COMMON P. G. ENTRANCE TEST – 2024 (CPET-2024)

Test Booklet No. : 03878

Subject Code : 34

Hall Ticket No. :

Subject : PHYSICS

TEST BOOKLET

*Time Allowed : **60** Minutes*

*Full Marks : **80***

: INSTRUCTIONS TO CANDIDATES :

1. The Test Booklet contains **23** pages including the cover page and **80** (Question No. 1 to 80) multiple choice questions.
2. DO NOT break open the seal of the Test Booklet until the invigilator instructs to do so.
3. The candidates must check discrepancy, if any (like up-printed or torn or missing pages or missing questions) in the Test Booklet immediately after breaking the seal of the Test Booklet. If detected, the invigilator may be requested to replace the same.
4. Candidates are required to fill up and darken the **Hall Ticket No, Test Booklet Serial No.** and OMR Answer Sheet Serial No. in attendance sheet carefully. Wrongly filled in OMR Answer Sheet is liable for rejection.
5. Each question has four choices / answers marked (A), (B), (C), (D). Candidate has to select the most appropriate choice / answer to each question and darken the oval completely against the question number provided in the OMR Answer Sheet.
6. Indicate only one choice / answer from the options provided by darkening the appropriate oval in the OMR Answer Sheet. More than one response to a question shall be treated as a wrong answer.
7. Use only **Black Ball Point Pen** for darkening the oval for answering.
8. All the questions are compulsory and they carry equal marks. The total marks scored by a candidate depends on the number of correct choices / answers darkened in the OMR Answer Sheet. There will be no negative marking for wrong answers.
9. No candidate shall be allowed to leave the Examination Hall / Room till all OMR Answer Sheets have been collected by the invigilator.
10. On completion of the entrance test, the original OMR Answer Sheet be handed over to the invigilator. Candidates are allowed to take the second copy of the OMR Answer Sheet along with the used Test Booklet for reference.
11. Candidates are not allowed to carry any personal belongings including electronic devices such as scientific calculator, cell phones, headphones, earbuds, or any other type of devices that allow communication of any kind inside the Examination Room / Hall.
12. The candidates are advised not to scribble or make any mark on the OMR Answer Sheet except marking the answers at the appropriate places and filling up the details required. Rough work, if any, may be done in the blank sheet(s) provided at the end of the Test Booklet.
13. Any malpractice / use of unfair means will lead to your disqualification from the entrance test / admission process and may also lead to appropriate legal action as deemed fit.

SEAL

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(Turn over)

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1. The number of terms in the Legendre polynomial $P_{37}(x)$ is :

(A) 19

(B) 18

(C) 20

(D) 17

2. According to Bohr's theory of hydrogen atom, the energy difference between two adjacent energy levels :

(A) Increases as one moves to higher energy states

(B) Decreases as one moves to higher energy states

(C) Remains the same for all the states

(D) Is proportional to the difference between the principal quantum numbers of the two states

3. Which of the following is true for a transistor amplifier in the CB configuration ?

(A) The output resistance is very small

(B) The input resistance is very large

(C) The phase difference between the input voltage and the output voltage is $\pi/2$

(D) The input voltage and the output voltage are in phase

4. An ideal, coaxial optical system is in air. Which of the following is true ?

(A) The principal points coincide with the focal points

(B) The nodal planes are coincident with the focal planes

(C) The distance between the nodal points is equal to the distance between the principal points

(D) The distance between the focal points is equal to the distance between the nodal points

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5. An isolated, homogeneous, solid sphere rotates with a constant angular speed about a fixed axis passing through its centre. Suppose the sphere shrinks so that its diameter reduces to half of its initial value. The rotational kinetic energy of the sphere :

(A) Remains unchanged

(B) Becomes double of its initial value

(C) Becomes four times its initial value

(D) Becomes half of its initial value

6. In the binomial expansion of $(3 + 2x)^{50}$, with $x = 1/5$, the largest term is the :

(A) 25th term

(B) 24th term

(C) 6th term

(D) 8th term

7. In a propagating electromagnetic wave, the dimension of the Poynting vector is the same as the dimension of :

(A) Energy

(B) Energy per unit time

(C) Power per unit time

(D) Power per unit area

8. In the vibration of a diatomic linear chain of atoms, the optical mode corresponds to :

(A) The motion of the two types of atoms opposite to each other, with the lighter atoms having greater amplitude

(B) The motion of the two types of atoms opposite to each other, with the heavier atoms having greater amplitude

