Code No: **R1632042** **R16** SET - 1

III B. Tech II Semester Regular/Supplementary Examinations, August-2021

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 a dominant mode? [2M]
   b) Sketch circular and rectangular wave guide. [2M]
   c) What is bunching process? [2M]
   d) What is meant by strapping? [3M]
   e) What do you mean by S parameter? Why it is be used for analysis of Microwave networks? [3M]
   f) What is transferred electron effect? [2M]

PART –B **(56 Marks)**

2. a) Deduce the electromagnetic field relations for the dominant mode in a rectangular waveguide from the Maxwell's equations. [7M]
   b) A rectangular wave guide with dimension of 4 cm × 3 cm operates in the TM_{11} mode at 10 GHz. Determine the characteristic wave impedance. [7M]

3. a) Write the advantages and disadvantages of rectangular waveguide over circular wave guide. List out the differences between the TE mode and TM mode. [7M]
   b) An air-filled circular waveguide has a radius of 2 cm and is to carry energy at a frequency of 10 GHz. Find all the TEnp and TMnp modes for which energy transmission is possible. [7M]

4. a) Explain the working of multi cavity klystron with necessary diagram and waveforms. [7M]
   b) What is velocity modulation? Explain with a diagram how velocity modulation is utilized in Klystron amplifier? [7M]

5. a) A TWT operates with following parameters: V_b = 2.5 KV; I_b = 25 mA; Z_0 = 10; circuit length, L = 50; f = 9 GHz. Find the gain parameter and power gain. [7M]
   b) Explain favorable and unfavorable electrons with respect to Magnetron. Explain the performance of magnetron and list important applications. [7M]
~~~~~~

6. a) Explain the coupling factor and directivity of the four ports directional coupler. Also derive the S-matrix for completely matched four-port directional coupler. [7M]
   b) Describe the structure of Waveguide irises, Tuning Screws and Posts with diagrams. [7M]

7. a) What are avalanche transit time devices? Explain the operation, construction and application of the IMPATT diode. [7M]
   b) How to measure low power microwave energy? Explain. [7M]

*****