

**THE KAVERY ENGINEERING COLLEGE**  
(An Autonomous Institution)

**B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025**

**Sixth Semester**

**Electronics and Communication Engineering**

**CEC345 - Optical Communication & Networks**

**Regulations –2021**

**Duration: 3 Hrs**

**Maximum: 100 Marks**

**PART – A (ANSWER ALL QUESTIONS) (Marks 10\*2=20)**

| <b>Q.No</b> | <b>Questions</b>                                                                 | <b>BLT</b> | <b>CO</b> | <b>Marks</b> |
|-------------|----------------------------------------------------------------------------------|------------|-----------|--------------|
| 1.          | List the advantages of an optical fiber communication.                           | L2         | 1         | 2            |
| 2.          | Define group velocity.                                                           | L1         | 1         | 2            |
| 3.          | Mention the factors that cause Scattering losses.                                | L2         | 2         | 2            |
| 4.          | What is intermodal dispersion?                                                   | L1         | 2         | 2            |
| 5.          | What are the characteristics needed for an LED to be used in fiber transmission? | L2         | 3         | 2            |
| 6.          | What is spontaneous emission?                                                    | L1         | 3         | 2            |
| 7.          | What are the methods available for the measurement of attenuation of fiber?      | L1         | 4         | 2            |
| 8.          | State the significance of maintaining the fiber outer diameter constant.         | L2         | 4         | 2            |
| 9.          | What are the basic performance criteria of the WDM?                              | L2         | 5         | 2            |
| 10.         | How is Multiprotocol Label Switching used in an optical communication network?   | L1         | 5         | 2            |

**PART – B (ANSWER ALL QUESTIONS) (Marks 5\*16 = 80)**

| <b>Q.No</b> | <b>Questions</b>                                                                                                           | <b>BLT</b> | <b>CO</b> | <b>Marks</b> |
|-------------|----------------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 11.         | a Explain ray theory of fiber with total internal reflection, Acceptance angle and Numerical Aperture.                     | L2         | 1         | 16           |
|             | <b>Or</b>                                                                                                                  |            |           |              |
|             | b Explain the mode propagation in circular waveguides. Obtain its wave equation and modal equations for step index fibers. | L2         | 1         | 16           |
| 12.         | a Explain Stimulated Brillouin Scattering and Stimulated Raman Scattering in detail.                                       | L2         | 2         | 16           |
|             | <b>Or</b>                                                                                                                  |            |           |              |
|             | b i What is meant by waveguide dispersion? Derive the expression for the same.                                             | L2         | 2         | 8            |

|     |   |                                                                        |                                                                                                                                                                                                                                                                                                                      |    |   |    |
|-----|---|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|----|
|     | i | Derive the expression for pulse broadening due to material dispersion. | L2                                                                                                                                                                                                                                                                                                                   | 2  | 8 |    |
| 13. | a | i                                                                      | Discuss the principle of optical feedback and LASER oscillation.                                                                                                                                                                                                                                                     | L3 | 3 | 8  |
|     |   | i                                                                      | Derive the threshold condition for LASER oscillations.                                                                                                                                                                                                                                                               | L3 | 3 | 8  |
|     |   |                                                                        | <b>Or</b>                                                                                                                                                                                                                                                                                                            |    |   |    |
|     | b |                                                                        | Draw the structure of edge emitting and surface emitting LEDs and Explain the working in detail.                                                                                                                                                                                                                     | L3 | 3 | 16 |
| 14. | a | i                                                                      | A photodiode has a capacitance of 6 PF. Calculate the maximum load resistance which allows an 8 MHz post –detection bandwidth. Determine the bandwidth penalty with the same load resistance when the following amplifier also has an input capacitance of 6pF.                                                      | L5 | 4 | 8  |
|     |   | i                                                                      | Explain the measurement technique used in the case of Numerical aperture                                                                                                                                                                                                                                             | L3 | 4 | 8  |
|     |   |                                                                        | <b>Or</b>                                                                                                                                                                                                                                                                                                            |    |   |    |
|     | b |                                                                        | A trigonometrical measurement is performed in order to determine the numerical of a step index fiber. The screen is positioned 10 cm from the fiber end face. When illuminated from a wide-angled visible source the measured output pattern size 6.2 cm. Calculate the appropriate numerical aperture of the fiber. | L5 | 4 | 16 |
| 15. | a |                                                                        | Elaborate optical circuit switching networks and optical packet switching networks.                                                                                                                                                                                                                                  | L3 | 5 | 16 |
|     |   |                                                                        | <b>Or</b>                                                                                                                                                                                                                                                                                                            |    |   |    |
|     | b |                                                                        | Describe the concept of routing and wavelength assignment technique in the wavelength routed networks.                                                                                                                                                                                                               | L3 | 5 | 16 |