

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-VII EXAMINATION – WINTER 2015**

**Subject Code: 173201****Date: 12/12/2015****Subject Name: Microwave and Satellite Communication****Time: 10:30am to 1:00pm****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) Do as Directed: **07**  
 (i). State the application of Magic Tee. Explain any two applications in detail with diagram. (ii). State the reason why tubes or transistors cannot be used for UHF
- (b) Define the following terms: **07**  
 (i) Guide wavelength (ii) Klystrons (iii) Phase velocity (iv) Group velocity
- Q.2** (a) Derive wave equation for a TE wave and obtain all the field components in a rectangular waveguide. **07**
- (b) Line is matched if it is terminated in a load equal to its characteristic impedance ( $Z_0$ ). With the help of reflection coefficient find out the equation of  $Z_0$  when  $V_s$  and  $I_s$  will be in phase. **07**
- OR**
- (b) The dimension of a guide is  $2.5 \times 1$  cms. The frequency is 8.6 GHz. Find the following: **07**  
 (a). Possible modes (b). cut-off frequencies (c). guide wavelength.
- Q.3** (a) A 50 ohm lossless line connects a signal of 300 KHz to a load of 100 ohm. If the load power is 50 mW; determine (i) VSWR (ii) Position of first  $V_{min}$  and  $V_{max}$ . (iii).  $V_{min}$  and  $V_{max}$ . (iv). Impedance at  $V_{min}$  and  $V_{max}$ . **07**
- (b) Define VSWR. What is impedance matching? Explain various methods of achieving impedance matching. **07**
- OR**
- Q.3** (a) Draw and explain the operation of Two cavity Klystron amplifier. Also state the applications of Reflex Klystrons. **07**
- (b) Draw and explain Physical construction of TWT and also draw schematic of electrode arrangement. **07**
- Q.4** (a) Explain the construction of Varactor diode with its equivalent circuit. Also explain the static figure of merit and state few applications. **07**
- (b) Draw and explain TTC&M system in satellite communication **07**
- OR**
- Q.4** (a) Only Draw constructions of below and List out the application of following devices IMPATT, TRAPATT, BARRITT **07**
- (b) Define the following terms **07**  
 Perigee, Apogee, Mean Anomaly, Ascending node and descending node, Elevation angle, Eccentricity, Azimuth angle
- Q.5** (a) What are the advantages and limitations of RADAR system? Explain the block diagram of bistatic radar and monostatic radar. **07**
- (b) Two satellites are moving in an elliptical orbit with same perigee but different apogee distances. Satellite 1 is having an orbital period of 5 hours and semimajor axis, 20000 Km. while the orbital period of satellite 2 is 2 hours 50 min. Determine the semimajor axis of satellite. **07**

**OR**

- Q.5**    **(a)**    What are the general requirements for any radar system? Also explain CW radar and Pulsed Radar.    **07**
- (b)**    Draw and Explain Doppler effect with respect to CW Doppler RADAR with its block diagram    **07**

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