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PHY-554

Microwave Devices and Communication System

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

2nd Year, Examination-2019

Time: 3 Hours **Max. Marks: 80**

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Note:- This paper is of Eighty (80) marks divided into two (02) Section 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 fifteen (15) marks each. Learners are required to answer any three (03) questions only. **(3×15=45)**

1. Discuss TE and TM wave propagation between two parallel conducting planes. Obtain expression for (a) group velocity and (b) cut off frequency (c) Guide wavelength.

2. Explain the working of magnetron oscillator. Explain formation of bunches and phase focussing effect in magnetron. What is strapping?

3. What do you understand by the effective height of an antenna? Describe how is it determined experimentally? Obtain an expression for the radiation resistance of a short vertical grounded antenna.

4. Show that only one third of the total power of modulated wave is contained in the two side bands.

   Describe the action of phase discriminator or foster seeley discriminator circuit for the following signal conditions

(a) Centre frequency signals

(b) Signals above the centre frequency

(c) Signals below the centre frequency

5. Write short notes on any two :

a. Travelling wave tube

b. RADAR

c. Microwave antennas

d. IMPATT Diode

Section-B

(Short Answer Type Questions)

Note:- Section-B contains eight (08) short answer type questions of seven (07) marks each. Learners are required to answer any five (05) questions only. **(5×7=35)**

1. Write a note on principle of AM detection and type of A.M. detectors.

2. Explain the scattering matrix formulation and needs of S parameter.

3. Explain need of modulation. Write a note on different types of modulation.

4. What is parameteric up converter? Explain.

5. Show that the TEM wave cannot exist in a single conductor waveguides.

6. What is faraday's rotation?

7. Explain use of tunnel diode as microwave amplifier.

8. Describe the method of amplitude comparison monoplus target tracking RADAR.