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BRAINWARE UNIVERSITY

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Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125

Term End Examination 2025-2026

Programme – Dip.CE-2024/Dip.CSE-2024/Dip.EE-2024/Dip.ME-2024/Dip.RA-
2024/Dip.CSE-2025/Dip.EE-2025/Dip.ME-2025

Course Name – Applied Physics-II

Course Code - DBS00005

(Semester II)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Two electric field lines, away from any point-charge _____.
 - a) always intersect each other
 - b) always perpendicular to each other
 - c) never intersect
 - d) may intersect sometimes
- (ii) Batteries are generally connected in _____.
 - a) series
 - b) parallel
 - c) mixed combination
 - d) open circuit
- (iii) From Coulomb's law, electrostatic force is inversely proportional to the _____.
 - a) square of the distance between two point charges
 - b) the distance between two point charges
 - c) product of charges
 - d) None of these
- (iv) What is the SI unit of magnetic field strength (B)?
 - a) tesla
 - b) ampere
 - c) weber
 - d) gauss
- (v) A pentavalent impurity has _____ valence electrons.
 - a) 3
 - b) 4
 - c) 5
 - d) 6
- (vi) In a ruby LASER, population inversion is achieved by _____.
 - a) inelastic atom-atom collision
 - b) optical pumping
 - c) chemical reaction
 - d) electrical pumping
- (vii) A semiconductor in its purest form is called _____.
 - a) insulator
 - b) extrinsic semiconductor
 - c) intrinsic semiconductor
 - d) None of these
- (viii) What is the SI unit of the coefficient of self-induction?
 - a) tesla
 - b) henry

- c) weber d) ampere
- (ix) In photoelectric effect, which of the following describes the work function?
- a) The energy required to release electrons from a material when illuminated by light. b) The energy of the incident photon.
- c) The kinetic energy of the emitted electrons. d) The intensity of the incident radiation.
- (x) The magnetic flux (ϕ) linked through a surface of area (A) in the magnetic field (B) is given by ____.
- a) $\phi = BA$ b) $\phi = B^2A$
- c) $\phi = B/A^3$ d) $\phi = B/A^2$
- (xi) In Ohm's law, voltage is directly proportional to ____.
- a) current b) conductivity
- c) capacitance d) charge density
- (xii) In a circuit, the ammeter is connected in ____.
- a) series b) mixed combination
- c) parallel d) None of these
- (xiii) If β and γ are the coefficients of areal and volume expansion of a solid cube, respectively, the relation between the coefficients is ____.
- a) $3\beta = 2\gamma$ b) $\beta = 7\gamma$
- c) $\beta = \gamma$ d) $\beta = 5\gamma$
- (xiv) The coefficient of areal expansion (β) is defined as ____.
- a) the change in length per unit area b) the change in area per unit area per unit temperature change
- c) the change in density per unit length per unit density d) the change in volume per unit volume
- (xv) In a circuit, the voltmeter is connected in ____.
- a) series b) mixed combination
- c) parallel d) None of these

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Define the coefficient of areal expansion (β). State its unit. (3)
3. Write down the applications of X-rays. (3)
4. State Coulomb's law. Write the SI unit of force. (3)
5. Define magnetic flux density (B). Write its SI unit. (3)
6. An electric current (I) of 2 A flows through a wire when a potential difference (V) of 10 V is applied across it. Calculate the resistance (R) of the wire. Write the SI unit of resistance. (3)

OR

- A wire of length (L) 10 m and cross-sectional area (A) 25 m^2 , has a resistance (R) of 4 Ω . Calculate the resistivity (ρ) of the wire. Write the SI unit of resistivity. (3)

Group-C
(Long Answer Type Questions)

5 x 6=30

7. Write the SI unit of magnetic field. An infinitely long straight wire carries a current (I) of 10 A. Calculate the magnetic field (B) at a distance (r) of 2 m from the wire. (5)
[Given, $\mu_0/(4\pi) = 10^{-7} \text{ H/m}$]
8. State Gauss's law. Write the SI units of charge and electric field. (5)
9. Write the SI unit of area. A metal sheet has an initial area (A_i) of 100 m^2 . If the coefficient of areal expansion (β) is $1 \times 10^{-5} \text{ }^\circ\text{C}^{-1}$, calculate the increase in area when the temperature (t) is raised by 10°C . (5)
10. Write the expression for the equivalent resistance (R_{eq}) when three resistances R_1 , R_2 and R_3 are connected in series. Write the SI unit of resistance. Three resistances of 10Ω , 15Ω and 30Ω , respectively, are connected in series. Calculate the equivalent resistance (R_{eq}) of the combination. (5)
11. State Joule's law of heating. Write the SI unit of heat energy. A current (I) of 10 A is passing through a resistance (R) of 25Ω . Calculate the amount of energy dissipated in joule, by the resistance in 10 s. (5)
12. Write the expression for the energy (E) of a photon in terms of its wavelength (λ). Write the SI unit of wavelength. Find the wavelength of a photon with energy of 1.5 eV. [Given, Planck's constant (h) = $6.626 \times 10^{-34} \text{ Js}$, speed of light in air (c) = $3 \times 10^8 \text{ m/s}$, and $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$] (5)

OR

Write the expression for the work function (ϕ_0) of a metal in terms of threshold frequency (ν_0) of incident light. Write the SI unit of work function. Find the work function of a metal having threshold frequency of $4.6 \times 10^{14} \text{ Hz}$. [Given, Planck's constant (h) = $6.626 \times 10^{-34} \text{ Js}$] (5)

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