



SRM Institute of Science and Technology  
College of Engineering and Technology

DEPARTMENT OF ECE  
SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu  
Academic Year: 2021-22 (Even)

**SET- C**

Test: CLAT-1

Date: 08-04-2022

Course Code & Title: 18ECE322T Optoelectronics

Duration: 8:00 -9:00AM

Year & SEM: II year/ 4<sup>th</sup> SEM

Max. Marks: 25

Course Articulation Matrix:

18ECE322T – Optoelectronics		Course Articulation Matrix															
	Course learning Outcome	Learning	Program Learning Outcome														
		E	Graduate Attributes (GA)											(PSO)			
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CLO1	Define the basic concepts of optics and semiconductor optics	1		3													1
CLO2	Demonstrate the working principle of various photonic sources and display devices	3		3	3	2											3
CLO3	Analyse the principle and operation of various detectors and noise associated with it	4			3	2											3
CLO4	Interpret the various optoelectronic modulators, switches and interconnects	3		3	2	3	3										2
CLO5	Apply the concepts of integrated optoelectronic components and its applications in various fields	3		3		3	3										3

**Part – A (5 x 1 = 5 Marks)**

Instructions: Answer all

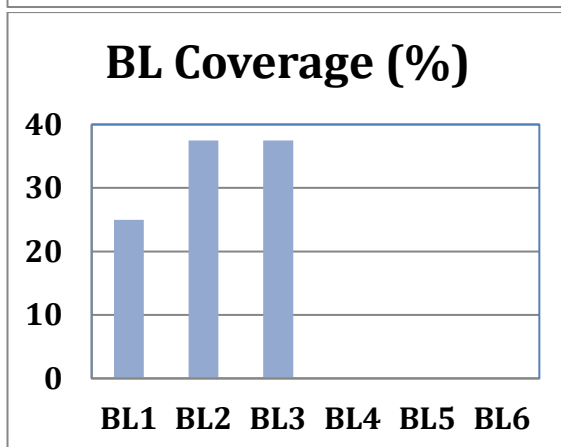
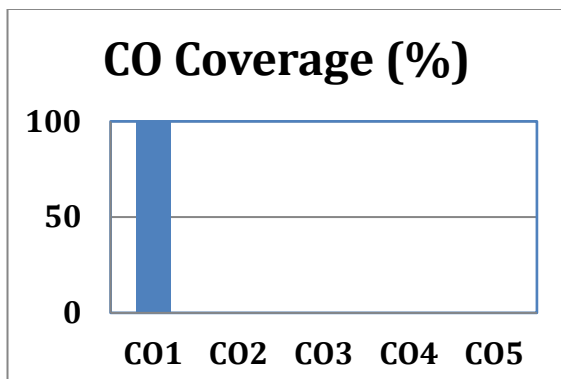
Q. No	Question	Marks	BL	CO	PO	PI Code
1	The phase velocity of an electromagnetic wave is proportional to _____. Optical diffraction A. Propagation constant (k) B. Frequency C. Permittivity D. Refractive index of the medium (n)	1	1	1	1	1.4.1
2	A surface over which the phase of a wave is constant is referred as _____.	1	2	1	1	1.4.1

	A. Wave front B. Grating C. Polarization D. Numerical Aperture					
3	Bragg diffraction condition is _____. A. $m\lambda = 2d \sin\theta$ B. $m\lambda = d \cos\theta$ C. $m\lambda = (d/2) \sin\theta$ D. $m\lambda = d \sin\theta$	1	1	1	1	1.4.1
4	GaAs has a band gap of 1.43 eV, which corresponds to a value for $\lambda_g$ of A. 867 nm B. 950 nm C. 1105 nm D. 1550 nm	1	2	1	1	1.4.1
5	A junction between two different semiconductor crystals with different band gaps is called _____. A. Homo junction B. Hetero junction C. Alloy junction D. Quantum well junction	1	2	1	1	1.4.1
<b>Part – B (2 x 10 = 20 Marks)</b> Instructions: Answer any two Questions						
6	Derive the mean lifetime of electron under different illumination condition using the principle of recombination and generation.	10	3	1	1	1.4.1
7	Illustrate the principle of diffraction using single slit experiment.	10	3	1	1	1.4.1
8	(a) Discuss the terms refractive index and propagation constant. State the relation between these two parameters. (b) Using the Cauchy coefficients for diamond, calculate the refractive index at 610 nm. The Cauchy coefficients for diamond are $n_2 = -1.07 \times 10^{-5}$ , $n_0 = 2.378$ , $n_2 = 8.01 \times 10^{-3}$ , $n_4 = 1.04 \times 10^{-4}$ . (5+5)	10	3	1	1	1.4.1

# Evaluation Sheet

Name of the Student:

Register No.:



Part- A (5x 1= 5 Marks)			
Q. No	CO/P O	Marks Obtained	Total
1	1		
2	1		
3	1		
4	1		
5	1		
Part- B(2 x 10= 20 Marks)			
6	1		
7	1		
8	1		

Consolidated Marks:

