

**R18**

Code No157CM

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech-IV Year I Semester Examinations, February - 2025

**MICROWAVE AND OPTICAL COMMUNICATIONS**

(Electronics and Communication Engineering)

Time: 3 Hours

Max. Marks: 75

**Note:** i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

**PART – A**

**(25 Marks)**

- 1.a) What is meant by suppression of oscillations? [2]
- b) Explain how amplification takes place in Helix TWT? [3]
- c) What is Hartee condition in Magnetron? [2]
- d) Discuss about the TEDs. [3]
- e) What is meant by the dominant mode of a waveguide? [2]
- f) Write short notes on E- plane Tee [3]
- g) What is an Isolator? What is significance of it? [2]
- h) Differentiate magic tee and circulator. [3]
- i) Describe the function of core and cladding in optical fiber. [2]
- j) Explain WDM in detail. [3]

**PART – B**

**(50 Marks)**

- 2.a) Explain the operation of two cavity klystron amplifier with neat diagram.
  - b) Explain in detail the classification of M type Microwave tubes. [5+5]
- OR**
- 3.a) Explain how TWT is increased gain by increasing the bunching of electrons and derive the equation of gain.
  - b) Derive the expression for output power and efficiency of a 2 cavity klystron. [5+5]
- 4.a) Explain the pi-mode operation of magnetron.
  - b) What is a Gunn Diode? Explain how it works as a Oscillator and also discuss about the characteristic curve. [5+5]
- OR**
- 5.a) Enumerate the concepts involved in the cylindrical travelling wave magnetron.
  - b) What is TRAPATT diode? How it is better than IMPATT diode. [5+5]

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6.a) Write short notes on:

i) Tuning Screws ii) Tuning Posts iii) Bends iv) Terminations

b) What is the need for phase shifters at microwave frequencies? Explain the concept of realizing phase shifting through Dielectric Materials. [5+5]

**OR**

7.a) Write short notes on wave guide discontinuities.

b) Explain the following (i) Precision variable attenuator (ii) Rotary vane attenuator. [5+5]

8.a) Derive the S matrix of a magic Tee.

b) Explain how a slot section is used to measure the frequency of a given microwave signal. [5+5]

**OR**

9.a) With a neat block diagram of typical microwave bench, explain the functionality of each block.

b) Draw the structure of 2-hole directional coupler, and write its characteristics and also derive its S-matrix. [5+5]

10.a) Briefly explain the types of losses occur in optical fiber.

b) Explain LED Structure with neat sketch. [5+5]

**OR**

11.a) Define an optical fiber. Explain in detail different types of optical fibers with neat sketches.

b) Explain P-I-N photo detector with neat sketch. [5+5]

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