Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**PDDC - SEMESTER–VII • EXAMINATION – SUMMER 2013**

**Subject Code: X 71101 Date: 10-05-2013**

**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.**

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|---|---|---|---|
| **Q.1** | **(a)** | Explain the advantage of Microwaves in detail. | **07** |
| | **(b)** | Give the definitions of TEM, TE, TM, HE and applications of microwaves. | **07** |
| **Q.2** | **(a)** | Derive the voltage and current relationship, characteristic impedance and reflection coefficient equations for transmission line. | **07** |
| | **(b)** | Derive the equation for input impedance in terms of characteristics impedance and load impedance for transmission line. Also derive the equations for short circuited open circuited, lossless and quarter wave transformer transmission lines. | **07** |
| | | **OR** | |
| | **(b)** | Explain the losses due to mismatch in transmission lines. | **07** |
| **Q.3** | **(a)** | Write a short note on impedance matching and stub matching. | **07** |
| | **(b)** | A transmission line has the following parameters:<br>R= 2 Ω/m G= 0.5 mmho/m L= 8nH/m<br>C= 0.23pF f= 1 GHz<br>Calculate: a) The characteristic impedance<br>b) The propagation constant. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Write short note on Smith chart. | **07** |
| | **(b)** | Explain similarities and dissimilarities of waveguides and two wire transmission lines. | **07** |
| **Q.4** | **(a)** | Determine the cutoff wavelength for the dominant mode in a rectangular waveguide of breadth 10cm.For a 2.5 GHz signal propagated in this waveguide in the dominant mode, Calculate the guide wavelength, the group and the phase velocities? | **07** |
| | **(b)** | Derive the equation of scattering matrix for E-H plane Tee and list the applications of it. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Derive the equation for scatting matrix of a Directional Coupler. | **07** |
| **Q.4** | **(b)** | Explain in detail Gyrator and Isolator. | **07** |
| **Q.5** | **(a)** | Explain in detail Reflex klystron. | **07** |
| | **(b)** | Discuss the types of Magnetrons and explain operation in detail. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Explain in detail Parametric Amplifier. | **07** |
| | **(b)** | List the advantages, limitations and applications of Radar and derive maximum radar range equation. | **07** |

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