PHY-554

MICROWAVE DEVICES AND COMMUNICATION SYSTEM

M.Sc. PHYSICS (MSCPHY-12/13/16/17)

2nd Year, Examination-2020

Time Allowed : 2 Hours Maximum Marks : 80

Note: This paper is of Eighty (80) marks divided into Two (02) sections A and B. Attempt the question 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. (2×20=40)

S-56/PHY-554

P. T. O.

- 1. What are the characteristics of rectangular wave guide if f and fc be the frequency of operation and cut off frequency of the propagating mode inside rectangular waveguide and λ_0 and λ_c is corresponding wavelength to f and fc respectively. Let λg be the wavelength within the waveguide. Then show that $\frac{1}{\lambda g^2} + \frac{1}{\lambda c^2} = \frac{1}{\lambda o^2}$.
- 2. Explain the scattering matrix formulation. Discuss needs of S parameter. Derive expressions for S-matrix for a shunt tee.
- What do you understand by modulation and defnodulation. Discuss need of modulation and it's type. Draw circuit diagram of balanced modulator and explain it's working.

Why is frequency modulation better than amplitude modulation.

4. Discuss why the conventional oscillator circuits cannot be used for generation of microwaves? With the help of neat diagram of two cavity klystron explain it's working and the phenomenon of bunching of electrons.

S-56/PHY-554

5. What is Radar? Discuss the types of Radar. Explain principle of Radar and Basic arrangement of Radar system using block diagram. Derive Radar range equations.

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. Show that TEM wave cannot exist in a single conductor waveguide.
- 2. Write a short note on single side band communication.
- 3. Explain parametric emplifier.
- 4. What is travelling wave tube (TWT)? Explain it's principle of operation.

- 5. Explain types of indicator in pulse Radar.
- What do you understand by TE mode and TM mode in waveguide. Discuss Advantages and disadvantages of waveguide.
- 7. Define the Doppler shift and also derive an expression for the Doppler frequency shift.
- 8. Explain construction and working of tunnel diode.

S-56/PHY-554