

Code No: 117FE

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech IV Year I Semester Examinations, March - 2017

MICROWAVE ENGINEERING

(Electronics and Communication Engineering)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

Part- A (25 Marks)

- 1.a) Define dominant and degenerative modes of waveguide. [2]
- b) Write the equation of Q factor of Microstrip line. [3]
- c) Which is the dominant mode in circular waveguide? [2]
- d) What is post and what is the application of it? [3]
- e) Compare 'O' type and 'M' type tubes. [2]
- f) What are the limitations of conventional tubes? [3]
- g) How pi-mode is separated in Magnetron? [2]
- h) How LSA mode of Gunn diode is used to produce oscillations? [3]
- i) Why S-parameters are needed in Microwave frequencies? [2]
- j) Why an Isolator is needed in Microwave bench? [3]

Part-B (50 Marks)

- 2.a) Derive the field equations for Rectangular Waveguide in TE mode starting from Maxwell's equations.
 - b) Why TEM wave is not possible in Rectangular waveguide? [5+5]
- OR**
- 3.a) Draw the field line for the following modes of Rectangular waveguide
i) TE₁₀ ii) TM₁₁ iii) TM₁₂ iv) TM₂₂
 - b) Determine the impedance of Rectangular waveguide in TE and TM mode. [5+5]
- 4.a) What are the different types of Attenuators? Explain them with neat diagrams.
 - b) Draw the structure diagram of E-plane Tee and explain its characteristics. [5+5]
- OR**
- 5.a) Why Matched loads are needed in Microwave circuits? Explain its working with neat diagrams.
 - b) Explain the principle of Faraday rotation. [5+5]
6. Explain how velocity modulation is converted into current modulation with Applegate diagram and also derive the equation for output power efficiency. [10]
- OR**
7. Explain how TWT is increased gain by increasing the bunching of electrons and derive the equation of gain. [10]

- 8.a) Explain how 8-cavity cylindrical Magnetron is used to produce oscillations.
b) What are the applications of Magnetron oscillator? [5+5]

OR

- 9.a) Explain how Gunn diode is used in waveguide oscillator.
b) What are the different avalanche transit time devices? [5+5]

10. Draw the structure of Magic tee and write its characteristics and also derive its S-matrix. [10]

OR

11. Explain how a slot section is used to measure the frequency of a given microwave signal. [10]

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