

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

B.Tech. III Year II Semester Regular & Supplementary Examinations June-2025

MICROWAVE THEORY & TECHNIQUES

(Electronics and Communications Engineering)

Time: 3 Hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

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|---|---|-----|----|----|
| 1 | a Define the following terms: i) Guide wavelength ii) Phase Velocity iii) Group Velocity | CO1 | L2 | 6M |
| | b The dimensions of a guide are 2.5x1cms. The frequency is 8.6 GHz. Find the cutoff frequencies for TE ₁₀ and TE ₀₁ mode. | CO5 | L1 | 6M |

OR

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|---|---|-----|----|----|
| 2 | a Briefly discuss the losses that occur in a transmission structure in ideal and practical situation. | CO5 | L2 | 6M |
| | b List out the features of TEM, TE and TM Modes | CO1 | L1 | 6M |

UNIT-II

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|---|--|-----|----|----|
| 3 | a Explain with neat sketch the working of coaxial line transmission line. | CO1 | L1 | 6M |
| | b A coaxial line has the following physical dimensions. Diameter of inner conductor=0.49cm, Inner diameter of outer conductor=1.10cm, Polyethylene dielectric $\epsilon_r=2.3$. Calculate i) Inductance per unit lengths ii) Capacitance per unit length iii) characteristic impedance iv) the velocity of propagation. | CO5 | L4 | 6M |

OR

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|---|---|-----|----|----|
| 4 | a Explain the working principle of Circulator with a neat sketch. | CO3 | L2 | 6M |
| | b Deduce the S-matrix for Circulator. | CO5 | L4 | 6M |

UNIT-III

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|---|--|-----|----|----|
| 5 | a What is the principle of phase shifter? Discuss the working mechanism of rotary vane phase shifter with neat sketch. | CO3 | L1 | 6M |
| | b Explain the significance and formulation of S-matrix in detail. | CO1 | L2 | 6M |

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|---|---|-----|----|----|
| 6 | a List and explain the applications of magic Tee. | CO2 | L2 | 6M |
| | b Demonstrate the working of Directional Coupler with suitable diagram & express its Coupling factor and directivity. | CO1 | L2 | 6M |

UNIT-IV

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|---|--|-----|----|----|
| 7 | a Discuss the classifications of microwave tubes | CO3 | L2 | 6M |
| | b Distinguish between O type Microwave tubes and M type Microwave tubes. | CO3 | L4 | 6M |

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|---|---|-----|----|----|
| 8 | a Explain the constructional structure of travelling wave tube. | CO6 | L2 | 6M |
| | b List the applications of travelling wave tube. | CO1 | L1 | 6M |

UNIT-V

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|---|---|-----|----|----|
| 9 | a With the help of a neat sketch, briefly explain the functions of different blocks of a microwave bench | CO4 | L2 | 6M |
| | b What are the precautions to be taken while setting up microwave bench for measurement of various parameters? Explain. | CO5 | L1 | 6M |

OR

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|----|--|-----|----|----|
| 10 | a Explain the measurement of Quality factor (Q) using Reflectometer method. | CO6 | L2 | 6M |
| | b Sketch the experimental setup necessary for the measurement of impedance using slotted line. Explain it in detail. | CO6 | L1 | 6M |

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