

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech-I Semester (BT/BI)

COURSE CODE (CREDITS):18B11PH112 (04)

MAX. MARKS: 35

COURSE NAME: Basic Engineering Physics-I

COURSE INSTRUCTORS: Dr. Ragini Raj Singh

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculators is permitted.

Q.No	Question	CO	Marks
Q1	(a) Differentiate between half-shade and biquartz polarimeters.	CO2	1.5 +
	(b) Discuss applications of polarimeter.		1.5 +
	(c) About 100 gm of impure sugar is dissolved in 1 Ltr of water. The solution gives an optical rotation of 10° when placed in a tube of length 20 cm. If the specific rotation of sugar is $66^\circ \text{ dm/gm/cm}^3$. Find the % purity of the sample.	CO3	1.5 =4.5
Q2	(a) Differentiate between spontaneous and stimulated emission? Which type of emission is a must for LASERs and why?	CO3	3 +
	(b) A laser beam has a power of 50 mW. It has an aperture of 5×10^{-3} m and wavelength 7000 Å. The beam is focused with a lens of focal length of 0.2 m. calculate the areal spread and intensity of the image.	CO4	1.5+
	(c) Calculate the relative population of energy levels N_1 and N_2 at 320 kelvin ; wavelength is 650 nm. (Given $K= 1.38 \times 10^{-23} \text{ m}^2 \cdot \text{Kg} \cdot \text{s}^{-2} \cdot \text{k}^{-1}$)		1.5 = 6
Q3	(a) Discuss the classification of optical fibers on the basis of modes and their refractive index profile with suitable diagrams.	CO4	4 +
	(b) Calculate the V number and number of modes propagating through a fiber having $a= 75$ micrometer, $n_1=1.56$, $n_2=1.54$ and wavelength is 1 micrometer.		2 +
	(c) An SI fiber has $n_1=1.666$, $n_2=1.66$, if the operating wavelength of rays is 0.9 micrometer. Calculate the cutoff parameter and the number of modes which are supported by this fiber. The diameter of the core is 60 micrometer.		2+

	(d) An SI fiber has $n_1=1.566$, $n_2=1.56$. Calculate the maximum radius allowed for the fiber, if it is supporting only one mode at a wavelength of 1200 nm. Also, calculate the NA, the critical angle and the maximum acceptance angle of the fiber.	CO5	3 =11
Q4	(a) Discuss all the mechanisms in detail which causes absorption in optical fibers. (b) Discuss intermodal delay in optical fibers. How to minimize the effect of modal dispersion? (c) The optical fiber after propagating through a fiber of 2 Km length is reduced to 20% of its original value. Compute the fiber loss in dB/Km.	CO5	3 + 3 + 1.5 =7.5
Q5	(a) What is biomedical device according to FDA/ Why do we need different biomaterials in biomedical field. (b) Classify the biomaterials with proper example, advantages and disadvantages. (c) What is the selection process for biomedical material? Discuss the guidance on biocompatibility assessment of biomaterials.		2 + 2 + 2 =6