SRM Institute of Science and Technology
College of Engineering and Technology

DEPARTMENT OF ECE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Mode of Exam
OFFLINE
SET A

Academic Year: 2021-2022 (EVEN)

Test: CLAT- 3 **Date:** 21-6-2022
Course Code & Title: 18ECE322T – OPTOELECTRONICS **Duration:** 08:00 – 09:40 PM
Year & Sem: II / 4th Sem **Max. Marks:** 50

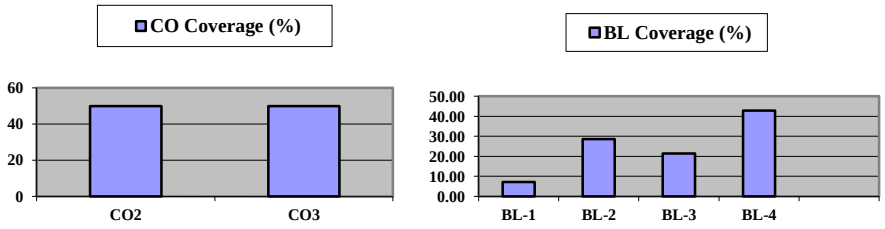
Course Articulation Matrix with PI:

	18ECE322T- Optoelectronics		Program Outcomes (POs)																								PSO		
COs	Course Outcomes	BL	1	PI	2	PI	3	PI	4	PI	5	PI	6	PI	7	PI	8	PI	9	PI	10	PI	11	PI	12	PI	1	2	3
CO-1:	Define the basic concepts of optics and semiconductor optics.	1	3	1.4.1	-		-		-																				1
CO-2:	Demonstrate the working principle of various photonic sources and display devices.	3	3	1.2.1	3	2.1.2	-		2	4.1.1																			3
CO-3:	Analyze the principle and operation of various detectors and noise associated with it.	4	-		3	2.1.3	2	3.1.1	3	4.1.2																			3
CO-4:	Interpret the various optoelectronic modulators, switches, and interconnects.	3	3	1.3.1	2	2.2.1	3	3.2.1	-																				2
CO-5:	Apply the concepts of integrated optoelectronic components and its application in various fields.	3	3	1.4.1	-		3	3.2.2	3	4.2.1																			3

Q. No	Question	Marks	BL	CO	PO	PI
	Part – A **(10 x 1 = 10 Marks)** **Instructions: Answer ALL the Questions**					
1	The linear electro-optic effect is known as A.Kerr effect B.Pockels effect C.Raman effect D.Hall effect	1	1	4	1	1.3.1
2	In Acousto optic modulators, modulating the acoustic wavelength leads to A. Modulating the intensity of reflected optical beam B. Modulating the wavelength of the optical beam C. Modulating the diffraction angle D. Modulating the polarization of the crystal	1	2	4	1	1.3.1
3	If 660nm light passing through KDP crystal then the second harmonic wavelength is A.200nm B. 330nm C.660nm D. 1320nm	1	2	4	1	1.3.1
4	Identify the devise propagate optical signal from one waveguide to another waveguide at 50:50 ratio A. Isolator B. Circulator C. Amplifier D. 3dB coupler	1	1	4	3	3.2.1
5	The disadvantage of hybrid optoelectronic integration A. Lack of compactness and parasitic effects from leads and connectors B. Heating effects C. Bias voltage effects due to leakage currents at the interconnects D. Unable to make flip chip connections	1	2	4	1	1.3.1
6	Losses in integrated optical waveguides are _____ optical fiber losses A.Higher than B. Lower than C. Relatively equal to D. Half of	1	1	5	1	1.4.1
7	_____have been used for many years in microwave applications A. Phased-array antennas B. Avalanche photo diode C. Optical lenses D. High intense LED	1	2	5	1	1.4.1
8	OEIC Transmitter consist of A. Low power laser B. High power laser C. Integrated amplifier D. Photo receiver	1	1	5	3	3.2.2
9	_____ OEIC device is used Doppler effect A. OEIC Temperature sensor B. OEIC Optical read head C. OEIC Velocitimeter D. OEIC High voltage sensor	1	2	5	3	3.2.2
10	_____ is a OEIC temperature sensor material A.SiO2 B. GaAs C.InGaAs D. LiNbO3	1	1	5	3	3.2.2
	Part – B **(4 x 10 = 40 Marks)**					
	SECTION B1 **Instructions: Answer ANY 2 Questions**					
11	(a) Discuss photo-elastic effect and state two types of acoustic modulation techniques and the difference between them.	5	4	4	1	1.3.1
	(b) Explain in brief the Bragg type acousto-optic modulator working principle with a neat diagram. Calculate frequency for and acoustic signal having wavelength of 15mm and the speed in the medium is 350 m/s	5	3	4	2	2.2.1
12	(a) Illustrate $LiNbO_3$ based Mach-Zehnder type single mode waveguide modulator and explain the output characteristics	5	3	4	3	3.2.1

