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

B.Tech III Year II Semester Regular Examinations July-2021
MICROWAVE THEORY AND TECHNIQUES
(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

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|---|---|--|----|----|
| 1 | a | Define Wave-guide and guide wavelength. | L1 | 2M |
| | b | Why TEM mode cannot propagate in rectangular waveguides? | L1 | 2M |
| | c | What is scattering matrix? | L1 | 2M |
| | d | Compare O-type and M-type Microwave tubes. | L2 | 2M |
| | e | Define Reflection coefficient. | L1 | 2M |

PART-B

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

UNIT-I

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|---|---|--|----|----|
| 2 | a | Calculate the characteristics impedance and propagation constant for a transmission line having the following parameters $R=2 \text{ Ohm/m}$, $G=0.5 \text{ mmho/m}$, $L=8 \text{ nH/m}$, $C=0.23 \text{ pF}$, $f=1 \text{ GHz}$. | L5 | 5M |
| | b | What is Phase Velocity? Express it in terms of cut-off frequency and guide wavelength. | L1 | 5M |

OR

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|---|---|---|----|----|
| 3 | a | Classify the Power Losses in Rectangular Guide and explain how to estimate them. | L2 | 6M |
| | b | Identify and elaborate the method to estimate the power transmission for TE_{mn} and TM_{mn} modes. | L5 | 4M |

UNIT-II

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|---|--|---|----|-----|
| 4 | | Deduce expression for E_x , E_y , E_z , H_x , H_y and H_z for TE mode propagation in Rectangular Waveguide. | L5 | 10M |
|---|--|---|----|-----|

OR

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|---|---|---|----|----|
| 5 | a | Discuss about the excitation modes in circular waveguides. | L1 | 4M |
| | b | Explain the working of strip line transmission line with the help of a neat sketch of its field distribution. Obtain the expression for characteristic impedance. | L2 | 6M |

UNIT-III

- 6 a Interpret the coupling mechanism of waveguide. L2 5M
 b Explain the following (i) Waveguide irises (ii) Tuning Screws L2 5M

OR

- 7 Identify the microwave tee, where the H-plane and E-plane tee are combined for Wave propagation. Explain its working mechanism. And derive its S-matrix, L3 10M

UNIT-IV

- 8 a Discuss about the power output, condition for maximum efficiency of two cavity Klystron. L6 6M
 b Write short notes on the characteristics and application of the reflex klystron. L1 4M

OR

- 9 a Explain the constructional details and principle of operation of two cavities Klystron with the neat sketch. L1 7M
 b Illustrate the phenomenon of bunching with the help of Applegate diagram of two-cavity Klystron tube. L2 3M

UNIT-V

- 10 a Explain about measurement of attenuation using a microwave bench setup. L2 6M
 b Using the Wave meter method explain the microwave frequency measurement. L2 4M

OR

- 11 a Show the experimental setup necessary for the measurement of impedance using slotted line. Explain it in detail. L2 5M
 b Using the reflectometer method, explain how to measure the impedance with the help a block diagram. L2 5M

END