

Name :

Roll No. :

Invigilator's Signature :

CS/M.Tech (ECE-COMM)/SEM-2/MCE-201/2011

2011

PHOTONICS & OPTICAL COMMUNICATION

Time Allotted : 3 Hours

Full Marks : 70

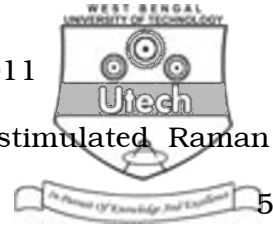
The figures in the margin indicate full marks.

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

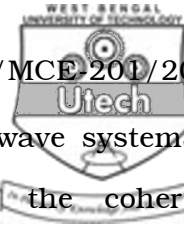
Answer Question No. 1 and any six from the rest.

7 × 10 = 70

1. a) Derive wave guide condition for symmetric planar dielectric slab wave guide. 7
- b) The radius of a step index fibre is 5 micron, core index = 1.48 and clad index = 1.45. Calculate the V value of the fibre. 3
2. a) Discuss photonic band gap in semiconductor. 5
- b) Compare DFB and DBR laser. What do you mean by mode locking in laser ? 5



3. a) Compare stimulated Brillouin and stimulated Raman scattering in optical fibres. 5
- b) Describe optical fibre couplers. 5
4. a) What are the different categories of fibre optic communication systems ? Briefly describe each of the network. 7
- b) What is loss limited and dispersion limited lighted light wave systems ? 3
5. a) Describe power budget and rise-time budget. 5
- b) Discuss the major consideration in design of digital drive circuit for LED source. Illustrate with an example of drive circuit. 5
6. a) A star network uses directional couplers with 0.5 dB insertion loss to distribute data to its subscribers. If each receiver requires a minimum of 100 nW and each transmitter is capable of emitting 0.5 mW, calculate the maximum number of subscribers. 5
- b) Prove that the rise time T_r and the 3 dB bandwidth Δf of an RC circuit are related by $T_r \cdot \Delta f = 0.35$. 5



7. a) What do you mean by coherent light wave systems ?
Explain the basic concepts behind the coherent detection. 5
- b) Explain the different coherent schemes of detection. 5
8. a) What are the different WDM optical network architectures ? Explain Broadcast and Select networks. 5
- b) What are the different optical components used in the implementation of WDM technology in fibre optic communications ? Explain add-drop multiplexers. 5
9. a) What are the advantages of SONET over first generation network ? What are the different SONET signals ? 5
- b) Describe the SONET LAYERS and FRAME structure using a diagram. 5
10. Write short notes on any *two* of the following : 2 × 5
- a) Fibre Bragg gratings
 - b) Optical amplifiers
 - c) Semi-conductor laser amplifiers
 - d) Electro-optic effect.

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