

Hall Ticket Number :

R-19

Code: 19A463T

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2023

Microwave Engineering

(Electronics and Communication Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

UNIT-I

1. a) Define Cut-off frequency and dominant mode in a rectangular waveguide with expression. 6M
b) Why TEM Mode cannot exist in a rectangular waveguide. 8M

OR

2. a) What do you mean by Group and Phase velocity in a waveguide and relate them. 6M
b) Compare between different Microwave transmission lines and their modes of propagation. 8M

UNIT-II

3. List the Advantages and Application of Circular Waveguides. Also discuss about Attenuation in Circular Waveguides. 14M

OR

4. An air filled rectangular cavity with brass walls has $\mu = 1.54 \times 10^7$ (s/m) and the following dimensions $a=4$ cm, $b=3$ cm and $d=5$ cm. Determine: (i) The dominant mode and its resonant frequency for this cavity. (ii) Find the Q and the time average stored electric and magnetic energies at resonant frequency, assuming H_0 to be 0.1A/m. 14M

UNIT-III

5. a) Derive the scattering matrix of H-plane Tee? 7M
b) What are the properties of S matrix? Derive the scattering matrix for a 3 port circulator? 7M

OR

6. a) Explain Coupling factor, Directivity and Isolation using Directional coupler. 5M
b) What is meant by Microwave Attenuator? Explain the functioning of flap and vane Attenuators. 9M

UNIT-IV

7. a) Describe the two cavity klystron amplification with the aid of schematic diagram. 7M
b) Obtain expression for round trip transit angle in reflex klystron. 7M

OR

8. a) Compare between Linear and cross field microwave amplifiers. 6M
b) Explain Oscillation mechanism in a Magnetron. 8M

UNIT-V

9. a) Explain the construction of GUNN diode using RWH theory. 7M
b) What is TRAPATT diode and explain the principle of operation? 7M

OR

10. a) What is meant by Avalanche Transit Time Devices? Explain the operation, construction and application of IMPATT. 7M
b) The helical TWT has diameter of 2 mm with 50 turns per cm. Calculate axial phase velocity and a node voltage at which the TWT can be operated for useful gain. 7M
