

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER- VII EXAMINATION-SUMMER 2023****Subject Code: 3171001****Date: 26/06/2023****Subject Name: Microwave Theory and Techniques****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

- Q.1** (a) What is the range of microwave frequency? List down the advantages of microwave. **03**
- (b) Show that TEM mode is not possible in rectangular waveguide. **04**
- (c) Enlist the applications of microwave and explain any one. **07**

- Q.2** (a) What is the dominant mode in the rectangular waveguide? Which mode is called the dominant mode in the rectangular waveguide? Rectangular waveguide is which type of filter? **03**
- (b) Demonstrate TE_{10} , TE_{01} , TM_{11} and TE_{11} modes in rectangular waveguide with necessary indications. **04**
- (c) Derive an expression for a TM wave and obtain all the field components in a rectangular waveguide. **07**

OR

- (c) Classify various types of strip lines. Explain microstrip lines. **07**
- Q.3** (a) Which components are used in an equivalent circuit of non – TEM line? Draw the transmission line circuit and explain it in brief. **03**
- (b) Differentiate between active and passive microwave components. **04**
- (c) What is S-parameter? Why it is used at high frequencies? Explain S-parameter in detail with its matrix properties. **07**

OR

- Q.3** (a) What is the difference between microwave power divider and microwave power coupler? Enlist and draw various microwave power dividers and couplers? **03**
- (b) Write a brief note on PIN diode **04**
- (c) Write a short note on Microwave amplifier design. **07**

- Q.4** (a) Explain IMPATT diode in brief. **03**
- (b) Explain the effect of microwave on human body. **04**
- (c) Draw diagram of Magic Tee junction and derive its s-parameter matrix. **07**

OR

- Q.4** (a) Mention the importance of the impedance matching. **03**
- (b) Give difference between E-plane Tee and H-plane Tee. **04**
- (c) Explain two - cavity klystron in detail. **07**

- Q.5** (a) Write a brief note on antennas for ground based systems. **03**
- (b) Explain microwave imaging in a brief. **04**
- (c) Explain medical and civil applications of microwaves. **07**

OR

- Q.5** (a) Demonstrate the working of directional coupler **03**

- (b) Define the following terms and which parameters are measured by them. 1. Spectrum Analyzer 2. Network Analyzer. **04**
- (c) List the various methods for measuring microwave frequencies and explain any one. **07**
