**TCET/FRM/IP-02/09** **Semester Plan (Theory)** **Revision: A**

**Semester: VII** **Course: ETRX**

**Subject: : EXC7054: : Optical Fiber Communication** **Class: BE ETRX**

| S.No. | Prerequisite/ Bridge course: | Duration (Week /Hrs) | Modes of Learning | Recommended Sources |
|---|---|---|---|---|
| 1 | **Prerequisite:**<br>EXC503: Electromagnetic Engineering<br>EXC405: Fundamentals of Communication Engineering<br>EXC505: Digital Communication<br>**Bridge course**:<br>Photonic integrated circuits | 20 hours | NPTEL on line Course | **Textbooks:**<br>**1. http://www.optical eletronics .com**<br>**2. http://www.ebook/enhancedebook.org** |

## Class Room Teaching

| Sr. No | Module No. | Lesson No | Topics Planned (Technology to be used) | Teaching Aids Required | Planned /Completion Date | Resource Book Reference | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | SOP | L1.1 | Optical Fiber Communication(theory) | Power point presentation, Chalk & Board | 12.07.17 | | |
| 2 | SOP | L1.2 | Optical Fiber Communication(OBE) | Power point presentation, Chalk & Board | 12.07.17 | | |
| 3 | SOP | L1.3 | Optical Fiber Communication(pract) | Power point presentation, Chalk & Board | 13.07.17 | | |
| 4 | Module 1 | L2.1 | The evolution of fiber optic systems | Power point presentation, Chalk & Board | 17.07.17 | 1.7.1 | |
| 5 | Module 1 | L2.2 | Elements of an optical fiber transmission link, block diagram, | Power point presentation, Chalk & Board | **19.07.17** | 1.7.2 | |
| 6 | Module 1 | L2.3 | Advantages of optical fiber communication, applications | Power point presentation, Chalk & Board | **20.07.17** | 1.7.3 | |
| 7 | Module 1 | L2.4 | Ray theory transmission, total internal reflection, | Chalk & Board, Animation | **21.07.17** | 1.7.4 | |
| 8 | Module 1 | L3.1 | Acceptance angle, numerical aperture and skew rays | Power point presentation, Chalk & Board | **24.07.17** | 1.7.5 | |
| 9 | Module 1 | L3.2 | Modes, electromagnetic mode theory and propagation, | Chalk & Board, Animation | 26.07.17 | 1.7.6 | |
| 10 | Module 1 | L3.3 | single mode and multimode fibers, linearly polarized modes | Power point presentation, Chalk & Board | 27.07.17 | 1.7.7 | |
| 11 | Module 1 | L3.4 | Fiber material, fiber cables and fiber fabrication | Power point presentation, Chalk & Board | 28.07.17 | 1.7.8 | |
| 12 | Module 1 | L4.1 | fiber joints, fiber connectors, splicer | Power point presentation, Chalk & Board | 31.07.17 | 1.7.9 | |
| 13 | Module 2 | L4.2 | Coherent and non-coherent sources, Quantum efficiency, modulation capability of optical sources | Power point presentation, Chalk & Board | 02.08.17 | 2.7.1 | |
| 14 | Module 2 | L4.3 | LEDs: Working principle and characteristics | Power point presentation, Chalk & Board | 03.08.17 | 2.7.2 | |
| 15 | Module 2 | L4.4 | Laser diodes: Working principle and characteristics | Power point presentation, Chalk & Board | 04.08.17 | 2.7.2 | |

