x) - \phi(x) + \frac{1}{2}$ (c) $\phi(x) - \psi(x) + 1$ (d) $\psi(x) - \phi(x) + 1$

51. If $Y(p)$ is the laplace transform of $y(t)$, which is the solution of the initial value problem

$$\frac{d^2y}{dt^2} + y(t) = \begin{cases} 0 & 0 < t < 2\pi \\ \sin t & t > 2\pi \end{cases}$$

which $y(0) = 1$ and $y'(0) = 0$ the $Y(p)$ equals

(a) $\frac{p}{1+p^2} + \frac{e^{-2\pi p}}{(1+p^2)^{3/2}}$ (b) $\frac{p+1}{1+p^2}$ (c) $\frac{p}{1+p^2} + \frac{e^{-2p\pi}}{(1+p^2)}$ (d) $\frac{p(1+p^2)+1}{(1+p^2)^2}$

52. Let A_1, A_2 ....A_n be n independent events which the probability of occurence of the event A_i given by $P(A_i) = 1 - \frac{1}{\alpha^i}, \alpha > 1,\ i = 1, 2, \ldots\ldots n$ then the probability that at least one the event occurs is

(a) $1 - \frac{1}{\alpha^{\frac{n(n+1)}{2}}}$ (b) $\frac{1}{\alpha^{\frac{n(n+1)}{2}}}$ (c) $\frac{1}{\alpha^n}$ (d) $\left(1 - \frac{1}{\alpha^n}\right)$

53. Suppose a charge Q is distributed within a sphere of radius R in such a way that the charge density $\rho(r)$ at a distance r from the center is

$$\rho(r) = \begin{cases} \frac{3Q}{\pi R^4}(R - r) & \text{for } 0 < r < R \\ 0 & \text{for } r > R \end{cases}$$

The value of maximum electric field due to this charge distribution is

(a) $\frac{Q}{4\pi\varepsilon_0 R^2}$ (b) $\frac{Q}{3\pi\varepsilon_0 R^2}$ (c) $\frac{Q}{2\pi\varepsilon_0 R^2}$ (d) $\frac{Q}{\pi\varepsilon_0 R^2}$

54. The quardrupole moment for the ground state of ${}_{8}O^{17}$ as given by single particle shell model is __________barn. (upto three decimal places) [Given : Radius $R = R_0 A^{1/3}$ where $R_0 = 1.2$ fermi]

55. The binding energy of a nucleus with atomic number z and atomic mass number A is given by semi-empirical mass formula

$$B(z,A) = aA - bA^{2/3} - \frac{c(A-2z)^2}{A} - d\frac{z^2}{A^{1/3}} - \frac{\delta}{A^{1/2}}$$

where, a = 15.8 MeV, b = 18.3 MeV, c = 23.2 MeV, d = 0.7 MeV and $\delta = (+11.2, 0, -11.2)$ MeV for nuclei which are (odd-odd, odd-even, even-even). If we consider all possible isobars of mass number 216, the most stable nuclei is

(a) ${}^{216}_{82}Pb$ (b) ${}^{216}_{87}Fr$ (c) ${}^{216}_{85}At$ (d) ${}^{216}_{86}Rn$

56. Suppose a plane EM-wave with electric field

$$\vec{E} = \hat{x}10\cos(kz - \omega t)Vm^{-1}$$

is incident from air on a dielelectric occupying the region $z \geq 0$. Assuming that the permitivity of the medium is $4\varepsilon_0$ and permeability μ_0 the electric field of the reflected waves can be written as

(a) $\vec{E} = \hat{x}\frac{10}{3}\cos(kz - \omega t)$ (b) $\vec{E} = -\hat{x}\frac{10}{3}\cos(kz + \omega t)$

(c) $\vec{E} = -\hat{x}\frac{10}{3}\cos(kz - \omega t)$ (d) $\vec{E} = \hat{x}\frac{20}{3}\cos(kz - \omega t)$

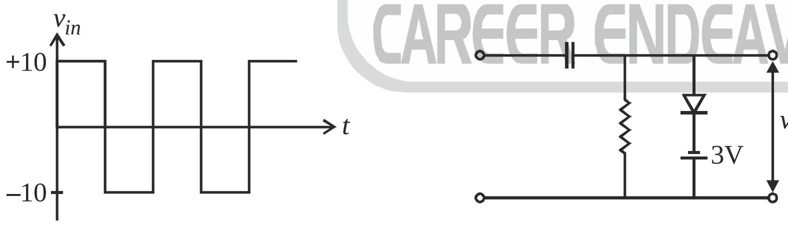
57. Consider a dielectric-conductor interface at z = 0. The magnetic field in the dielectric $z \leq 0$ is given by $\vec{H} = \hat{y}H_1 \cos kz \cos \omega t$, then the surface current density is given by

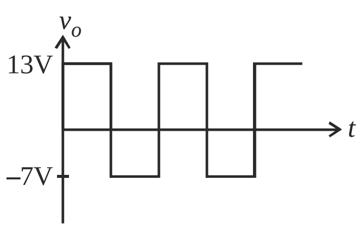
(a) $\hat{x}H_1 \sin \omega t$ (b) $\hat{x}H_1 \cos \omega t$ (c) $\hat{y}H_1 \sin \omega t$ (d) $\hat{y}\cos \omega t$

58. Which of the following CANNOT BE the imaginary part of a complex analytic function $f(z)$?

(a) $x^2 - y^2$ (b) $x^3 - 3xy^2$ (c) $x^3 - 3xy^2 + x$ (d) $x^2 - 2y^2$

59. The output of the given circuit is (assume that the diode is ideal)



(a)