(C) The motion of both types of atoms in the same direction

(D) The identical vibration of both types of atoms when light of high intensity is incident on the linear chain

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9. In a real gas, with the van der Waals constants 'a' and 'b'. The Boyle temperature is :

(A) $\frac{a}{bR}$

(B) $\frac{2a}{27bR}$

(C) $\frac{Ra^2}{3b}$

(D) $\frac{a}{3bR}$

10. In the Compton scattering of photons by electrons, the Compton shift of wavelength is equal to the Compton wavelength of electron when the scattering angle θ is equal to :

(A) Zero

(B) π

(C) $\frac{\pi}{2}$

(D) 2π

11. A point, positive electric charge Q is placed in air at the body centre of a cube of side L. The electric flux over any face of the cube is equal to :

(A) $\frac{\epsilon_0 Q}{L}$

(B) $\frac{\epsilon_0 Q}{6L^2}$

(C) $\frac{Q}{6\epsilon_0}$

(D) $\frac{QL^2}{\epsilon_0}$

12. Which of the following is the correct statement of the Carnot's theorem ?

(A) The entire heat energy received by a heat engine cannot be converted to mechanical energy.

(B) All reversible heat engines, operating between the same two temperature limits have the same efficiency.

(C) When an ideal gas undergoes a reversible cyclic process, the net change in its internal energy is zero.

(D) A heat engine, unaided by any external agency, cannot transfer heat from a body at a lower temperature to a body at a higher temperature.

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13. The Fourier transform of the Dirac delta function $\delta(x)$ is :

(A) Proportional to $\frac{1}{\sqrt{x}}$

(B) Proportional to $\frac{1}{x}$

(C) Independent of x

(D) Proportional to $|x|$

14. The commutator $\left[x, \frac{d}{dx}\right]$ is equal to :

(A) $i\hbar$ (B) $-i\hbar$

(C) 1 (D) -1

15. A capacitor is connected in the feedback path of an operational amplifier circuit. The resulting circuit can act as :

(A) a divider (B) a differentiator

(C) a subtractor (D) an integrator

16. The Lissajous figure., formed by the superposition of two orthogonal simple harmonic motions in the frequency ratio 2 : 1, has the shape of the figure 8 (eight). The phase difference between the two orthogonal simple harmonic motions is :

(A) Zero. (B) 60°

(C) 45° (D) 90°

17. The relation among the Young's modulus (Y), Bulk modulus (B) and the Rigidity modulus (η) of a homogeneous, isotropic solid is :

(A) $\frac{3}{\eta}+\frac{1}{B}=\frac{9}{Y}$ (B) $\frac{Y}{3}+\frac{B}{2}=-\sqrt{3}\eta$

(C) $3B(1-2\eta)=Y$ (D) $\frac{3}{B}-\frac{9}{\eta}=\frac{2}{Y}$

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18. Which of the following corresponds to the Maxwell's electromagnetic equation

$$\vec{\nabla} \times \vec{B} = \epsilon_0 \mu_0 \frac{\partial \vec{E}}{\partial t} + \mu_0 \vec{J} \; ?$$

(The symbols carry their usual meaning)

(A) Ampere's circuital law with Maxwell's modification

(B) Biot-Savart law

(C) Faraday's law of electromagnetic induction

(D) Maxwell's law of magnetic flux

19. The residue of $f(z) = \dfrac{z^3}{(z-2)(z-3)(z-1)^4}$ at $z = 3$ is :

(A) Zero

(B) $-\dfrac{8}{27}$

(C) $\dfrac{27}{16}$

(D) $\dfrac{4}{7}$

20. Magnetic hysteresis can occur in :

(A) Diamagnetic materials

(B) Paramagnetic materials

(C) Ferromagnetic materials

(D) Non-magnetic materials with high electrical conductivity

21. For a thermodynamic system, the relation between entropy(S) and the thermodynamic probability (W) is :

(A) $S = e^{-kW}$

(B) $S = ke^{\frac{1}{W}}$

(C) $S = \dfrac{1}{k} \ln W$

(D) $S = k \ln W$

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22. In the Stern-Gerlach experiment, a beam of silver atoms is passed through :

