Total Pages : 7 Roll No. .....

PHY-554

Microwave Devices and Communication System

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

Second Year Examination, 2019 (June)

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

Note : This paper is of Eighty (80) marks divided into three (03) sections A, B and C. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION–A
(Long Answer Type Questions)

Note : Section 'A' contains four (04) long answer type questions of Nineteen (19) marks each. Learners are required to answer any two (02) questions only.

(2×19=38)

1. What is directional coupler ? Explain the working of a directional coupler with the help of block diagram. Define coupling factor and directivity.

2. Discuss in detail with a neat diagram about two-cavity Klystron. Write an expression for output power and efficiency.

3. What is Radar ? Derive Radar range equations. Write the applications of Radar.

4. What is S-matrix and derive scattering matrix for a two-port junclion.

SECTION–B

(Short Answer Type Questions)

Note : Section 'B' contains eight (08) short answer type questions of eight (08) marks each. Learners are required to answer any four (04) questions only. (4×8=32)

1. Derive expression for TM mode field equation in a rectangular wave guide.

2. Explain the operational principle and construction of IMPATT diode and its major disadvantage.

3. Write short notes on the following :

(a) Need of modulation.

(b) Suppressed carrier balanced modulation.

4. Define cut-off wavelength and cut-off frequency.

5. Discuss how transistor works as an AM modulator.

6. Derive an expression for the Doppler frequency shift.

7. Briefly describe the ratio detector.

8. State and prove antenna theorem.

SECTION–C

(Objective Type Questions)

Note : Section 'C' contains ten (10) objective type questions of one (01) mark each. All the questions of this section are compulsory. (10×1=10)

1. One can provide two or more circuits of the same carrier by using :

(a) DSB-SC

(b) SSB with pilot carrier

(c) ISB systems

(d) SSB-BC system.

2. When the length of Antenna is a whole wavelength :

(a) the radiation at right angles is zero.

(b) the radiation at right angles is maximum.

(c) the radiation is zero in all directions.

(d) the radiation is maximum in all directions.

3. Which of the following does not cause losses in optical fibre cables ?

(a) Stepped index operation

(b) Impurities

(c) Microbending

(d) Attenuation in glass.

4. A solution to the "blind speed" problem is :

(a) To change the Doppler frequency

(b) To vary the PRF

(c) To use monopulse

(d) To use MTI.

5. The COHO in MTI radar operates at the :

(a) intermediate frequency

(b) transmitted frequency

(c) received frequency

(d) pulse repetition frequency.

6. One of the following is not used as a microwave mixer or detector :

(a) Crystal diode

(b) Schottky-barrier diode

(c) Backward diode

(d) PIN diode.

7. SAW devices may be used as :

(a) Transmission media like stripline

(b) Filters

(c) UHF amplifiers

(d) Oscillators at millimeter frequencies.

8. The wavelength of a wave in a waveguide :

(a) is greater than of free space

(b) depends only on the waveguide dimensions and the free-space wavelength

(c) is the inversely proportional to the phase velocity

(d) is directly proportional to the group velocity.

9. For low attenuation, the best transmission medium is

(a) Flexible waveguide

(b) Ridged waveguide

(c) Rectangular waveguide

(d) Coaxial line.

10. Operating frequency of a reflex Kylstron

(a) 4 GHz-200 GHz

(b) 30 KHz-300 KHz

(c) 30 GHz-300 GHz

(d) None of these.