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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech III Year II Semester Supplementary Examinations July-2021**

**MICROWAVE ENGINEERING**

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 60

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

**UNIT-I**

- 1 a Discuss how the microwave spectrum is categorized into different bands. 4M  
b Derive the expressions for the field components due to TM waves in rectangular waveguide. 8M

OR

- 2 Explain following terms (i) Guide wavelength (ii) Phase Velocity (iii) Group Velocity. 12M

**UNIT-II**

- 3 a Explain the Precision variable attenuator. 6M  
b Draw a typical directional coupler and define directivity and coupling coefficient. 6M

OR

- 4 a Derive the S-matrix for E-plane junction. 8M  
b A 20 dB coupler has a directivity of 30 dB. Calculate the value of isolation. 4M

**UNIT-III**

- 5 a Describe with a neat sketch the constructional details and principle of operation of a reflex klystron tube. 7M  
b Write any two limitations of conventional tubes at Microwave frequencies and explain why. 5M

OR

- 6 a Derive the expressions for propagation constant and output power gain of TWT. 5M  
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. 7M

**UNIT-IV**

- 7 Discuss in detail about cylindrical magnetron. 12M

OR

- 8 a Explain the V-I characteristics of a Gunn diode 6M  
b List the differences between microwave transistor and TED device 6M

**UNIT-V**

- 9 a Discuss about the important considerations when making attenuation measurement 6M  
b Explain about measurement of attenuation using a microwave bench setup 6M

OR

- 10 a Distinguish between the terms: Insertion Loss and Attenuation. With a neat set up, describe the method of measurement of attenuation using a waveguide bench. 8M  
b Write short notes on usage of Isolator and its significance in a microwave bench. 4M

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