

GUJARAT TECHNOLOGICAL UNIVERSITY**B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012****Subject code: 173201****Date: 26/12/2012****Subject Name: Microwave and Satellite Communication****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain three laws of Kepler's for planetary motion. **07**
(b) (i) List out various applications and advantages of microwaves. **07**
(ii) Explain one of the applications of Magic Tee.

- Q.2** (a) Calculate the propagation constants and phase velocities for the TE_{10} , TE_{01} , TE_{11} modes for a rectangular waveguide with dimensions 7.214 cm x 3.404 cm operating at 5 GHz. **07**
(b) Explain working of Two cavity klystron amplifier and list out application of Two cavity klystron amplifier. **07**

OR

- (b) Prove that it is impossible to construct perfectly matched lossless, reciprocal three port junction. **07**
Q.3 (a) Explain the operation of H-plane Tee junction. Derive the scattering matrix for H-plane Tee. **07**
(b) Show that for TE_{10} mode a frequency of 6 GHz will pass through the guide of dimensions $a = 1.5$ cm, $b = 1$ cm if a dielectric with $\epsilon_r = 4$ is inserted into the waveguide. **07**

OR

- Q.3** (a) What is the PIN diode? Describe the construction of a PIN diode and also its characteristic. **07**
(b) List out application of following devices. **07**
(1) IMPATT
(2) TRAPATT
(3) BARRITT

- Q.4** (a) Explain Doppler effect with respect to RADAR. **07**
(b) Explain different scanning techniques for RADAR. **07**

OR

- Q.4** (a) Explain pulse RADAR systems with necessary block diagram. **07**
(b) Calculate the maximum range of a radar system which operates at 3 cm with a peak pulse power of 600 kW if its antenna is 5 m^2 , minimum detectable signal is 10^{-13} W and the radar cross sectional area of the target is 20 m^2 . **07**

- Q.5** (a) Explain basic transmission theory with necessary equation. **07**
(b) The earth rotates once per sidereal day of 23h 56 min 4.09s. Calculate the radius of GEO satellite in Km. **07**

OR

- Q.5** (a) Explain need of Telemetry, Tracking, command and monitoring system in satellite communication. **07**
(b) Derive wave equation for a TE wave and obtain all the field components in a rectangular waveguide. **07**
