



PRESIDENCY UNIVERSITY

BENGALURU

Roll No.														
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Make Up Examinations – December 2025

Date: 26 – 12- 2025

Time: 1.00pm to 04.00pm

School: SOE	Program: B. Tech		
Course Code: ECE3021	Course Name: Optoelectronic Materials		
Semester: MK	Max Marks: 100	Weightage: 50%	

CO - Levels	C01	C02	C03	C04	C05
Marks	19	19	41	21	-

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.

10Q x 2M=20M

1.	Define a unit cell and mention its types.	2 Marks	L1	C01
2.	What is called the Brillouin zone?	2 Marks	L1	C01
3.	Compare coherent and non-coherent sources in interference.	2 Marks	L1	C02
4.	State Wien's displacement law.	2 Marks	L1	C02
5.	What is an active medium in a laser?	2 Marks	L1	C03
6.	Compare LED vs. LASER.	2 Marks	L1	C03
7.	Define population inversion.	2 Marks	L1	C03
8.	Represent the output voltage relationship of the boost converter.	2 Marks	L1	C04
9.	Represent the mathematical expression for the Fermi-Dirac distribution.	2 Marks	L1	C04
10.	List any two applications for DC-to-DC converters.	2 Marks	L1	C04

Part B

Answer the Questions.

Total Marks 80M

11.	a.	Explain the following photomultiplier configurations with their advantages (i) Venetian blind (ii) Box/grid (iii) Linear focused (iv) Circular edge focused	20 Marks	L3	CO3
Or					
12.	a.	Light (Photons) is a mysterious phenomenon that can behave like a wave or a particle, depending on how we observe it. Illustrate with an experiment how light and matter can display characteristics of both classically defined waves and particles, along with conditions for sustained interference.	20 Marks	L3	CO3
13.	a.	The basic principle of strained-layer epitaxy is that any material can accommodate a certain amount of elastic strain without generating dislocations or defects. Explain the strained epitaxial heterostructure in detail.	15 Marks	L2	CO1
Or					
14.	a.	Capacitance-voltage (C-V) characterization is used to analyze the electrical properties of dielectric materials, particularly in semiconductor devices like MOS capacitors. Explain the C-V characteristics of MOSFET in detail, along with different modes of operation.	15 Marks	L2	CO1
15.	a.	Explain in detail how the PN junction diode behaves under different bias conditions, with its characteristics.	15 Marks	L2	CO2
Or					
16.	a.	Derive and explain the equation in quantum mechanics, allowing us to find the wave function for a given situation and describe its time-independent equation.	15 Marks	L2	CO2
17.	a.	Identify the optical instrument that emits through an optical amplification process based on the controlled discharge of electromagnetic radiation. which generates a very narrow and dense light beam and explain its principle, construction, working, and applications with a neat diagram.	15 Marks	L2	CO 3
Or					

18.	a.	Thermal detectors detect and respond to temperature or infrared radiation changes. Illustrate the four different thermal detectors in detail and their advantages.	15 Marks	L2	CO 3
19.	a.	Explain the working principle, construction, and working of liquid crystal display (LCD), and which type of addressing scheme is used in flat panel displays.	15 Marks	L2	CO 4
Or					
20.	a.	Illustrate the buck and boost the type converter with a real-time example.	15 Marks	L2	CO 4