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Set-1Course Code: **23MTVLE06**

**MALINENI LAKSHMAIAH WOMEN'S ENGINEERING COLLEGE
(AUTONOMOUS)**

I - M.Tech. I - Semester (MR23) Regular Examinations, March - 2024

PHOTONICS

Department of Electronics & Communication Engineering

Time: 3 hours

Max. Marks: 75

Answer **ALL** the questions – **5*15=75 Marks**

Q. No.	Question		Marks	CO	BL
1	a)	With neat sketch explain Semiconductor optical amplifiers	7M	CO1	L3
	b)	Explain the construction geometry of free electron laser system	8M	CO1	L3
(OR)					
2	a)	Illustrate the forward and backward pumping capability associated with the Raman Amplifier.	8M	CO1	L3
	b)	Explain application of Lasers in Isotope separation	7M	CO1	L3
3	a)	Differentiate Active Mode Locking and Passive Mode Locking.	8M	CO2	L3
	b)	Explain any two Methods of Q- switching.	7M	CO2	L3
(OR)					
4	a)	Explain why it is unwise to place the Q-switch in a Q-switched laser between the gain medium and the output mirror of the resonator	8M	CO2	L3
	b)	Define and explain the terms: Frequency doubling and Phase conjugation	7M	CO2	L3
5	a)	Discuss about LED materials, Device configuration and efficiency	7M	CO3	L4
	b)	The total efficiency of an injection laser with a GaAs active region is 20%. The voltage applied to the device is 3.5 V and the band gap energy for GaAs is 1.4 eV. Calculate the external power efficiency of the device	8M	CO3	L4
(OR)					
6	a)	Discuss the requirement for population inversion in order that stimulated emission may dominate over spontaneous emission. Illustrate with an energy level diagram of a common non-semiconductor laser.	8M	CO3	L4
	b)	Discuss about Injection efficiency, Internal quantum efficiency of optical source.	7M	CO3	L3

7	a	Outline the common LED structures for optical fiber communications, discuss their relative merits and drawbacks	7M	CO4	L3
		A planar LED is fabricated from gallium arsenide which has a refractive index of 3. (i) Calculate the optical power emitted into air as a percentage of the internal optical power for the device when the transmission factor at the crystal-air interface is 0.58. (ii) When the optical power generated internally is 25% of the electric power supplied, determine the external power efficiency.	8M	CO4	L3
(OR)					
8	a	Explain about p-n photodiode with depletion and diffusion regions and also explain p-n photodiode output characteristics with neat sketches.	7M	CO4	L4
	b	Explain about Laser diode amplification	8M	CO4	L3

9	a	Explain about Raman-Nath and Bragg modulators.	8M	CO5	L4
	b	Write about Electro-optic amplitude modulation	7M	CO5	L5
(OR)					
10	a	Discuss the terms :Birefringence, Electro-optic effect	8M	CO5	L4
	b	Write short notes on Electro optic Phase modulation and Amplitude modulation.	7M	CO5	L4
