BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – Dip.CE-2024/Dip.CSE-2024/Dip.EE-2024/Dip.ME-2024/Dip.RA-2024
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) If α, β and γ are the coefficients of linear, areal and volume expansion of a solid cube, the relation between the coefficients is _____.

a) $6\alpha = 3\beta = 2\gamma$ b) $3\alpha = 6\beta = \gamma$
c) $6\alpha = 2\beta = 3\gamma$ d) None of these

(ii) Which mode of heat transfer does not require a medium?

a) Convection b) Radiation
c) Conduction d) None of these

(iii) Coulomb's law is valid _____.

a) only for point charges b) only for distributed charges
c) for both point and distributed charges d) neither for distributed charges nor for point charges

(iv) Resistance of a wire is R Ω. If the wire is stretched to double its initial length, then the resistance becomes _____.

a) double b) half
c) triple d) one-fourth

(v) Which of the following laws gives the magnetic field produced by a small current element?

a) Joule's law b) Newton's law
c) Biot-Savart's law d) Gauss's law

(vi) What is the SI unit of magnetic field intensity?

a) tesla b) henry

c) coulomb d) ampere

(vii) If the current across all resistors in a circuit remains the same; it implies that they are connected in _____.

a) series b) loop
c) parallel d) mesh

(viii) In Ruby laser, Al_2O_3 is doped with _____.

a) carbon b) oxygen
c) chromium d) cadmium

(ix) The coefficient of linear expansion (α) is defined as _____.

a) the change in length per unit length per unit temperature-change
b) the change in area per unit area per unit temperature-change
c) the change in volume per unit volume per unit temperature-change
d) the change in density per unit volume per unit temperature-change

(x) Which of the following waves are used to determine the internal structure of a crystal?

a) α-ray b) β-ray
c) γ-ray d) X-ray

(xi) In photoelectric effect, the stopping potential refers to _____.

a) the energy required to remove an electron from the sample
b) the photon's energy
c) the minimum electric potential that causes the photocurrent to vanish
d) the kinetic energy of the ejected photoelectron

(xii) The force 'F' acting on a conductor of length 'l', carrying current 'i', in a magnetic field 'B' is given by _____.

a) $F = B \cdot i \cdot l \cos\theta$ b) $F = B \cdot i \cdot l \sin\theta$
c) $F = B \cdot i \cdot l$ d) $F = B \cdot l$

(xiii) In Ohm's law, voltage is directly proportional to _____.

a) mass b) current
c) inductance d) conductance

(xiv) To measure the voltage across a resistor, _____ is used.

a) a voltmeter b) a potentiometer
c) an ammeter d) a meter-bridge

(xv) Pure semiconductors have _____ valence electrons.

a) 3 b) 4
c) 5 d) 6

Group-B

(Short Answer Type Questions) 3 x 5=15

2. 4 A current flows through a 0.3-metre-long conductor, placed perpendicular to a magnetic field of strength 0.2 T. Calculate the force acting on the conductor. (3)

3. State Coulomb's law. (3)

4. A copper rod has an initial length of 10 m. If the coefficient of linear expansion (α) of copper is $1.7\times10^{-5}\ °C^{-1}$, calculate the increase in length of the rod when the temperature (3)

is increased by 50°C.

5. Differentiate between LASER and ordinary light. (3)

6. A material has resistance 2 Ω, cross-sectional area 25 cm^2 and length 15 cm. Calculate its resistivity. (3)

OR

2 A current flows through an iron of resistance 5 Ω. Calculate the voltage between the terminals of the iron. (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. The threshold wavelength of a metal is 663 nm. Calculate the work function of the metal in electron-volt, given the Planck's constant (h) = 6.625×10^{-34} Js, 1 eV = 1.6×10^{-19} J and the velocity of light in vacuum (c) = 3×10^{8} m/s. (5)

8. Describe the properties of electric field lines. (5)

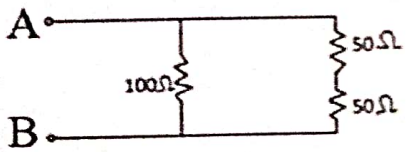
9. A long straight wire carries a current of 5 A. Calculate the magnetic field at a point 0.2 m away from the wire. (Use $\mu_0 = 4\pi \times 10^{-7}$ H/m) (5)

10. How do the properties of X-rays make them useful in medical and industrial applications? (5)

11. Differentiate between the heat transfer processes conduction, convection and radiation. (5)

12. Evaluate the heat energy produced in a resistor of resistance 10 Ω when 5 A current flows through it for 5 minutes. (5)

OR



(5)

Evaluate the equivalent resistance between A and B.

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