

P-121

Total Pages : 3

Roll No.

MPHY-608

Microwave Devices

M.Sc. Physics (MSCPHY)

4th Semester Examination, 2023 (June)

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 answer 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 ($9\frac{1}{2}$) marks each. Learners are required to answer any Two (02) questions only.
($2 \times 9\frac{1}{2} = 19$)

- 1.** Discuss the propagation of TM waves in a rectangular waveguide. Derive expression for $\lambda_c, f_c, \lambda_p$ in TM mode.

2. What is S matrix in microwave? Why S matrix is used in microwave analysis? Derive S matrix for a E plane.
3. With the aid of a diagram explain fully the construction and working of gyrator. Compare it with isolator and circulator.
4. Discuss the construction, operating principle, application and disadvantages of IMPATT diode. Compare IMPATT diode with TRAPATT diode and BARITT diodes.
5. Write a short note on any *two* of the following :
 - (a) Tunnel diode.
 - (b) S matrix of magic tee.
 - (c) Parallel plane waveguide.
 - (d) Phase shifters in microwave.

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. Define and fully explain the meaning and consequences of the cutoff wavelength of a waveguide.

2. What is the difference between TE mode and TM mode? What is dominant mode of a waveguide ? Mention dominant mode for rectangular waveguide.
 3. Explain the properties and need of S matrix.
 4. What is the difference between E-plane, H plane and magic tee?
 5. What is Faraday's rotation? Name the microwave passive devices which make use of faraday rotations.
 6. Explain fully the operation of a directional couplers with the help of a block diagram.
 7. Explain TRAPATT diode, it's construction and principle.
 8. What is parametric up/down converter? Explain.
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