(A) A strong uniform electric field

(B) A strong uniform magnetic field

(C) A non-uniform electric field

(D) A non-uniform magnetic field

23. Which of the following represents the Hermite polynomial $H_5(x)$?

(A) $32x^5 + 94x^4 - 12x^3 - 48x$

(B) $32x^5 - 160x^3 + 120x$

(C) $32x^5 - 216x^3 - 84x$

(D) $32x^5 + 216x^4 - 12x^2 - 68$

24. Which of the following network theorems is the dual of Norton's theorem ?

(A) Reciprocity theorem

(B) Superposition theorem

(C) Maximum power transfer theorem

(D) Thevenin's theorem

25. A thermodynamic system undergoes an adiabatic process. In the temperature (T) versus entropy (S) diagram, the process is represented by :

(A) A straight line parallel to the T-axis

(B) A straight line parallel to the S-axis

(C) A straight line making angle 45° with the S-axis

(D) A parabolic arc

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26. In a bcc crystal, the structure factor for reflection from (111) plane is :

(A) 4f

(B) Zero

(C) 2f

(D) f

(Here, f is the atomic form factor)

27. If the vector $\hat{r}\, f(r)$ is solenoidal, then f(r) is proportional to :

(A) r

(B) r^2

(C) $\frac{1}{r}$

(D) $\frac{1}{r^2}$

28. For a quantum system, the equation satisfied by the probability density and the probability current density is called :

(A) Heisenberg's uncertainty relation

(B) Schrodinger's time independent equation

(C) The equation of continuity

(D) The eigenvalue equation

29. The biasing voltage for the base-emitter junction of a transistor amplifier is chosen in such a way that the collector current flows for the entire cycle of the input signal. The amplifier can be classified as :

(A) Class – A

(B) Class – B

(C) Class – C

(D) Class – AB

30. The Haidinger fringes formed in thin films are fringes of equal :

(A) Thickness

(B) Inclination

(C) Phase

(D) Intensity

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31. A wave propagates on the surface of a liquid having density ρ and surface tension T. If λ is the wavelength of the wave and g is the acceleration due to gravity at the place, the speed of the wave is :

(A) $\frac{2\pi g}{T}+\frac{T}{\rho\lambda}$

(B) $\sqrt{\frac{2\pi T}{\rho\lambda}+\frac{g\lambda}{2\pi}}$

(C) $\sqrt{\frac{2\pi g}{\lambda}+\frac{\rho\lambda}{T}}$

(D) $\sqrt{\frac{2\pi}{g\lambda}+\frac{T\lambda}{2\pi\rho}}$

32. A plane electromagnetic wave propagates in free space along the positive Z-direction. Which of the following can be the unit vectors along the electric field $\vec{E}$ and the magnetic field $\vec{B}$ respectively associated with the electromagnetic wave ?

(A) $\frac{\hat{x}-\hat{y}}{\sqrt{2}}, \frac{\hat{x}+\hat{y}}{\sqrt{2}}$

(B) $\hat{y}, \hat{x}$

(C) $\frac{\hat{x}+\hat{y}}{\sqrt{2}}, \frac{\hat{x}-\hat{y}}{\sqrt{2}}$

(D) $\frac{\hat{x}+2\hat{y}}{\sqrt{5}}, \frac{2\hat{x}+\hat{y}}{\sqrt{5}}$

33. According to Debye's theory, the molar specific heat at constant volume for a non-conducting solid is proportional to :

(A) e^{-T}

(B) $\frac{1}{T}$

(C) $\frac{1}{T^3}$

(D) T^3

(Here, T is the absolute temperature of the solid)

34. In an ideal, classical, monatomic gas, in thermal equilibrium at absolute temperature T, the average kinetic energy per atom is :

(A) $\frac{3}{2}kT$

(B) $3k\sqrt{T}$

(C) $3kT$

(D) $kT^{\frac{3}{2}}$

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35. The relation between the group velocity (v_g) and the phase velocity (v_{ph}) of a wave packet is :

(A) $v_g = v_{ph} + \hbar c \frac{dv_{ph}}{d\lambda}$

(B) $v_g = v_{ph} - \lambda \frac{dv_{ph}}{d\lambda}$

(C) $v_g = v_{ph} - \frac{1}{\lambda} \frac{dv_{ph}}{d\lambda}$

(D) $v_g = v_{ph} + \frac{1}{\lambda} \frac{dv_{ph}}{d\lambda}$

36. In an AC circuit, a capacitor C, a resistor R and an inductor L are connected in series with an AC source. If ω is the resonant angular frequency of the AC, the impedance of the circuit at resonance is :

