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Code No: 127FE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B.Tech IV Year I Semester Examinations, May/June - 2019****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) What modes are the dominant modes in TE and TM waveguides. [2]
- b) Define effective permittivity of Microstrip line. [3]
- c) Define Q factor of Circular waveguides. [2]
- d) Compare probe and loop connections. [3]
- e) What are the reentrant cavities? [2]
- f) How Microwave tubes are classified? [3]
- g) What is strapping in Magnetron? [2]
- h) How cross-field concept is used to produce oscillations in Magnetron? [3]
- i) What type of slot is used in Microwave bench? [2]
- j) What are the properties of S-matrix? [3]

PART-B**(50 Marks)**

- 2.a) What are the applications of Microwave frequencies? [2]
- b) Derive the equation for impedance of Microstrip line. [3]
- c) Prove the cutoff frequency of Rectangular waveguide in TM and TE modes is same. [10]

OR

- 3.a) Determine the equations of Fields of Rectangular waveguide in TM mode starting from Maxwell's equations. [5]
- b) Explain the power loss in waveguides with suitable equations. [5]

- 4.a) What are the different types of Phase shifters? Explain them with neat diagrams. [5]
- b) Draw the structure diagram of H-plane Tee and explain its characteristics. [5]

OR

- 5.a) Explain how Ferrites are used for isolators? Explain any one of such circuit. [5]
- b) What are the waveguide windows? How these are used in Microwave circuits? [5]

6. Explain the bunching process of two cavity klystron amplifier with Applegate diagram and also derive the equations for power efficiency. [10]

OR

- 7.a) What are the different oscillating modes in TWT and explain them. [6]
- b) Compare the performance of TWT with Klystron amplifier. [4]

8. Explain the electron bunching process in Cylindrical Magnetron with neat diagrams and derive the Hartree condition. [10]

OR

- 9.a) Draw the characteristics of Gunn diode and explain how negative resistance region is obtained?
b) What are the applications of Gunn diode? [6+4]

10. What are the characteristics of two hole direction coupler and derive the S-matrix of it. [10]

OR

11. Explain how to measure the VSWR of a given load at microwave frequencies with neat block diagram. [10]

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