

Code No: R1941041

**R19**

**Set No. 1**

**IV B.Tech I Semester Advance Supplementary Examinations, March – 2023**  
**MICROWAVE AND OPTICAL COMMUNICATION ENGINEERING**

**(Electronics and Communication Engineering)**

**Time: 3 hours**

**Max. Marks: 75**

*Answer any FIVE Questions*  
*ONE Question from Each unit*  
*All Questions Carry Equal Marks*

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**UNIT I**

- 1 a) Explain in detail the bunching process and obtain expression for bunching parameter in a two cavity klystron amplifier. [7]  
b) How 8-cavity cylindrical magnetron is used to produce oscillations? Explain. [8]  
(OR)
- 2 a) Draw the structure of TWT and explain its principle. [7]  
b) Derive the criterion for classifying the modes of operation for Gunn effect diodes. [8]

**UNIT II**

- 3 a) What are the various types of waveguide attenuators? Describe them with neat diagrams. [7]  
b) Why s-parameters are needed in Microwave circuits? Mention its properties. [8]  
(OR)
- 4 a) Explain the rotary vane type waveguide attenuator with a neat diagram. [7]  
b) Describe the need of s-parameters in Microwave circuits and derive the S-matrix of a two-port network. [8]

**UNIT III**

- 5 a) What are the various types of optical fibers? Explain them with neat sketches. [7]  
b) Consider two identical single-mode optical fibers that have a core refractive index 1.48 and mode-field radius  $5 \mu\text{m}$  at 1300 nm. Assume the material between the fiber ends is air. Calculate the connector loss in decibels, if the longitudinal offset is  $15 \mu\text{m}$  keeping the other two mechanical misalignments fixed at zero. [8]  
(OR)



- 6 a) What are the different types of fiber optic connectors? Describe them. [7]
- b) Find the core radius necessary for single-mode operation at 1550 nm of a step-index fiber with  $n_1=1.480$  and  $n_2= 1.478$ . What are the numerical aperture and maximum acceptance angle of this fiber? [8]

**UNIT IV**

- 7 a) Explain the principle of operation of edge-emitting LED with a neat schematic diagram. [7]
- b) Explain the Wavelength division multiplexing(WDM) with a neat block diagram. [8]

(OR)

- 8 a) Explain the principle of laser diode with neat diagrams. [7]
- b) Explain the operation of pin photodiode with its energy-band diagram. [8]

**UNIT V**

- 9 a) Explain the various blocks of a microwave bench with a neat diagram. [7]
- b) Explain the measurement of microwave power using bolometer method. [8]

(OR)

- 10 a) Explain the measurement of microwave attenuation by reflection method. [7]
- b) What is OTDR? Why it is used? Explain. [8]

