

2009**M.Sc.****2nd Semester Examination****ELECTRONICS****PAPER—EL-1201***Full Marks : 40**Time : 2 Hours*

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Answer Q. No. 1 and any three from the rest.

1. Answer any five questions : 5×2
- (a) What do you mean by intermodal and intramodal dispersion ?
 - (b) What is Pockle's effect ?
 - (c) Explain clearly what do you mean by stimulated emission ?
 - (d) What is volumn hologram ?
 - (e) Why four level laser system is more advantageous over three level laser system ?
 - (f) Why 1.33 μm and 1.55 μm are important for choosing wavelengths of propagating light signal through optical fibre ?
 - (g) What do you mean by underfilled and overfilled conditions in launching light through an optical fiber ?

(Turn Over)

- (h) Why nonlinearity in refractive index occurs at highly intense E_r fields when the same material is linear in low fields ?
2. What are the different modes of vibration in CO_2 ? What does the role plays N_2 molecules in CO_2 laser? Explain the mechanism of population inversion in CO_2 laser.
4+2+4
3. Discuss how (a) population invarior (b) coherence and (c) amplification are obtained in a semiconductor laser.
3+3+4
4. (a) What is photo-detector? What are the advantages of p-i-n photo-diode over p-n junction photo diode? Explain the operating principle of p-i-n photo diode.
(b) When 3×10^{11} photons each with a wavelength of $0.85 \mu\text{m}$ are incident on a photo diode, on average 1.5×10^{11} electrons are collected at the terminals of the device. Determine the quantum efficiency and responsibility of the photodiode at the wavelength of $0.85 \mu\text{m}$. Define the efficiency of a semiconductor laser.
(1+2+4)+3
5. What do you mean by step and graded index optical files? Draw ray propagation diagram in both such files with justification. How dispersion is reduced in case of graded index files?
2+2+2+2+2
6. Write short notes on any two of the following topics : 5×2
- (a) Wave guide Dispersion in optical fiber ;
(b) Nd : YAG Laser ;
(c) Light dependent Resistor (LDR) ;
(d) Basic holography equations.