K-428

Total Pages : 3 Roll No. .....

MPHY-608

MICROWAVE DEVICES

M.Sc. Physics (MSCPHY)

4th Semester Examination, 2023 (Dec.)

Time : 2 Hours] **[Max. Marks : 35**

Note : This paper is of Thirty Five (35) marks divided into two (02) Sections 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 (9½) marks each. Learners are required to answer any Two (02) questions only.

(2×9½=19)

1. Discuss about reflection in a parallel plane waveguide. What do you mean By TE and TM mode in waveguide? Discuss propagation of TM waves in a circular waveguide.

2. What is the importance of S-matrix? Explain the scattering matrix formulation. Derive the expression for the S matrix for a series element in the transmission line.

3. Explain Faraday rotation, also describe the construction and working of isolator and compare it with the gyrator and circulator.

4. Derive Manley-Rowe power relations.

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

(a) Rectangular waveguides.

(b) H-plane tee.

(c) Directional couplers.

(d) BARITT diode.

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. (4×4=16)

1. What are waveguides? Mention their type, use and advantages.

2. What do you mean by cutoff wavelength (λ_c) and cutoff frequency (f_c) of a waveguide? Write expression for λ_c, f_c in a circular waveguide.

3. Discuss scattering matrix for a two-port junction.

4. What are the characteristics of E-plane Tee? Also draw its equivalent circuit.

5. Explain the construction and working of rotary phase shifter.

6. What is a Hybrid rings? Explain its working and write its S-matrix.

7. Describe the construction and operating principle of IMP ATT diode.

8. Explain parametric up/down converter.
