

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 7 – EXAMINATION – SUMMER 2026

Subject Code: 2171001

Date: 01/06/2026

Subject Name: Microwave Engineering

Time: 02:30 PM TO 05:00 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.**

- Q.1**
- (a) What are microwaves? Explain advantages of microwave and its applications **03**
 - (b) Why TEM mode is not possible in Rectangular Wave guide? **04**
 - (c) Draw equivalent circuit of transmission line and derive basic equations for voltage and current on transmission line. Define characteristic impedance of transmission line. **07**
- Q.2**
- (a) Define (i) Standing wave ratio (ii) Return loss (iii) Propagation Constant **03**
 - (b) Sketch circular and rectangular waveguide and compare their dominant mode, advantages and disadvantages. **04**
 - (c) What is the importance impedance matching? Give your answer with respect to transmission line. Derive expression of the length of short-circuit stub for impedance matching on transmission line. **07**
- OR
- (c) Derive necessary equations for attenuation constant and phase constant with reference to EM wave propagating along transmission line. **07**
- Q.3**
- (a) Enumerate merits and demerits of microstrip line compared to other types transmission media at microwave frequencies. **03**
 - (b) Draw and explain waveguide bend, corners and twist in detail with their applications. **04**
 - (c) Draw diagram of E-plane Tee junction and derive s-parameter matrix for the same. **07**
- OR
- Q.3**
- (a) What is magic tee with magic tee junction? **03**
 - (b) What is the purpose of directional Coupler. Define coupling factor, directivity, isolation of Directional coupler and write expression for each. **04**
 - (c) What do you mean by reciprocal network? Draw and explain series tee junction and find its simplified S-matrix using S-parameter. **07**
- Q.4**
- (a) Write down short notes on (i) PIN diode (ii) varactor diode **03**
 - (b) What do you understand by avalanche transit time effect? Explain working, construction, and applications of TRAPATT device. **04**
 - (c) Draw cavity magnetron and explain its working with clear diagrams for π - mode and phase focusing effect. **07**

OR

- Q.4**
- (a)** Explain difference between ordinary PN diode & Schottky diode. **03**
 - (b)** Explain IMPATT Diode with its construction, working and application. **04**
 - (c)** Using Applegate diagram explain working of reflex klystron. Differentiate between klystron and travelling wave tube. **07**
- Q.5**
- (a)** Discuss the effects of microwave on human body **03**
 - (b)** Explain about Microwave power measurement methods **04**
 - (c)** Derive expression for range of the radar. Practically how one can increase the range of radar? **07**
- OR
- Q.5**
- (a)** Explain in brief EMI and EMC issue **03**
 - (b)** Explain Microwave Antennas in detail. **04**
 - (c)** Draw and explain the block diagram of simple RADAR system and differentiate between CW and Pulse RADAR system. **07**