(A) $R + \omega L - \frac{1}{\omega C}$

(B) $\sqrt{R^2 + \omega^2 \left(L + \frac{1}{C}\right)^2}$

(C) R

(D) $\omega \left(L + \frac{1}{C}\right)$

37. The correct relation among pressure (P), volume (V), temperature (T), entropy (S), internal energy (U) and Gibb's free energy (G) is :

(A) $G = U + PV - TS$

(B) $G + PV = U + TS$

(C) $\frac{PV}{TS} = \frac{U}{G}$

(D) $G = U + \frac{PV}{TS}$

38. Suppose $z = x + iy$ is a complex variable and f(z) is an analytic function. If the imaginary part of the function is $(y^2 - x^2)$, a possible form of the real part can be :

(A) $2xy^2$

(B) $2x^2y$

(C) $2xy$

(D) $\frac{xy}{\sqrt{x^2 + y^2}}$

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39. The eigenvalues of a Hermitian operator :

(A) Are always non-negative

(B) Are always non-zero

(C) Are always real

(D) Can never have a fractional value

40. Which of the following components is the most difficult to fabricate on an integrated circuit ?

(A) Inductor

(B) Capacitor

(C) Resistor

(D) Transformer

41. The kinetic energy of a planet revolving round the Sun has :

(A) The maximum value when the planet is the farthest from the Sun

(B) The maximum value when the planet is closest to the Sun

(C) The same value at all points on the orbit of the planet round the Sun

(D) The minimum value when the distance between the planet and the Sun is equal to the semimajor axis of the orbit of the planet

42. A plane, monochromatic electromagnetic wave of frequency f enters a conducting medium of electrical conductivity σ. The skin depth for the conducting medium is proportional to :

(A) σf

(B) $\frac{\sigma}{f}$

(C) $\frac{\sqrt{f}}{\sigma}$

(D) $\frac{1}{\sqrt{\sigma f}}$

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43. In a homogeneous, isotropic dielectric medium, the electric susceptibility χ and the relative permittivity ϵ_r are related by :

(A) $\epsilon_r = 1 + \chi$

(B) $\chi = \frac{1}{1+\epsilon_r}$

(C) $1 + \chi = \frac{1}{\epsilon_r}$

(D) $\sqrt{\epsilon_r^2 + \chi^2} = 1$

44. In a classical, statistical system, Gibbs paradox is associated with :

(A) The additive property of internal energy

(B) The additive property of entropy

(C) The random motion of the constituents of the system

(D) The large number of degrees of freedom of the constituents of the system

45. The Davisson-Germer experiment provides the experimental confirmation of :

(A) Heisenberg's uncertainty principle

(B) de Broglie hypothesis of matter wave

(C) The existence of spin of the electron

(D) Planck's formula for black body radiation

46. A point charge Q is placed at a distance R from an infinite, grounded, conducting plane. If the charge and the conducting plane are in air (permittivity = ϵ_0), the electrostatic energy of the system is :

(A) $\frac{1}{4\pi\epsilon_0}\frac{Q^2}{R}$

(B) $-\frac{Q^2}{16\pi\epsilon_0 R}$

(C) $-\frac{Q^2}{2R\pi\epsilon_0}$

(D) $\frac{Q^2}{8\pi R\epsilon_0}$

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47. The Clausius-Clapeyron equation is applicable :

(A) Only for first order phase transition

(B) Only for second order phase transition

(C) For both first order and second order phase transitions

(D) Only when the thermodynamic system does not undergo any phase transition

48. Which of the following represents the beta function B(a, b) ?

(A) $\frac{a+b}{b}B(a, b+1)$

(B) $\frac{1+b}{a}B(a+1, b-1)$

(C) $\frac{b}{a}B(a, b+1)$

(D) $\frac{a-b}{a}B(a+2, b-2)$

49. Supposing A and B are two commuting, Hermitian operators. Which of the following is true ?

(A) The eigenvalues of A are also the eigenvalues of B

(B) The eigenfunctions of A are also the eigenfunctions of B

(C) The expectation value of A for a given state of the system is equal to the expectation value of B for the same state of the system

(D) The eigenvalues of A are integral multiples of the eigenvalues of B

50. A shift register which is capable of shifting data left, right and parallel is called :

(A) A tristate shift register

(B) A turnaround shift register

(C) A conversion shift register

(D) An universal shift register

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51. The potential energy of an one dimensional harmonic oscillator is equal to V_1 when its displacement from the equilibrium position is x_1. The potential energy becomes V_2 when its distance from the equilibrium position is x_2. When its displacement from the equilibrium position is $(x_1 + x_2)$, the potential energy is :