CO	Marks Scored
1	
Total	

Signature of the Course Teacher

Approved by the Course Coordinator



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**SET- D**

Test: CLAT-1

Date: 08-04-2022

Course Code & Title: 18ECE322T Optoelectronics

Duration: 8:00 -9:00 AM

Year & SEM: II year/ 4<sup>th</sup> SEM

Max. Marks: 25

Course Articulation Matrix:

18ECE322T – Optoelectronics		Course Articulation Matrix																
	Course learning Outcome	Learning			Program Learning Outcome													
		E	Graduate Attributes (GA)										(PSO)					
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CLO1	Define the basic concepts of optics and semiconductor optics	1	3														1	
CLO2	Demonstrate the working principle of various photonic sources and display devices	3	3	3	2												3	
CLO3	Analyse the principle and operation of various detectors and noise associated with it	4		3	2												3	
CLO4	Interpret the various optoelectronic modulators, switches and interconnects	3	3	2	3	3											2	
CLO5	Apply the concepts of integrated optoelectronic components and its applications in various fields	3	3		3	3											3	

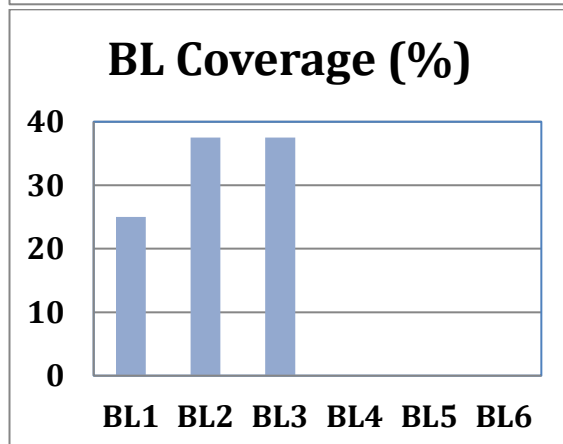
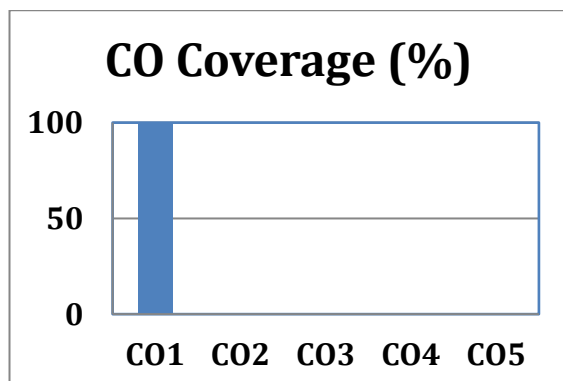
**Part – A (5 x 1 = 5 Marks)**

Instructions: Answer all

Q. No	Question	Marks	B L	CO	PO	PI Code
1	Brewster's angle is also known as _____ A. Refracted angle B. Snell's angle C. Diffracted angle D. Polarisation angle	1	1	1	1	1.4.1

2	According to Malus law, the intensity of polarised light emerging through the analyzer varies A. $I = I_0 \cos^2(2\theta)$ B. $I = I_0 \sin^2(2\theta)$ C. $I = I_0 \cos\theta$ D. $I = I_0/2 \cos^2(2\theta)$	1	2	1	1	1.4.1
3	Interference pattern of light and dark bands on screen is called _____. A. Fringes B. Diffraction C. Reflection D. Dark light	1	1	1	1	1.4.1
4	If 'Rr' denotes radiative recombination rate per unit volume and 'Δn' denotes excess electron concentration, then radiative lifetime is expressed as _____. A. Δn/Rr B. Δn+1/Rr C. Δn/Rr+Rnr D. Δn+Rnr/Rr	1	2	1	1	1.4.1
5	The measurement of refractive index of a material by Sellmeier equation is _____ than Cauchy's Equation. A. Less accurate in visible region B. Less accurate in Infrared region C. More accurate in Infrared region D. More accurate in UV region	1	2	1	1	1.4.1
<b>Part – B (2 x 10 = 20 Marks)</b> Instructions: Answer any two Questions						
6	(a) Describe in details about the principle of polarization by reflection (b) An optical fibre made up the glass with refractive index $n_1 = 1.5$ which is surrounded by another glass of refractive index $n_2$ . Find the refractive index $n_2$ of the cladding such that the critical angle between the two cladding is $80^\circ$ . (c) Find the refractive index of the medium whose critical angle is $40^\circ$ . (4+3+3)	10	3	1	1	1.4.1
7	Illustrate the principle of interference using double slit experiment.	10	3	1	1	1.4.1
8	(a). classify the materials in terms of energy gap (b). In details discuss about the various types of semiconductor material and their band diagram (5+5)	10	3	1	1	1.4.1

# Course Outcome (CO) and Bloom's level (BL) Coverage in Questions



Approved by the Course Coordinator

## Evaluation Sheet

Name of the Student:

Register No.:

Part- A (5x 1= 5 Marks)			
Q. No	CO/P O	Marks Obtained	Total
1	1		
2	1		
3	1		
4	1		
5	1		
Part- B(2 x 10= 20 Marks)			
6	1		
7	1		
8	1		

Consolidated Marks:

CO	Marks Scored
1	
Total	

Signature of the Course Teacher