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| 16 | Module 2 | L5.1 | Working principle and characteristics of detectors: | Chalk & Board, Animation | 07.08.17 | 2.7.4 | |
| 17 | Module 2 | L5.2 | PIN and APD, noise analysis in detectors, | Power point presentation, Chalk & Board | 09.08.17 | 2.7.5 | |
| 18 | Module 2 | L5.3 | coherent and non-coherent detection | Power point presentation, Chalk & Board | 10.08.17 | 2.7.6 | |
| 19 | Module 2 | L5.4 | receiver structure, bit error rate of optical receivers, and receiver performance | Power point presentation, Chalk & Board | 11.08.17 | 2.7.7 | |
| 20 | Module 2 | L6.1 | receiver structure, bit error rate of optical receivers, and receiver performance | Power point presentation, Chalk & Board | 14.08.17 | 2.7.8 | |
| 21 | Module 3 | L6.2 | Overview of fiber optic networks, | Power point presentation, Chalk & Board | 16.08.17 | 3.7.1 | |
| 22 | Module 3 | L6.3 | trans-receiver, semiconductor optical amplifiers | Power point presentation, Chalk & Board | 18.08.17 | 3.7.2 | |
| 23 | Module 3 | L8.1 | Couplers/splicer, | Power point presentation, Chalk & Board | 30.08.17 | 3.7.3 | |
| 24 | Module 3 | L8.2 | wavelength division multiplexers and de-multiplexers | Power point presentation, Chalk & Board | 31.08.17 | 3.7.4 | |
| 25 | Module 3 | L8.3 | Filters, isolators and optical switches | Power point presentation, Chalk & Board | 01.09.17 | 3.7.5 | |
| 26 | Module 3 | L9.1 | Filters, isolators and optical switches | Power point presentation, Chalk & Board | 04.09.17 | 3.7.6 | |
| 27 | Module 3 | L9.2 | Filters, isolators and optical switches | Power point presentation, Chalk & Board | 06.09.17 | 3.7.7 | |
| 28 | Module 3 | L9.3 | Filters, isolators and optical switches | Power point presentation, Chalk & Board | 07.09.17 | 3.7.8 | |
| 29 | Module 4 | L9.4 | Attenuation, absorption, linear and nonlinear scattering losses | Power point presentation, Chalk & Board | 08.09.17 | 4.7.1 | |
| 30 | Module 4 | L10.1 | bending losses, modal dispersion, | Chalk & Board, Animation | 11.09.17 | 4.7.2 | |
| 31 | Module 4 | L10.2 | waveguide dispersion and pulse broadening, | Power point presentation, Chalk & Board | 13.09.17 | 4.7.3 | |
| 32 | Module 4 | L10.3 | Dispersion shifted and dispersion flattened fibers, and non linear effects | Power point presentation, Chalk & Board | 14.09.17 | 4.7.4 | |
| 33 | Module 4 | L10.4 | Dispersion shifted and dispersion flattened fibers, and non linear effects | Power point presentation, Chalk & Board | 15.09.17 | 4.7.5 | |

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| 34 | Module 4 | L11.1 | Measurement of optical parameters, attenuation and dispersion, OTDR | Chalk & Board, Animation | 18.09.17 | 4.7.6 | |
| 35 | Module 4 | L11.2 | Measurement of optical parameters, attenuation and dispersion, OTDR | Power point presentation, Chalk & Board | 20.09.17 | 4.7.7 | |
| 36 | Module 4 | L11.3 | Measurement of optical parameters, attenuation and dispersion, OTDR | Chalk & Board, Animation | 21.09.17 | 4.7.8 | |
| 37 | Module 5 | L11.4 | SONET and SDH standards, architecture of optical transport networks (OTNs), network topologies | Chalk & Board, Animation | 22.09.17 | 5..7.1 | |
| 38 | Module 5 | L12.1 | SONET and SDH standards, architecture of optical transport networks (OTNs), network topologies | Power point presentation, Chalk & Board | 25.09.17 | 5..7.2 | |
| 39 | Module 5 | L12.2 | Operational principle of WDM, WDM network elements and Architectures, | Power point presentation, Chalk & Board | 27.09.17 | 5..7.3 | |
| 40 | Module 5 | L12.3 | Operational principle of WDM, WDM network elements and Architectures, | Power point presentation, Chalk & Board | 28..09.17 | 5..7.4 | |
| 41 | Module 5 | L12.4 | Introduction to DWDM, Solitons. | Power point presentation, Chalk & Board | 29.09.17 | 5..7.5 | |
| 42 | Module 5 | L13.1 | Introduction to DWDM, Solitons. | Power point presentation, Chalk & Board | 04.10.17 | 5..7.6 | |
| 43 | Module 6 | L13.2 | Point to point links system considerations, | Power point presentation, Chalk & Board | 05.10.17 | 6.7.1 | |
| 44 | Module 6 | L13.3 | link power budget, and rise time budgetTransmission system model, power penalty-transmitter, receiver optical amplifiers | Power point presentation, Chalk & Board | 06.10.17 | 6.7.2 | |
| 45 | Module 6 | L14.1 | crosstalk, dispersion, wavelength stabilizationNetwork management functions, configuration management, | Power point presentation, Chalk & Board | 12.10.17 | 6.7.3 | |
| 46 | Module 6 | L14.2 | performance management, fault management, optical safety and service interface. | Power point presentation, Chalk & Board | 13.10.17 | 6.7.4 | |
| 47 | Module 6 | L15.1 | Transmission system model, power penalty-transmitter, receiver optical amplifiers, crosstalk, dispersion, wavelength stabilization | Power point presentation, Chalk & Board | 16.10.17 | 6.7.5 | |
| 48 | Revision | L4.5 | MOD-1-2 (UoM QUE-ANS) | Power point presentation, Chalk & Board | 05.08.17 | | |
| 49 | Revision | L6.4 | MOD-3(UoM QUE-ANS) | Power point presentation, Chalk & Board | 19.08.17 | | |
| 50 | Revision | L8.4 | MOD-4(UoM QUE-ANS) | Chalk & Board, Animation | 02.09.17 | | |
| 51 | Revision | L10.5 | MOD-5(UoM QUE-ANS) | Chalk & Board, Animation | 16.09.17 | | |
| 52 | Revision | L11.5 | MOD-6(UoM QUE-ANS) | Chalk & Board, Animation | 23.09.17 | | |