(A) $\frac{1}{2}\sqrt{V_1^2 + V_2^2}$

(B) $V_1 + V_2$

(C) $2\sqrt{V_1 V_2}$

(D) $V_1 + V_2 + 2\sqrt{V_1 V_2}$

52. The boundary conditions for the electric displacement $\vec{D}$ and the electric field $\vec{E}$ at the interface of two homogeneous, isotropic, linear dielectric media are :

(A) The normal component of $\vec{E}$ and the tangential component of $\vec{D}$ are continuous

(B) The normal component of $\vec{D}$ and the tangential component of $\vec{E}$ are continuous

(C) The normal components of both $\vec{E}$ and $\vec{D}$ are continuous

(D) The tangential component of both $\vec{E}$ and $\vec{D}$ are continuous

53. If A and B are the Einstein's coefficients for spontaneous and stimulated transitions respectively, which of the following corresponds to spontaneous emission of photons ?

(A) A_{12}

(B) A_{21}

(C) B_{12}

(D) B_{21}

54. In Bose-Einstein distribution, a given state can be occupied by :

(A) Only one particle

(B) Only two particles

(C) Any number of particles

(D) A definite number of particles which is equal to the number of degrees of freedom of each particle

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55. The non-existence of electrons inside the atomic nucleus can be ascertained by using :

(A) Heisenberg's uncertainty principle

(B) Bohr's theory of hydrogen atom

(C) Rutherford's alpha particle scattering experiment

(D) The liquid drop model of the nucleus

56. A closely wound solenoid of N turns of wire carring a current – I is placed in air. The length of the solenoid is L and its diameter is very small in comparison with its length. The magnitude of magnetic induction inside the solenoid at its centre is :

(A) $\mu_0 \frac{IN^2}{L}$

(B) $\mu_0 \frac{I^2N}{L}$

(C) $\mu_0 \frac{IN}{L}$

(D) $\mu_0 \frac{IN}{6L}$

57. A gas is in thermal equilibrium at absolute temperature T and the gas molecules obey Maxwell-Boltzmann velocity distribution. If C_1, C_2 and C_3 are the r.m.s. speed, the mean speed and the most probable speed of the molecules respectively, then $C_1 : C_2 : C_3$ is :

(A) $\sqrt{3} : \sqrt{5} : \sqrt{2}$

(B) $\sqrt{3} : \sqrt{\frac{8}{\pi}} : \sqrt{2}$

(C) $\sqrt{8} : \sqrt{5} : \sqrt{2\pi}$

(D) $\sqrt{5} : \sqrt{7} : \sqrt{2}$

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58. The Laplace transform of sin at with $a > 0$ is :

(A) $\frac{s}{\sqrt{a^2 + s^2}}$

(B) $\frac{a}{a^2 + s^2}$

(C) $\frac{s}{a^2 - s^2}$

(D) $\frac{s + a}{a^2 + s^2}$

59. The wavefunction of an one dimensional harmonic oscillator :

(A) Is always dimensionless

(B) Has the dimension of $L^{0.5}$

(C) Has the dimension of $L^{-1.5}$

(D) Has the dimension of $L^{-0.5}$

60. Which of the following are universal gates ?

(A) OR, AND

(B) NOR, AND

(C) NOR, NAND

(D) OR, NOT

61. The resolving power of a telescope for light of wavelength λ is proportional to :

(A) λ

(B) λ^2

(C) $\frac{1}{\lambda^4}$

(D) $\frac{1}{\lambda}$

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62. The kinetic energy of a particle moving with relativistic speed is equal to its rest energy. The ratio of the speed of the particle to that of light in vacuum is :

(A) $\frac{1}{\sqrt{2}}$ (B) $\frac{\sqrt{3}}{2}$

(C) $\frac{\sqrt{2}}{3}$ (D) $\frac{1}{2}$

63. A plane, unpolarised, monochromatic, electromagnetic wave is incident from a dielectric medium of refractive index n_1 on another dielectric medium of refractive index n_2 at an angle of incidence θ. If the reflected electromagnetic wave is completely plane polarised, then $\frac{n_2}{n_1}$ is equal to :

(A) $\frac{1}{\sin\theta}$ (B) $\sin\theta$

(C) $\frac{1}{\tan\theta}$ (D) $\tan\theta$

64. A superconductor behaves as a :

(A) Perfect conductor and perfect diamagnet

(B) Perfect conductor and perfect paramagnet

(C) A material having negative electrical resistivity

(D) Perfect conductor and perfect ferromagnet

65. An ideal fermionic system is at absolute zero temperature. If n is the number density of fermions, the Fermi energy $\in_F$ is proportional to :

(A) $n^{\frac{3}{2}}$ (B) $n^{\frac{2}{3}}$

(C) $\frac{1}{n}$ (D) n^2

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66. Which of the following is a doubly magic nucleus ?

