**20ECD14**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
| **February, 2023** | **Electronics & Communication Engineering** | | |
| **Fifth Semester** | **Optical Communications** | | |
| **Time:** Three Hours | | **Maximum: 7**0 Marks | |
| *Answer Question No. 1 Compulsorily.* | | | (14X1 = 14 Marks) |
| *Answer* ***ANY ONE*** *question from each Unit.* | | | (4X14=56 Marks) |

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| 1. | a) | Mention the types of optical fibers. | CO1 | L2 | 1M |
|  | b) | Identify the advantages of optical fiber communications when compared with wireless Communications. | CO1 | L3 | 1M |
|  | c) | Define Acceptance Angle? | CO1 | L1 | 1M |
|  | d) | Explain about dispersion. | CO2 | L2 | 1M |
|  | e) | Write about bending losses. | CO2 | L1 | 1M |
|  | f) | List different optical couplers . | CO2 | L1 | 1M |
|  | g) | Discuss about fiber optic switch. | CO3 | L2 | 1M |
|  | h) | What is population inversion how it can be achieved for a laser diode | CO3 | L2 | 1M |
|  | i) | Write about intensity modulation. | CO3 | L1 | 1M |
|  | j) | What is Stimulated Emission? | CO3 | L1 | 1M |
|  | k) | Write the applications of OTDR. | CO4 | L1 | 1M |
|  | l) | What are source limitations. | CO4 | L1 | 1M |
|  | m) | What is the use of Pre amplifier? | CO4 | L1 | 1M |
|  | n) | Why WDM is preferred for Optical Communications? | CO4 | L2 | 1M |
| **Unit -I** | | | | | |
| 2. | a) | Illustrate the Applications of Optical Fiber Communications in Various fields. | CO1 | L2 | 7M |
|  | b) | Define and explain about Total Internal Reflection and Derive the relation for Numerical Aperture. | CO1 | L3 | 7M |
|  |  | **(OR)** |  |  |  |
| 3. | a) | A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.53 and a cladding refractive index of 1.44 . Calculate the numerical aperture, critical angle at core-cladding interface, acceptance angle in air for the fiber. | CO1 | L4 | 7M |
|  | b) | Discuss in detail about different materials used for Optical fiber manufacturing. | CO1 | L2 | 7M |
|  |  | **Unit -II** |  |  |  |
| 4. | a) | Discuss in detail about different types of Dispersions present in an Optical Fiber. | CO2 | L2 | 7M |
|  | b) | With neat sketches explain in detail about fiber alignment and joint loss. | CO2 | L2 | 7M |
|  |  | **(OR)** |  |  |  |
| 5. | a) | Identify the need of different types of connectors. | CO2 | L3 | 7M |
|  | b) | Examine the nonlinear scattering losses in Optical fiber. | CO2 | L4 | 7M |
|  |  | **Unit -III** | |  |  |
| 6. | a) | With a neat sketch explain about Surface Emitting LED | CO3 | L2 | 7M |
|  | b) | Discuss in detail about the Avalanche Photo Diode. | CO3 | L2 | 7M |
|  |  | **(OR)** |  |  |  |
| 7. | a) | With a neat sketch explain about the operation of Single frequency injection lasers. | CO3 | L2 | 7M |
|  | b) | Analyze in detail about Optical Link Power Budget. | CO3 | L4 | 7M |
|  |  | **Unit -IV** |  |  |  |
| 8. | a) | Identify the need of Advanced Multiplexing Strategies in Optical Communications and Explain about them in detail. | CO4 | L3 | 7M |
|  | b) | Discuss in detail about LED Drive Circuits. | CO4 | L2 | 7M |
|  |  | **(OR)** |  |  |  |
| 9. | a) | Make use of OTDR in assessment of optical measurements. | CO4 | L3 | 7M |
|  | b) | Discuss in detail about the Optical Receiver Circuit. | CO4 | L2 | 7M |

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**SCHEME OF EVALUATION**

1. a) Types of Optical Fibers —1Mark

b) Advantages of Optical Fibers —1Mark

c) Definition of Acceptance Angle —1Mark

d) Definition dispersion —1Mark

e) Definition bending loss —1Mark

f) Optical Couplers list —1Mark

g) fiber optic switch —1Mark

h) Population inversion —1Mark

i) Definition of intensity modulation ---1mark

j) Stimulated Emission explanation —1Mark

k) Applications of OTDR —1Mark

l) Optical Source Limitations —1Mark

m) Use of PreAmplifier - 1Mark

n) WDM – 1Mark

1. a) Any 4 Applications with explanation --- 7Marks

b) Definition and Explanation of TIR --- 3Marks

Numerical Aperture Derivation --- 4 marks

1. a) Problem --- 7 Marks

b) Explanation — 7marks

1. a) Explanation of any three types of Dispersions---7marks

b) Diagrams ---3marks

Explanation —4marks

1. a) Diagrams ---3marks

Explanation —4marks

b) Diagrams ---3marks

Explanation —4marks

1. a) Diagrams ---3marks

Explanation —4marks

b) Diagrams ---3marks

Explanation —4marks

1. a) Diagrams ---3marks

Explanation —4marks

b) Diagrams ---3marks

Explanation —4marks

1. a) Diagrams ---3marks

Explanation —4marks

b) Diagrams ---3marks

Explanation —4marks

1. a) Diagrams ---3marks

Explanation —4marks

b) Diagrams ---3marks

Explanation —4marks