Roll No. …………………..

PHY–554

Microwave Devices and Communication System
M. Sc. PHYSICS (MSCPHY–12/13/16)

Second Year, Examination, 2017

Time : 3 Hours   **Max. Marks : 60**

Note : This paper is of **sixty (60)** marks containing **three (03)** sections A, B and C. Learners are required to 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 fifteen (15) marks each. Learners are required to answer *two* (02) questions only.

1. What is S-matrix and derive scattering matrix for a two-port junction.

2. What is Faraday's rotation ? Describe the construction and working of a Gyrator.

3. What is Travelling Wave Tube (TWT) ? Describe the principle of operation of TWT.

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

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Section–B

(Short Answer Type Questions)

Note : Section 'B' contains eight (08) short answer type questions of five (05) marks each. Learners are required to answer *four* (04) questions only.

1. What are the advantages of a waveguide ?

2. Draw circuit diagram for collector modulation and base modulation and also explain its working.

3. Explain the following :
   (a) Gain
   (b) Efficiency
   (c) Radiation resistance of an antenna.

4. Discuss about BARITT diode.

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

6. A wireless transmitter radiated 4 kW, with an un-modulated carrier wave and 5.2 kW with modulated wave. Assuming negligible distortion, calculate percentage of modulation.

7. Briefly describe the ratio detector.

8. Explain parametric up-convertor.

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.

Write True *or* False against the following :

1. The waveguide dimension decreases as frequency is increased.

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2. E-plane tee is series tee.

3. The working of a circulator is depend on the Doppler effect.

4. Tunnel diode is used for rectification.

5. IMPATT diode have low efficiency

Choose the correct alternative.

6. The value of S_{32} in a Hybrid tee is :

   (a) 1

   (b) $\dfrac{1}{2}$

   (c) $\dfrac{1}{\sqrt{2}}$

   (d) $-\dfrac{1}{\sqrt{2}}$

7. Condition for no-wave propagation in a waveguide is :

   (a) $\lambda_O < \lambda_C \, \lambda_P$

   (b) $\lambda_O < \lambda_C \, \lambda_P$

   (c) $\lambda_O << \lambda_C$

   (d) $\lambda_O = \lambda_C$

8. Antenna lens will be highly dispersive when refractive index (n) is :

   (a) $n < 1$

   (b) $n > 1$

   (c) $n = 1$

   (d) $n = 0$

P. T. O.

9. Cellular phone works in the frequency range :

    (a) 30 kHz—300 kHz

    (b) 300 kHz —3 MHz

    (c) 300 MHz — 3 GHz

    (d) 30 GHz — 300 GHz

10. The two cavity Klystron operates on the principle of :

    (a) Velocity modulation

    (b) Amplitude modulation

    (c) Frequency modulation

    (d) None of these