

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII • EXAMINATION – SUMMER • 2014****Subject Code: 173201****Date: 22-05-2014****Subject Name: Microwave and Satellite Communication****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) Explain three laws of Kepler's for planetary motion. **07**
(b) Explain the operation of E-plane Tee junction. Derive the scattering matrix for E-plane Tee. **07**
- Q.2** (a) (i) List out various applications and advantages of microwaves. **07**
(ii) Explain one of the applications of E-H plane Tee. **07**
(b) Determine the cut off wavelength for the dominant mode in a rectangular waveguide of breadth 10 cm. For a 2.5 GHz signal propagated in this waveguide in the dominant mode, find λ_g , V_g , and V_p . **07**
- OR**
- (b) A rectangular wave guide has dimensions 2.5 x 5 cm. Determine the guide wavelength, phase constant β and phase velocity V_p at a wavelength of 4.5 cm for the dominant mode. **07**
- Q.3** (a) Define the following terms. **07**
(1) Phase velocity (2) Group velocity
(3) Guide wavelength (4) Dominant mode.
(b) How are waveguides different from normal two wire transmission lines? Discuss the similarities and dissimilarities. **07**
- OR**
- Q.3** (a) Prove that it is impossible to construct matched lossless, reciprocal three port junction. **07**
(b) Explain the working of TWT. **07**
- Q.4** (a) Discuss the application of PIN diode. **07**
(b) Explain different scanning techniques for RADAR. **07**
- OR**
- Q.4** (a) Explain the basic principles of a RADAR system. Give the applications and limitations of RADARs. **07**
(b) Military RADAR operates at 5 GHz with 2.5 MW power output. If the antenna diameter is 5 m, the receiver bandwidth is 1.6 MHz and has a 12 dB noise figure, what is the maximum detection range for 1 m² target. **07**
- Q.5** (a) Explain need of Telemetry, Tracking, command and monitoring system in satellite communication. **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) Derive wave equation for a *TE* wave and obtain all the field components in a rectangular waveguide. **07**
(b) Explain the need of microwave tubes as compare to conventional tubes at microwave frequencies. **07**
