C125

PHY-554

Microwave Devices and Communication System

M.Sc. Physics (MSCPHY)

2nd Year, Examination, 2022 (June)

Time : 2 Hours]   **Max. Marks : 80**

Note : This paper is of Eighty (80) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION–A
(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Twenty (20) marks each. Learners are required to answer any Two (02) questions only.

$$(2\times20=40)$$

1. What are the characteristics of rectangular waveguide. Explain about the field patterns of TE and TM waves in a rectangular waveguide.

2. What are the properties of S-matrix and discuss about the scattering matrix of a two-port junction. Also Derive expression for the S-matrix for a shunt element.

3. Explain the operation of Tunnel diode and its volt-ampere characteristics. Describe briefly Tunnel diode working as microwave amplifier.

4. Discuss in detail with a neat diagram about two cavity Klystron. Also derive the equation for velocity modulation.

5. Deduce an expression indicating frequency spectrum of AM wave. Compare Amplitude and Frequency Modulation.

SECTION–B
(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Ten (10) marks each. Learners are required to answer any Four (04) questions only. (4×10=40)

1. What is demodulation? Explain the principle of Square law detector and describe briefly average diode detector for detection of AM wave.

2. Mention the radio frequency bands, band names and their applications. Explain Gain, efficiency and radiation resistance of an antenna.

3. What are the types of loop antennas? Discuss the field patterns of vertical and horizontal loop antennas.

4. What is a parabolic reflector? Describe the geometry of parabolic reflector in transmitting mode and its radiation pattern.

5. Explain the working of basic Radar system. Also derive the Radar range equation.

6. Draw the block diagram of CW radar and explain its working.

7. Define cut-off wavelength and cut-off frequency. What is the relation between λ_p, λ_c and λ_0? Also derive expression for v_p and v_g.

8. What is a directional coupler? Derive expression for the scattering matrix of a directional coupler.

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