(A) Carbon – 14

(B) Oxygen – 16

(C) Cobalt – 60

(D) Helium – 3

67. A plane conducting loop, having a vector area $\vec{A}$, carries a steady current I and is placed in an external uniform magnetic field $\vec{B}$. The torque on the loop is :

(A) $\mu_0 I \vec{B} \times \vec{A}$

(B) $I \vec{A} \times \vec{B}$

(C) $\frac{\mu_0}{4\pi} I \vec{A} \times \vec{B}$

(D) $\sqrt{2} I \vec{B} \times \vec{A}$

68. A gas, enclosed in a given volume, is in thermal equilibrium. If the gas molecules are assumed to be spherical with diameter d, the mean free path of the gas molecules is proportional to :

(A) d

(B) 1/d

(C) $\frac{1}{d^2}$

(D) $\sqrt{d}$

69. Which of the following Boolean relations does not obey De Morgan's theorem ?

(A) $\bar{A} + \bar{B} = \overline{A \cdot B}$

(B) $A \cdot B = \overline{A + B}$

(C) $\overline{A \cdot \bar{B}} = \bar{A} + B$

(D) $\overline{A + B} = \bar{A} \cdot \bar{B}$

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70. A plane polarised electromagnetic wave is incident normally on a quarter wave plate with the electric field making angle 45° with the optic axis of the quarter wave plate. The electromagnetic wave emerging from the quarter wave plate is :

(A) Plane polarised

(B) Elliptically polarised

(C) Circularly polarised

(D) Unpolarised

71. A black body is in thermal equilibrium at absolute temperature T. According to Rayleigh-Jean's law, the energy density $u(\upsilon)$ of black body radiation per unit frequency range at frequency υ is proportional to :

(A) $\upsilon^2 T$

(B) $\frac{\upsilon^3}{T}$

(C) $\upsilon T^{\frac{3}{2}}$

(D) υ^3

72. The primary process of energy production in stars is :

(A) Radioactive decay

(B) Nuclear fusion

(C) Nuclear fission

(D) Ionic dissociation

73. Two conducting loops are placed close to each other in air. When the electric current in one loop changes at the rate of 1.5 A/s , an e.m.f of 0.3 Volt is induced in the other loop. The mutual inductance between the two loops is :

(A) 0.2 Farad

(B) 5 Henry

(C) 0.2 Henry

(D) 0.2 Weber

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74. The temperature at which the Joule-Thomson coefficient changes sign is called the :

(A) Temperature of inversion

(B) Saturation temperature

(C) Clausius temperature

(D) Thomson temperature

75. A monochromatic, plane polarised light passes through an optically active medium of length L. The angle through which the plane of polarisation of the light is rotated is proportional to :

(A) L

(B) $\frac{1}{L}$

(C) $\sqrt{L}$

(D) $\frac{1}{\sqrt{L}}$

76. In the low frequency limit, Planck's formula for black body radiation leads to :

(A) Wien's displacement law

(B) Stefan-Boltzmann law

(C) Kirchoff's radiation law

(D) Rayleigh-Jean's law

77. The ratio of the half life to mean life of a radioactive sample is :

(A) 0.693

(B) 1.12

(C) 0.716

(D) 0.438

78. The magnetic susceptibility of a material is a very small negative quantity. The material is a :

(A) Non-magnetic material

(B) Diamagnetic material

(C) Paramagnetic material

(D) Ferromagnetic material

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79. If n represents the hole concentration in a semiconductor, the Hall coefficient R_H of the material is proportional to :

(A) n

(B) $\sqrt{n}$

(C) $\sqrt{\frac{1}{n}}$

(D) n^2

80. The exchange of both energy and number of particles, with the surroundings, is possible in :

(A) Microcanonical ensemble

(B) Canonical ensemble

(C) Dual ensemble

(D) Grand canonical ensemble

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