	(b) Describe in brief about faraday rotational optical isolator and calculate the Faraday rotation angle for a 3 cm cavity operated at 0.9T when exposed to 630 nm Laser source. Given verdet constant 60 rad/T-m.	5	3	4	2	2.2.1
13	(a) Draw T-Coupler and 3-dB Coupler and explain the key specification of optical couplers	5	3	4	3	3.2.1
	(b) Sketch basic configurations of optical switches and name few characteristic of photonic switches	5	3	4	3	3.2.1
	SECTION B2 **Instructions: Answer ANY 2 Questions**					
14	(a) Mention few relevant points about the need for optoelectronic integration and draw the OEIC block diagram	5	2	5	1	1.4.1
	(b) Illustrate the channel and ridge waveguide elements and show the distribution of transfers electric field in a slab waveguide	5	3	5	3	3.2.2
15	(a) Explain OEIC based Velocimeter with a detailed diagram.	5	4	5	1	1.4.1
	(b) Explain the working principle of Monolithic wavelength multiplexed optical source	5	4	5	1	1.4.1
16	(a) Give equivalent circuit diagram for OEIC Transmitter and explain its working principle	5	4	5	3	3.2.2
	(b) Illustrate and explain epitaxial structure of OEIC Receiver and explain in brief the working principle.	5	4	5	3	3.2.2

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



Approved by the Course Coordinator **Signature of the Question paper setter**

Evaluation Sheet

Name of the Student: **Register No.:**

Part- A (10 x 1= 10 Marks)					
Q. No	**CO**	**PO**	**Maximum Marks**	**Marks Obtained**	**Total**
1	**CO4**	1	**1**		
2	**CO4**	1	**1**		
3	**CO4**	1	**1**		
4	**CO4**	3	**1**		
5	**CO4**	1	**1**		
6	**CO5**	1	**1**		
7	**CO5**	1	**1**		
8	**CO5**	3	**1**		
9	**CO5**	3	**1**		
10	**CO5**	3	**1**		
Part- B (4 x 10= 40 Marks)					
11(a)	**CO4**	1	**5**		
11(b)	**CO4**	2	**5**		
12(a)	**CO4**	3	**5**		
12(b)	**CO4**	2	**5**		
13(a)	**CO4**	3	**5**		
13(b)	**CO4**	3	**5**		
14(a)	**CO5**	1	**5**		
14(b)	**CO5**	3	**5**		
15(a)	**CO5**	1	**5**		
15(b)	**CO5**	1	**5**		
16(a)	**CO5**	3	**5**		
16(b)	**CO5**	3	**5**		

Consolidated Marks:

CO	**Maximum Marks**	**Marks Obtained**
4	**35**	
5	**35**	
Total	**70**	

PO	**Maximum Marks**	**Marks Obtained**
1	**26**	
2	**10**	
3	**34**	
Total	**70**	

Signature of Course Teacher

Signature of the Course Coordinator **Signature of the Academic Advisor**