

**PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY**  
**(Autonomous) Kanuru, Vijayawada-520007**

**Department of Computer Science & Engineering (Data Science)**

**IV B. Tech – I Semester**

**Optical Communications**

|                                       |                   |                                |                   |                      |        |
|---------------------------------------|-------------------|--------------------------------|-------------------|----------------------|--------|
| <b>CourseCode</b>                     | 23EC2701B         | <b>Year</b>                    | IV                | <b>Semester</b>      | I      |
| <b>Course Category</b>                | Open Elective III | <b>Branch</b>                  | CSE(Data Science) | <b>Course Type</b>   | Theory |
| <b>Credits</b>                        | 3                 | <b>L-T-P</b>                   | 3-0-0             | <b>Prerequisites</b> | ---    |
| <b>Continuous Internal Evaluation</b> | 30                | <b>Semester End Evaluation</b> | 70                | <b>Total Marks</b>   | 100    |

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| <b>Course Outcomes</b>                                                |                                                                                                |    |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------|----|
| Upon successful completion of the course, the student will be able to |                                                                                                | BL |
| <b>CO1</b>                                                            | Illustrate the basic components of Fiber Optic Communication system and its applications       | L2 |
| <b>CO2</b>                                                            | Illustrate the effects of different types of materials and dispersion losses in optical fibers | L3 |
| <b>CO3</b>                                                            | Interpret different types of Splices & Connectors.                                             | L3 |
| <b>CO4</b>                                                            | Analyze different types of Sources and Detectors in fiber communication link                   | L4 |
| <b>CO5</b>                                                            | Analyze optic Heterodyne Receiver and Optic System Design                                      | L4 |

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**Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3-High, 2: Medium, 1:Low)**

| COs         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| <b>CO1</b>  | 2   |     |     |     |     |     |     |     |     | 2    | 1    | 2    |      |
| <b>CO2</b>  | 3   |     |     |     |     |     |     |     |     | 2    | 1    | 2    |      |
| <b>CO3</b>  | 3   |     |     |     |     |     |     |     |     | 2    | 1    | 2    |      |
| <b>CO4</b>  | 3   | 3   |     |     |     |     |     |     |     | 3    | 1    | 3    |      |
| <b>CO5</b>  | 3   | 2   |     |     |     |     |     |     |     | 2    | 1    | 2    |      |
| <b>Avg.</b> | 3   | 2   |     |     |     |     |     |     |     | 2    | 1    | 2    |      |

| Syllabus |                                                                                                                                                                                                                                                                                                                                                                                                                |           |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Unit No. | Contents                                                                                                                                                                                                                                                                                                                                                                                                       | Mapped CO |
| 1        | <b>Overview of optical fiber communication</b> – History, The Block Diagram, advantages and applications of optical fiber communications.<br><b>Optical Fiber Waveguides</b> - Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Step Index fibers, Graded Index fibers, Effective Refractive Index, & Related problems.                      | CO1       |
| 2        | <b>Fiber Materials:</b> - Glass, Halide, Active glass, Plastic-clad glass fibers and plastic fibers.<br><b>Signal distortion &amp; losses in Optical Fibers</b> - Attenuation, Pulse broadening, Absorption, Scattering and Bending losses, Core and Cladding losses, Information capacity determination, Group delay, Types of Dispersion:- Material dispersion, Wave-guide dispersion, Intermodal dispersion | CO2       |
| 3        | <b>Optical fiber Connectors:</b> Principles, Fiber end Preparation, Splices, Splicing techniques, Connectors, Types of connectors .                                                                                                                                                                                                                                                                            | CO3       |
| 4        | <b>Light Sources and Detectors:</b> Light-Emitting Diodes-Surface Emitting LEDs, Edge Emitting LEDs, Operating Characteristics, Laser Principles, Laser Diodes, Laser-Diode Operating Characteristics, Principles of Photo detection, PIN Photodiode, Avalanche Photodiode                                                                                                                                     | CO4       |
| 5        | <b>Optical Receiver &amp; System Design:</b> Optic Heterodyne Receiver, WDM, Analog System Design, Digital System Design.                                                                                                                                                                                                                                                                                      | CO5       |

| Learning Resources                                                                                                                                                                                                       |
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| <b>Text Books</b>                                                                                                                                                                                                        |
| 1. Gerd Keiser Optical Fiber Communication, McGraw Hill. 3 <sup>rd</sup> Ed., 2003                                                                                                                                       |
| 2. J.M.Senior, Optical Fiber Communication: Principles and Practice, Pearson Ed., 2 <sup>nd</sup> Ed., 2006                                                                                                              |
| <b>Reference Books</b>                                                                                                                                                                                                   |
| 1. Joseph. C. Palais, Fiber Optic Communications, Pearson Education, Asia, 2002.                                                                                                                                         |
| 2. S. C. Gupta, Text Book on Optical Fiber Communication and its Applications, PHI, 2005                                                                                                                                 |
| 3. D. K. Mynbaev, Gupta, Scheiner, Fiber Optic Communications, Pearson Education, 2005                                                                                                                                   |
| <b>e- Resources &amp; other digital material</b>                                                                                                                                                                         |
| 1. <a href="http://www.ocw.titech.ac.jp/index.php?module=General&amp;action=T0300&amp;JWC=201806903&amp;lang=EN">http://www.ocw.titech.ac.jp/index.php?module=General&amp;action=T0300&amp;JWC=201806903&amp;lang=EN</a> |
| 2. <a href="https://www.ll.mit.edu/r-d/communication-systems/optical-communications-technology">https://www.ll.mit.edu/r-d/communication-systems/optical-communications- technology</a>                                  |