

Total No. of Questions: 09

B.Tech. (ECE) (2011 Batch)/(ETE) (2011 Onwards) (Sem. – 7, 8)

OPTICAL COMMUNICATION

M Code: 71911

Subject Code: BTEC-702

Paper ID: [A3001]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION A

1. Write briefly:

- a) What you understand by fifth generation of WDM lightwave systems.
- b) Give importance of DFB lasers used in optical transmitters.
- c) Define optical receiver sensitivity and give its units also.
- d) Differentiate between SPM and XPM nonlinear effects.
- e) Why generally III-V alloys type semiconductor materials are used in fabrications of optical sources.
- f) Give source limitations becoming obstacles in transmitter circuit design.
- g) What is the importance of normalized frequency? Define it.
- h) What are merits & demerits of preamplifiers circuits used in receiver circuits.
- i) A photodiode has a quantum efficiency of 50% at a wavelength of $0.9\ \mu\text{m}$. Calculate its responsivity at $0.9\ \mu\text{m}$, received optical power if the mean photocurrent is $10^{-6}\ \text{A}$, the corresponding number of received photons at this wavelength.
- j) Explain spectral efficiency of WDM optical communication systems.

SECTION B

2. Define attenuation coefficient. Explain material absorption fiber loss mechanism in optical fibers.
3. Discuss with the aid of a block diagram, the function of an optical fiber receiver. In addition, describe possible techniques for automatic gain control in APD receivers.
4. Describe III-V alloys type semiconductor materials generally used for fabrications of optical sources. Suggest some names of materials for typical wavelengths.
5. Describe briefly optical TDM transmitter design for channel multiplexing of WDM lightwave systems.
6. Discuss light wave systems used for local area networks.

SECTION C

7. Explain optical transmitter design by considering various issues and components used in it.
8. Explain reasons for optical sensitivity degradation by considering various parameters and power penalty mechanisms for them.
9. Explain high capacity point to point WDM lightwave systems.