

III B. Tech II Semester Regular/Supplementary Examinations, October/November - 2020
MICROWAVE ENGINEERING

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**

PART –A

(14 Marks)

1. a) What is Degenerate Mode? [2M]
- b) Define the Quality factor in waveguides. [2M]
- c) What is the avalanche transit time? [2M]
- d) Define the slow wave structure of TWT using any three structures. [3M]
- e) How the microwave power can be trapped from the waveguide for coupling using a directional coupler? [3M]
- f) List out the applications of the TRAPATT device. [2M]

PART –B

(56 Marks)

2. a) Enumerate the basic advantages and applications of microwaves. [7M]
- b) The Dimensions of the Waveguide are 2.5 cm x 1 cm. The Frequency is 8.6 GHz. Find the (i) Possible Modes (ii) Cut off Frequency and (iii) Guide Wavelength. [7M]
3. a) Compare: (i) Transmission Line and Wave Guide [7M]
 (ii) Rectangular Wave Guide and Circular Wave Guide
 (iii) Waveguide and microstrip line.
- b) Explain the mathematical analysis of the rectangular cavity resonator. [7M]
4. a) Explain Working of the reflex klystron. Compare it with two-cavity klystron. [7M]
- b) Explain how the klystron amplifier can act as a klystron oscillator? Discuss the performance specifications of Reflex klystron. [7M]
5. a) With a neat diagram explain the operation of helix TWT. [7M]
- b) An X-band pulsed conventional magnetron has the following parameters: [7M]
 Anode voltage, $V_o=5.5$ KV, Beam current, $I_0=4.5$ A, Operating frequency, $f=9 \times 10^9$ Hz, Resonant conductance, $G_r=2 \times 10^{-4}$ mho, Loaded conductance, $G_l=2.5 \times 10^{-5}$ mho, Vane capacitance, $C=2.5$ PF. Compute: (i) Angular resonant frequency, (ii) Unloaded quality factor, and (iii) Loaded quality factor.
6. a) Using S parameters, explain the properties of a magic tee. [7M]
- b) Explain the coupling mechanism through probe and aperture. [7M]
7. a) Draw the basic block diagram of the microwave test bench setup and explain each part. [7M]
- b) Give at least three differences between microwave transistors and TEDs (i.e. transfer electron devices). Write the statement of the Gunn effect and explain the GaAs diode. [7M]

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