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| Remark: | Syllabus Coverage: | Practice Session: 05 | **Content Beyond Syllabus:** Application of Linked List to organize by solving problems and solutions of respective theory. |
| Course: | | | |

No. of (lectures planned)/(lecture taken): 54

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| **Advanced course:** Photonic Integrated Circuits | 20 Hours | Online NPTEL videos with Hands on Training in Laboratory | **Web sources:**<br>1. NPTEL-https://onlinecourses.nptel.ac.in<br>2. www.tutorialpoint.com1. Instructor's study material,<br>**Textbook reference:**<br>1.optical Fiber communication-By-Gred.Keiser,Mc Grw Hill publication |

**Text Books:**

1. . John M. Senior, “Optical Fiber Communication”, Prentice Hall of India Publication, Chicago, 3rd Edition, 2013
2. Gred Keiser, “Optical Fiber Communication”, Mc-Graw Hill Publication , Singapore, 4th Edition, 2012
3. G Agarwal, “Fiber Optic Communication Systems”, John Wiley and Sons, 3rd Edition, New York 2014
4. S.C. Gupta, “Optoelectronic Devices and Systems”, Prentice Hall of India Publication, Chicago, 2005.

**Reference Books:**

1.Fiber Optic Comunication By-Harold Kolimbiris ,Pearson Publication

**Digital Reference:**

*3.1 www.nptel.ac.in*

3.2 www.tutorialpoint.com

Name & Signature of Faculty Signature of HOD Signature of Principal /Dean (Academics)

Date: Date: Date:

**Note:**

1. Plan date and completion date should be in compliance
2. Courses are required to be taught with emphasis on resource book, course file, text books, reference books, digital references etc.
3. Planning is to be done for 15 weeks where 1st week will be AOP, 2nd -13th for effective teaching and 14th -15th week for effective university examination oriented teaching, mock practice session and semester consolidation.
4. According to university syllabus where lecture of 4 hrs/per week is mentioned minimum 55 hrs and in case of 3 lectures per week minimum 45 lectures are to be engaged are required to be engaged during the semester and therefore accordingly semester planning for delivery of theory lectures shall be planned.
5. In order to improve score in NBA, faculty members are also required to focus course teaching beyond university prescribed syllabus and measuring the outcomes w.r.t learning course and programme objectives.
6. Text books and reference books are available in syllabus. Here only additional references w.r.t. non –digital/ digital sources can be written (if applicable)
7. Technology to be used in class room during lecture shall be written below the topic planned within the bracket.