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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year II Semester Supplementary Examinations Dec 2019
MICROWAVE ENGINEERING
(ECE)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 a Explain the wave impedance of a rectangular waveguide and derive the expression for the wave impedance of TE and TM modes. **8M**
- b Calculate the cut-off frequency of the following modes in a square waveguide 4 cm × 4 cm TE₁₀, TM₁₁ and TE₂₂. **4M**

OR

- 2 a Discuss in detail about Q factor of cavity Resonator. **6M**
- b A wave guide operating in TE₁₀ mode has dimensions a = 2.26 cm and b = 1 cm. The measured guide wave length is 4 cm. Find
- i). Cut off frequency of the propagating mode
 - ii). The frequency of operation
 - iii). Maximum frequency of propagation in this mode. **6M**

UNIT-II

- 3 a Explain the coupling mechanism of waveguide. **6M**
- b Explain the following **6M**
- (i) Waveguide windows
 - (ii) Screws

OR

- 4 a Derive the S-matrix for E-plane junction. **6M**
- b Explain the principle of Ferrite phase shifter. **6M**

UNIT-III

- 5 a Give the performance specification of Reflex klystron. **6M**
- b Define and explain current modulation with neat diagrams and required expressions. **6M**

OR

- 6 a Derive the expressions for propagation constant and output power gain of TWT **6M**
- b In an O-type traveling wave tube, the acceleration voltage is 4000 V and the magnitude of the axial electric field is 4 V/m. The phase velocity on the slow wave structure is 1.10 times the average electron velocity. The operating frequency is 2 GHz. Determine the magnitude of velocity function. **6M**

UNIT-IV

- 7 a What is parametric amplifier? **6M**
- b Explain it as an amplifier and frequency converter. **6M**

OR

- 8 a Give the classification of solid state microwave devices along with examples? **6M**
- b An n-type GaAs Gunn diode has following parameters: **6M**
Electron drift velocity: $v_d = 2.5 \times 10^5$ m/s. Negative electron mobility: $\mu_n = 0.015$ m² / v. s. Relative dielectric constant: $\epsilon_r = 13.1$. Determine the criterion for classifying the modes of operation.

UNIT-V

- 9 a Distinguish between low frequency measurement and microwave measurements. **8M**
 b With the help of a neat sketch, briefly explain the functions of different blocks of a microwave bench. **4M**

OR

- 10 a Discuss in detail about measurement of VSWR. **6M**
 b Determine s-parameters of a 10 dB directional coupler of directional coupler of Directivity 30 dB. Assuming directivity of coupler loss-less VSWR at each port under Matched condition is unity. **6M**

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