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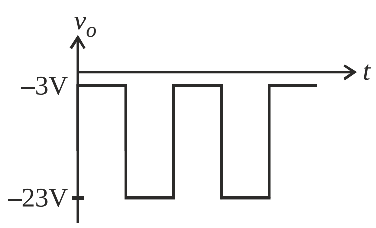
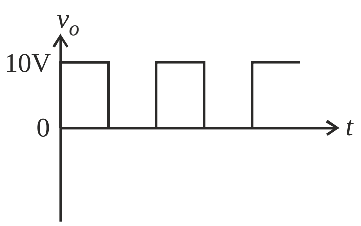
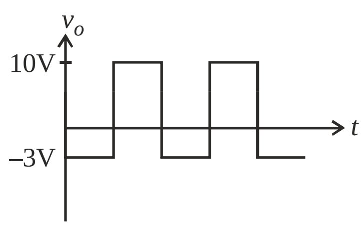
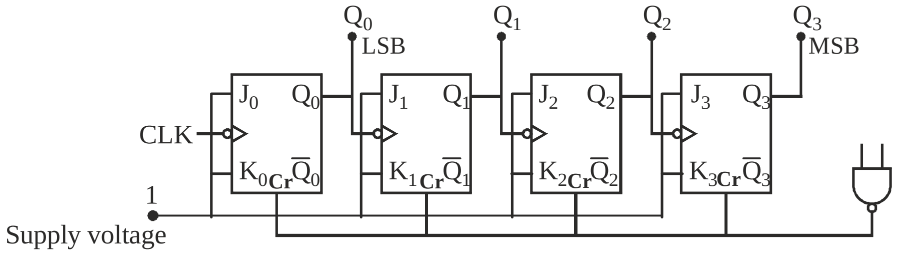


(c)


(d)


60. If the given circuit behave like mod-10 counter the inputs of NAND gate will be



(a) Q_0 and Q_3 (b) Q_1 and Q_3 (c) Q_2 and Q_3 (d) Q_0 and Q_1

61. The transition J = 3 to J = 4 in HCl molecule is associated with radiation of 83.03 cm^{-1}. The rotational constant is

(a) 7.65 cm^{-1} (b) 9.38 cm^{-1} (c) 10.38 cm^{-1} (d) 19.82 cm^{-1}

62. In normal Zeeman effectm the number of spectral lines will be observed in the transition $\left({}^3D_2 \rightarrow {}^3P_1\right)$ ____________________ (answer should be integer)

63. Assume that E vs k relatinoship for electron in the conduction band of a hypothetical tetravalent n-type semiconductor can be approximated by

$$E = ak^2 + \text{constant}$$

The cyclotron resonance for electrons in a field B = 0.1 Wb/m^2 occurs at an angular rotation frequency $\omega_c = 1.8 \times 10^{11}\ rad\ s^{-1}$. The value of a is ________________ 10^{-38} Jm^2 (upto first decimal place)

64. The Drude-Lorentz formula for the dielectric constant of a solid is

$$\varepsilon(\omega) = 1 + \frac{\omega_p^2}{\left(\omega_0^2 - \omega^2\right) - i\omega\tau^{-1}}$$

Here ω_p is the plasma frequency, ω_0 is the energy gap for interband transitions and τ is the scattering time of the electron. At room temperature the value of τ of copper is 10^{-14} sec. The value of plasma frequency ω_p is

(a) $1.2 \times 10^{16}\ Hz$ (b) $1.6 \times 10^{16}\ Hz$ (c) $2 \times 10^{16}\ Hz$ (d) $2.4 \times 10^{16}\ Hz$

65. The compound NaCl has lattice with density 3.0 g/cm^3. Na and Cl have molar mass of 23 and 35.4 respectively. If x-rays of wavelength $\lambda = 2.52$Å is used to study the crystal structure. The first peak will be observed at Bragg's angle (θ_B):

(a) 14.5° (b) 30° (c) 25.7° (d) 51.4°

Space for rough work

PHYSICS-PH

Date: 14-01-2018

GATE TEST SERIES-B

ANSWER KEY

1. (b)	**2.** (a)	**3.** (c)	**4.** (b)
5. (c)	**6.** (b)	**7.** (b)	**8.** (a)
9. (b)	**10.** (b)	**11.** (c)	**12.** (a)
13. (317.5 to 317.9)	**14.** (26)	**15.** (a)	**16.** (4)
17. (2)	**18.** (d)	**19.** (4)	**20.** (b)
21. (c)	**22.** (-1)	**23.** (c)	**24.** (d)
25. (c)	**26.** (30.0 to 30.1)	**27.** (5)	**28.** (b)
29. (-1.5)	**30.** (a)	**31.** (c)	**32.** (c)
33. (a)	**34.** (4.8 to 4.89)	**35.** (b)	**36.** (c)
37. (b)	**38.** (16)	**39.** (0.96 to 0.98)	
40. (c)	**41.** (0.5)	**42.** (0.5)	**43.** (c)
44. (d)	**45.** (c)	**46.** (a)	**47.** (**360.00 to 360.30**)
48. (b)	**49.** (0)	**50.** (a)	**51.** (a)
52. (a)	**53.** (b)	**54.** (0.031 to 0.034)	**55.** (c)
56. (b)	**57.** (b)	**58.** (d)	**59.** (b)
60. (b)	**61.** (c)	**62.** (3)	**63.** (6.2)
64. (b)	**65.** (c)		