

Odd Semester Examination 2022-23**Maximum Marks: 60**

Attempt ALL Questions

Q.No.	Questions	CO	BL
1	Write down the different types of optical fiber.	CO 3	2
2	Write short notes on (i) intrinsic and (ii) extrinsic semiconductors.	CO 1	2
3	Derive the relation between Einstein's A and B coefficients.	CO 2	4
4	Explain diffraction grating. What is dispersive power of a diffraction grating?	CO 4	2

Attempt any FOUR Questions

Q.No.	Questions	CO	BL
1	(i) Obtain the expression for conductivity and resistivity of an intrinsic semiconductor. (6 marks) (ii) Find the resistivity of intrinsic germanium at 300 K. Given that the intrinsic carrier concentration is $2.5 \times 10^{13} \text{ cm}^{-3}$. Also, mobility of electrons and holes are $\mu_e = 3800 \text{ cm}^2 / (\text{V-sec})$ and $\mu_h = 1800 \text{ cm}^2 / (\text{V-sec})$, respectively. (4 Marks)	CO 1	3,5
2	(i) Obtain the expression for the fringe width, β in Young's double slit experiment. (6 marks) (ii) In the Young's double slit experiment, the separation between the two slits is 0.5 mm, $\lambda = 5 \times 10^{-5} \text{ cm}$ and $D = 50 \text{ cm}$. What will be the fringe width? (4 marks)	CO 4	3,4
3	(i) Find the expression for acceptance angle for an optical fiber. (4 marks) (ii) Find the expression for numerical aperture for an optical fiber. (2 marks) (iii) Calculate the acceptance angle and numerical aperture of an optical fiber from the following data: n_1 (core) = 1.55 and n_2 (cladding) = 1.50 (4 marks)	CO 3	3,5
4	Explain the construction and working of Helium-Neon laser OR a Ruby laser.	CO 2	2
5	(i) Explain the operation of p - n junction under forward bias and reverse bias. (6 marks) (ii) Draw and explain the V-I characteristics of p - n junction. (4 marks)	CO 1	2
6	(i) Define superconductivity? (3 marks) (ii) Write short notes on Type I superconductors and Type II superconductors. (7 marks)	CO 5	2

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