26-Dec-2023 10:30 am - 01:30 pm   1T01037 - B.E.(Electronics and Telecommunication)
(SEM-VII)(Choice Base Credit Grading System) (R- 19) (C Scheme) / 42471 - MICROWAVE
ENGINEERING   QP CODE: 10040118

(3 Hours)   Max. Marks: 80

N.B.: **(1)** **Question No. 1 is compulsory.**
      (2) **Solve any three questions from the remaining five questions.**
      (3) **Figures to the right indicate full marks.**
      (4) **Assume suitable data if necessary and mention the same in answer sheet.**

Q.1   **Attempt any 5 questions**   **[20]**
   (a) List any four applications of Smith Chart?
   (b) Write and explain the S-matrix for isolators.
   (c) What is the dominant mode in a rectangular waveguide? Justify your answer.
   (d) Explain the Faraday Rotation phenomenon with the help of a diagram.
   (e) Compare stripline and microstrip line.
   (f) Explain two valley model theory for Gunn diode with suitable diagram.

Q.2 (a) Design a single stub matching network using short-circuited shunt stub to match   **[10]**
         the terminating load Z_L= 25-j50 Ω to the characteristic impedance Z_0= 50 Ω.
      (b) Derive an expression for velocity modulation of electrons in two-cavity klystron.   **[10]**

Q.3 (a) Derive the field equations for TE modes in a rectangular waveguide.   **[10]**
      (b) Draw and explain a rectangular cavity resonator. Derive the dominant mode in   **[10]**
         the same.

Q.4 (a) Derive the S-parameters of Hybrid Tee. List two applications where a Hybrid Tee   **[10]**
         could be used.
      (b) Explain the principle of operation of IMPATT diode with suitable diagrams and   **[10]**
         waveforms.

Q.5 (a) A two cavity Klystron amplifier has the following parameters: **[10]**
         V_o = 1200V, R_o = 30 KΩ, I_o = 25 mA and f = 10 GHz
         Gap spacing in either cavity: d = 1 mm
         Spacing between the two cavities: L = 4 cm
         Effective Shunt Impedance, excluding beam loading: R_{sh} = 30 KΩ
            a. Find the input gap voltage to give maximum voltage.
            b. Find the voltage Gain neglecting the beam loading in the output cavity
            c. Find the efficiency of the amplifier neglecting the beam loading
         Note: For maximum V_2, $J_1(X)$ = 0.582 at X = 1.841
      (b) Explain the method to measure microwave frequency.   **[10]**

Q.6   **Write short note on: (Attempt any four)**   **[20]**
   (a) Microwave spectrum and bands with their applications
   (b) Waveguide Phase Shifters.
   (c) Impedance Measurement in microwave circuit.
   (d) Microwave Solid State Devices
   (e) Transmission line equations

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