APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SECOND SEMESTER M. TECH DEGREE EXAMINATION
Electronics & Communication Engineering
(Telecommunication Engineering)
04EC6809—Optical Communication Systems

Max. Marks : 60   Duration: 3 Hours

PART A
Answer All Questions
Each question carries 3 marks

1. What is dispersion in optical fiber and how does it limit the data rate in optical fiber communication systems.
2. Explain the working principle of a two level laser using a p-n junction. How is population inversion achieved in this laser. Derive an expression for the wavelength of the light emitted.
3. Explain the working principle of the avalanche photodiode and its advantages.
4. Indicate the system architecture used in short-haul point-to-point communication systems.
5. What are the methods used for dispersion compensation.
6. Indicate the difference between two and three level lasers. Obtain an expression for the emission wavelength.
7. In what way does amplifier noise affect system performance in optical communication systems.
8. Indicate how the signals operating at $1.33\mu m$ and $1.5\mu m$ are separated using a phased-array demultiplexer.

PART B
Each question carries 6 marks

9. A laser can be used as an optical amplifier or an optical signal source. Indicate how a p-n junction laser is controlled to perform either as an optical source or as an optical amplifier.

OR

10. Derive an expression for the angle of the acceptance cone for an optical fiber cable.
11. Define bit error rate. What is the accepted value for it in design?

OR

12. Indicate the method of combining two noise sources. Derive expressions used.

13. Draw the block diagram of a light wave system using regenerative repeaters and another using optical amplifiers. Compare the two and indicate the best solution for a long haul system.

OR

14. Compare the following types of distribution networks and indicate the application of each (i) Bus topology (ii) Hub topology (iii) Ring topology (iv) Star topology.

15. Explain the methods used for dispersion management.

OR

16. Describe an optical amplifier using stimulated Raman scattering.
17. What is the basic idea used in a soliton based system of optical communication.

OR

18. Indicate how received power is estimated to provide a given bit error rate.
19. Indicate how a semiconductor modulator based on electroabsorption works.

OR

20. Explain the working of a tunable filter using a Fabry-Perot resonator