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Odd Semester Examination 2024 (BACKLOG)

Paper Name: Applied Physics-I

Paper Code: BTCSE-101/BTCSE-AI-101/BTECE-101

Time: 3 Hours

Maximum Marks: 75

Section A

Attempt ALL Questions

(7 × 5 = 35)

Q.No.	Questions	CO	BL
1	Distinguish between intrinsic and extrinsic semiconductors.	1	2
2	Explain the phenomenon of total internal reflection of light. How is it used in propagation of light in optical fiber?	3	2
3	Write briefly about the properties of laser.	2	2
4	Explain Huygen's principle.	4	2
5	Discuss Meissner effect.	5	2
6	Derive the relation between Einstein's A and B coefficients.	2	4
7	Write briefly about the different types of optical fiber.	3	2

Section B

Attempt any FOUR Questions

(4 × 10 = 40)

Q.No.	Questions	CO	BL
1	What are the different components of laser. Explain them with the help of diagrams.	2	2
2	(i) Derive the expression for acceptance angle for an optical fiber. (4 marks) (ii) Obtain the expression for numerical aperture for an optical fiber. (2 marks) (iii) Calculate the acceptance angle and numerical aperture of a given optical fiber if the refractive index of the core, $n_1 = 1.6$ and that of cladding, $n_2 = 1.4$. (4 marks)	3	4
3	(i) Draw energy band diagram for $p-n$ junction when (a) unbiased, (b) forward biased, and (c) reverse biased. (6 marks) (ii) Draw and explain the V-I characteristics of $p-n$ junction. (4 marks)	1	2
4	(i) Define superconductivity? (3 marks) (ii) Write short notes on Type I superconductors and Type II superconductors. (7 marks)	5	2
5	(i) Derive the expression for conductivity and resistivity of an intrinsic semiconductor. (6 marks) (ii) Find the resistivity and conductivity of intrinsic silicon at 300 K. Given that intrinsic carrier concentration at 300 K is $1.5 \times 10^{-10} \text{ cm}^{-3}$. Also, mobility of electrons and holes are $\mu_e = 1300 \text{ cm}^2 / (\text{V-sec})$ and $\mu_h = 500 \text{ cm}^2 / (\text{V-sec})$, respectively. (4 Marks)	1	4
6	(i) Derive the expression for the fringe width, β , in Young's double slit experiment. (6 marks) (ii) In Young's double slit experiment, light of wavelength, $\lambda = 4 \times 10^{-5} \text{ cm}$ is incident on the slits separated by distance, $d = 1 \text{ mm}$. What is the fringe width, β if the screen is placed 100 cm away. (4 marks)	4	4

BL: Bloom's Taxonomy Level (1-Remembering, 2-Understanding, 3-Applying, 4- Analysing, 5-Evaluating, 6- Creating).