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Code No: 157CM

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, February/March - 2022

MICROWAVE AND OPTICAL COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 Hours

Max. Marks: 75

**Answer any Five Questions
All Questions Carry Equal Marks**

- 1.a) Explain in detail the operation of Reflex Klystron and derive equation for its efficiency.
- b) What is Velocity modulation? How is it different from normal modulation? Explain how velocity modulation is utilized in Klystron amplifier. [8+7]
- 2.a) Explain the operation of TWT and derive its gain. Give its characteristics and applications.
- b) What is a Gunn Diode? Explain how it works as a Oscillator and also discuss about the characteristic curve. [8+7]
- 3.a) Explain the operation of magnetron and derive its Hull Cutoff Voltage equation.
- b) Explain the operation of IMPATT Diode and explain its characteristics curve. [7+8]
- 4.a) Discuss the design of Waveguide terminations.
- b) With a neat diagram explain in detail about H-plane tee and determine its S-matrix. [8+7]
- 5.a) What are ferrites? How they are useful in microwaves? Explain faradays rotation.
- b) Explain the design and working principle of a Gyrator. [8+7]
- 6.a) Explain the operation of Magic Tee. Describe how it can be used in constructing a Circulator and a Duplexer.
- b) Discuss in detail the operation of a 2-hole directional coupler, Calculate the coupling factor if the power in the primary waveguide is 65mw and the power delivered to the directional coupler is 7mw. [8+7]
- 7.a) With a neat block diagram of typical microwave bench, explain the functionality of each block.
- b) Define an optical fiber. Explain in detail different types of optical fibers with neat sketches. [8+7]
- 8.a) Explain P-I-N photo detector with neat sketch.
- b) Briefly explain the types of losses occur in optical fiber. [7+8]

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