

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII • EXAMINATION – SUMMER • 2014****Subject Code: 171001****Date: 22-05-2014****Subject Name: Microwave Engineering****Time: 02:30 pm - 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.

Q.1 (a) What are the types of distortion present on a transmission line? Starting from derivation of α and β , derive the condition for distortionless transmission. **07**

(b) A 75Ω transmission line is terminated in a load of $(150 + j225)\Omega$. Design a suitable stub line to match the load to the line. The operating frequency is 500 MHz. Use Smith chart for solving the problem. **07**

Q.2 (a) Explain TE, TM and TEM modes in a waveguide. What is meant by the Dominant mode in a rectangular waveguide? Explain why TEM mode can not propagate through a rectangular waveguide. **07**

(b) (1) Explain the terms: Cut off wavelength (λ_c), Guide wavelength (λ_g) and free space wavelength (λ_o). What is the relationship between them? **07**

(2) Distinguish between Phase Velocity and Group Velocity.

OR

(b) Describe the construction and working of Magic Tee. What are its applications? Explain any one application in detail. **07**

Q.3 (a) Describe the problems associated with conventional tubes at UHF and Microwave? **07**

(b) Explain the construction and working of Magnetron tube. What are its applications? **07**

OR

Q.3 (a) Explain the construction and working of Two cavity Klystron. What are its applications? What will happen when additional cavities are inserted between the buncher and catcher cavities? **07**

(b) What is Faraday's rotation principle? Explain the working of Faraday's rotation isolator. What are its applications? **07**

Q.4 (a) Explain the basic principle of Parametric amplifier. Explain degenerate and non degenerate mode. What are its applications? **07**

(b) What is Tunneling effect? Explain the construction and working of Tunnel diode. What are the applications of Tunnel diode? **07**

OR

Q.4 (a) Explain the construction and working of IMPATT diode. What are its applications? **07**

(b) Explain Calorimeter method of measuring Medium and High microwave power. **07**

Q.5 (a) What is a Doppler effect? Draw and explain the block diagram of MTI radar. **07**

(b) Write a note on Directional coupler and its applications. Explain the terms Coupling factor and Directivity. **07**

OR

Q.5 (a) Explain the principle of Radar. Derive the equation of the range of Radar. Discuss the parameters which affect the range of Radar. **07**

(b) Write a note on any one of the following. **07**

(1) Step Recovery Diode and its applications.

(2) $\lambda/4$ Line and its applications.
