A-105

Total Pages : 3 **Roll No. ----------**

MPHY-608

Microwave Devices

M.Sc. Physics (MSCPHY)

4th Semester, Examination 2024 (June)

Time: 2:00 hrs Max. Marks: 35

Note : This paper is of Thirty five (35) marks divided into Two (02) Section A and B. Attempt the questions contained in these sections according to the detailed instructions given therein. Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

Section-A (Long-Answer-Type Questions)

Note : Section 'A' contains Five (05) long-answer-type questions of Nine and Half (9.5) marks each. Learners are required to answer any Two (02) questions only.

[2x9.5=19]

P.T.O.

Q.1. Discuss propagation of TE and TM waves in the cylindrical waveguide.

Q.2. Discuss the properties and importance of S matrix. What are basic types of waveguide Tee junctions? Derive the S matrix for H plane Tee.

Q.3. What is directional coupler? Explain its working with the help of a block diagram. Also obtain expression for S matrix of directional coupler.

Q.4. Discuss the construction and operation of tunnel diode and its V-1 characteristics. Describe briefly how the tunnel Diode can be used as microwave amplifier.

Q.5. Write short notes on any 2 of the following:

a. Group and phase velocities in waveguide.

b. S matrix for a two-port junction.

c. Parametric amplifiers.

d. Rotary phase shifter.

Section-B (Short-Answer-Type Questions)

Note : Section 'B' contains Eight (08) short-answer-type questions of Four (04) marks each. Learners are required to answer any Four (04) questions only.

[4x4=16]

Q.1. Discuss about field patterns of TM waves in a rectangular waveguide.

Q.2. A wave is propagated in a parallel plane guide operating in TE mode at a frequency of 6 Gc/s. The separation between plains is 5 cm. Find the cut off wavelength and guided wavelength for the dominant mode.

Q.3. Discuss scattering matrix for lossless Junction.

Q.4. Derive the scattering matrix of H-plane tee.

Q.5. Discuss construction and working of hybrid ring and write its S matrix.

Q.6. Explain the construction and working of four port circulator.

Q.7. Explain the operating principle and construction of TRAPATT diodes.

Q.8. Write a note on Manley-Rowe power relations.

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