

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-VII • EXAMINATION – WINTER 2013

Subject Code: X 71101**Date: 03-12-2013****Subject Name: Microwave Engineering****Time: 10.30 am - 01.00 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) Describe the construction and working of a reflex klystron. **07**
 (b) Explain the principle of amplification in TWT? Explain helix TWT structure. How it is different from klystron. **07**

- Q.2** (a) Explain structure and working of PIN diode. What are the applications of PIN diode? **07**
 (b) Describe construction, principle of operation and working of two cavity klystron amplifier. **07**

OR

- 07**
- (b) Explain impedance matching. What is single stub matching
- Q.3** (a) Draw the standing wave patterns for voltage and current along a transmission line when it is terminated with short circuit, open circuit, matched load, inductive load and capacitive load. **07**
 (b) A rectangular waveguide is having the dimension $a=3$ cm, $b=2$ cm, $\mu_r=1$ and $\epsilon_r=2$. **07**
 Find
 i>The cut off wavelength and the frequency for the TE_{10} , TM_{20} and TM_{11} modes.
 ii>Find λ_g .

OR

- Q.3** (a) Explain the construction, equivalent circuit and application of E-plane Tee. How it is different from H-plane Tee. **07**
 (b) Write short notes on i>Directional coupler, **07**
 ii>Quarter wave Transformer

- Q.4** (a) Determine the cut off wavelength for the dominant mode in a rectangular waveguide of breadth 5 cm for a 5 GHz signal propagated in this waveguide in the dominant mode. Find guide wavelength, group velocity and phase velocity. **07**
 (b) Derive wave equation for TM wave. How waveguides are different from normal two wire transmission lines. **07**

OR

- Q.4** (a) **07**
 i>Explain what is standing wave ratio?
 ii>Give differentiation between TE and TM wave.
 (b) i>Give differentiation between Insertion loss and Return loss **07**
 ii>Give differentiation between two cavity klystron and Reflex klystron.

- Q.5 (a)** Differentiate continuous wave Radar and Doppler Radar. Derive Radar Range equation. **07**
- (b)** Explain MTI Radar with its Block diagram. **07**
- OR**
- Q.5 (a)** **07**
- i>What is Maximum Unambiguous Range?
- ii>A 20 GHz radar has peak transmitted power of 500kw, power gain of antenna is 1500, $S_{\min}$ is 10^{-14} watt; cross sectional area of the radar antenna is 10 m^2 . If this radar is to be used to detect a target of 2 m^2 equivalent cross section, find the maximum range possible.
- (b)** Write short notes on i>Double stub matching. **07**
- ii>Magic Tee.
