S-488

Total Pages : 3   Roll No. ....

MPHY-609

Communication System

M.Sc. Physics (MSCPHY)

4th Semester Examination, 2022 (Dec.)

Time : 2 Hours]   **[Max. Marks : 35**

Note : This paper is of Thirty Five (35) 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 Nine and Half (9½) marks each. Learners are required to answer any Two (02) questions only.

$(2×9½=19)$

1. Explain the construction and working principle for Two - Cavity Klystron with velocity diagram.

2. Explain amplitude modulation. Derive the voltage equation of an amplitude modulation wave. What are the limitations of amplitude modulation?

3. Deduce the effect of ground on the radiation by an antenna which is very close to earth.

4. Describe in details the radar transmitting and receiving system with reference to radar antennas.

5. Explain the principal of operation of a superheterodyne receiver for the reception of amplitude modulated signal. Describe how the sensitivity and fidelity of a radio receiver are determined.

SECTION–B
(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Four (04) marks each. Learners are required to answer any Four (04) questions only.   (4×4=16)

1. What is the operating frequency, power output and efficiency of a reflex klystron?

2. What are the performance characteristics of Travelling Wave tube (TWT)?

3. Calculate the maximum range of Radar for the following specifications :

Operating frequency, $f = 10\text{GHZ}$

Peak power transmitted by the Radar, $P_t = 400\text{KW}$

Effective aperture of the receiving Antenna, $A_e = 5\text{m}^2$

Radar cross section of the target, $\sigma = 30\text{m}^2$

Power of minimum detectable signal, $S_{m\ in} = 10^{-10}\text{W}$

4. Why isolation between transmitter of a receiver is required in CW Radar?

5. Find the power gain and directivity (D) of a horn antenna whose dimensions are 10×5 cm operating at a frequency of 6 GHz.

6. An unmodulated carrier frequency is given by 2 MHz. After frequency modulation, the maximum frequency is given by 2.4 MHz. Find the frequency deviation Δf and minimum frequency $f_{m\ in}$.

7. An AM transmitter power is given by 500 Watt. Find the amount of power saved if the carrier and one of the sideband is suppressed with $\mu = 0.8$?

8. Explain the FM transmitter with suitable diagram.

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