

Q.P.Code:23EC0420

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H.T.No.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech. III Year II Semester Regular Examinations April-2026

MICROWAVE AND OPTICAL COMMUNICATIONS

(Electronics & Communications Engineering)

Time: 3 Hours

Max. Marks: 70

PART-A

(Answer all the Questions 10 x 2 = 20 Marks)

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|---|---|--|-----|----|----|
| 1 | a | Define microwave? Mention their frequency range. | CO1 | L1 | 2M |
| | b | Write different types of modes in waveguide. | CO1 | L1 | 2M |
| | c | What is waveguide terminator and variable short circuit? | CO2 | L1 | 2M |
| | d | What is an isolator? | CO2 | L1 | 2M |
| | e | Mention any two blocks in microwave bench setup with features. | CO3 | L1 | 2M |
| | f | List any two common sources of error and precautions to be followed in microwave measurements. | CO3 | L1 | 2M |
| | g | What is meant by optical communication system? | CO4 | L1 | 2M |
| | h | Define refractive index of a medium. | CO5 | L1 | 2M |
| | i | What are light source materials used in optical transmitters? | CO6 | L1 | 2M |
| | j | State any two characteristics of hetero structure LEDs. | CO6 | L1 | 2M |

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

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|---|---|---|-----|----|----|
| 2 | a | Explain the evolution of microwave technology from its origin. | CO1 | L2 | 5M |
| | b | List out
i) Microwave frequency bands based on the IEEE standards.
ii) Applications of Microwaves | CO1 | L1 | 5M |

OR

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|---|---|--|-----|----|----|
| 3 | a | Explain the working of rectangular and cylindrical cavity resonators with neat diagrams. | CO1 | L2 | 5M |
| | b | Derive the cutoff frequency of a rectangular cavity resonator. | CO1 | L3 | 5M |

UNIT-II

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|---|---|---|-----|----|----|
| 4 | a | Explain the significance and formulation of S-matrix in detail. | CO2 | L2 | 5M |
| | b | List out the properties of S-matrix. | CO2 | L1 | 5M |

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|---|---|---|-----|----|----|
| 5 | a | Explain in detail about 8- Cavity magnetron with suitable diagram. | CO2 | L2 | 5M |
| | b | Describe the operation of pi-mode of 8-Cavity magnetron with neat sketch. | CO2 | L2 | 5M |

UNIT-III

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|---|---|---|-----|----|----|
| 6 | a | Explain the operation and characteristics of Gunn diode. | CO3 | L2 | 5M |
| | b | Discuss the Two-Valley model in Gunn diodes with suitable diagrams. | CO3 | L2 | 5M |

OR

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|---|---|---|-----|----|----|
| 7 | a | Using the Reflectometer method, explain how to measure the impedance with the help a block diagram. | CO3 | L2 | 5M |
| | b | In a setup for measuring impedance of a reflectometer, what is the reflection coefficient when the output of two couplers are 2mw and 0.5mw respectively. | CO3 | L3 | 5M |

UNIT-IV

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|---|---|---|-----|----|
| 8 | a | Describe different types of optical fibers. | CO4 | L2 |
| | b | Derive the expression for numerical aperture (NA) and acceptance angle. | CO4 | L3 |

OR

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|---|---|--|-----|----|
| 9 | a | Discuss how waveguide dispersion can be engineered to achieve zero-dispersion wavelength. | CO5 | L3 |
| | b | Define Mode Field Diameter & Analyze the role of Mode Field Diameter (MFD) in splice loss. | CO5 | L4 |

UNIT-V

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|----|---|---|-----|----|
| 10 | a | Explain the working principle of an LED and its applications in optical communication . | CO6 | L2 |
| | b | Discuss about homo-junction and hetero-junction LEDs with neat diagrams. | CO6 | L2 |

OR

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|----|---|--|-----|----|
| 11 | a | Illustrate in detail about Link power budget. | CO6 | L3 |
| | b | Explain the Rise Time Budget analysis with basic elements. | CO6 | L3 |

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