

Shiv Nadar University Chennai

Mid Semester Examinations 2023-2024 Odd

Question Paper

Name of the Program: Common to B.Tech. AI & DS and B.Tech. CSE (Cybersecurity)		Semester: 01
Course Code & Name: PH1001T ENGINEERING PHYSICS		
Regulation 2021		
Time: 2 Hours	Answer all sections	Maximum: 50 Marks

Q.No.		Part A (12 Marks)	Marks	CO	KL
1	a	What is piezoelectric effect? List one application that makes use of this phenomenon.	2	CO1	KL2
2	a	If the intensity of a 30 dB sound reduces by $1/8$, the corresponding intensity level after reduction is _____. (in integers)	2	CO1	KL2
3	a	The velocity of kerosene reduces by 3 m/s for every degree rise in temperature. Calculate the change in grating element of an acoustic grating formed in kerosene using a 6 MHz piezoelectric crystal, for a 10 degree increase in temperature.	3	CO1	KL3
4	a	What is the advantage of using a multimode graded index fiber instead of multimode step index fiber?	2	CO2	KL2
5	a	A step index optical fiber with core diameter of 9 μm has a numerical aperture of 0.15. How many modes will it support at 650 nm. What is the shortest wavelength at which it will start guiding only a single mode.	3	CO2	KL2
		PART B ($3 \times 6 = 18$ marks)			
7	a	Draw a labelled block diagram of a pulse echo system used for ultrasonic range sensing. (no explanations needed)	6	CO1	KL2
8	a	Discuss how ultrasound is used for imaging internal organs for medical diagnostics.	6	CO1	KL2
9	a	Draw a simple block diagram of a point-to-point fiberoptic link labelling all the blocks. Given the following parameters, estimate the maximum fiber length that can be deployed between the source and the receiving station for error free detection of 1 Gb/s data at wavelengths of 1350 nm and 1550 nm. Maximum optical output from transmitter at all wavelengths = +10 dBm, Linewidth of source = 2 nm, Minimum power requirement at the receiver = -35 dBm, attenuation and dispersion of fiber are respectively 0.5 dB/km and 1 ps/km.nm @ 1350 nm and 0.25 dB/km and 5 ps/km/nm @ 1550 nm.	3+3	CO2	KL3
		Part C ($2 \times 10 = 20$ marks)			
10	a	Describe with the help of a suitable circuit diagram, an ultrasonic generator at 40 kHz explaining the role of each component used in the circuit.	10	CO1	KL2
OR					

	b	What is meant by timbre of sound? Illustrate with the help of equal loudness curves why quality of a recorded music which has frequencies covering the full audio frequency range, changes with the dB level at which it is played.	10	CO1	KL2
11	a	Derive the expression for numerical aperture of fiber. An optical fiber has a core index of 1.458 and relative refractive index change with respect to the core, Δ of 2.7×10^{-3} . What will be the angle of refraction of the light in the fiber core if its angle of incidence is the acceptance angle,	5+5	CO2	KL2
		OR			
	b	What are the causes for extrinsic loss in optical fiber. Explain the working of an active fiberoptic sensor where the physical stimulus is sensed by monitoring the loss it causes.	10	CO2	KL2

KL – Bloom's Taxonomy Levels

(KL1: Remembering, KL2: Understanding, KL3: Applying, KL4: Analyzing, KL5: Evaluating, KL6: Creating)

CO – Course Outcomes
