

Seat No. : _____

N16-104

November-2014

B.Sc., Sem.-V

304 : Electronics

Time : 3 Hours]

[Max. Marks : 70

Instruction : All questions carry equal marks.

1. (a) Derive the equation for a sinusoidally modulated wave and explain its frequency spectrum. 7

OR

A modulating signal given by $e_m = 2\sin 2\pi 10^4 t$ volts is used to modulate a carrier given by $e_c = 10 \sin 2\pi 10^6 t$, where “t” is time in seconds. The modulated voltage wave is developed across a 50Ω load resistor.

- (i) Write the expression for the modulated wave
 - (ii) Calculate the total average power
 - (iii) Calculate power in one side frequency
 - (iv) Calculate power in carrier component
- (b) Explain how demodulation is achieved in an amplitude modulated wave. How can diagonal peak clipping be avoided ? 7

OR

Why is it important in AM broadcast transmissions to prevent 100% modulation depth being exceeded ? Describe the trapezoidal method for monitoring such transmissions.

2. (a) Derive the equation for a sinusoidally modulated wave using frequency modulation. Define modulation index for FM and draw the instantaneous frequency-time curve for a sinusoidally frequency-modulated wave. 7

OR

Discuss the frequency spectrum and bandwidth of a frequency modulated sinusoidal wave.

- (b) Derive equation for a phase modulated wave. Draw a comparison between the three types of modulation, AM, FM and PM using a stepwave as the modulating signal. 7

OR

Explain the equivalence between FM and PM using necessary equations.

3. (a) Explain in detail the principle behind the working of an antenna. 7

OR

Describe in detail the Yagi-Uda antenna.

- (b) Write in detail how a loop antenna can be used for direction finding. Derive the necessary equation. 7

OR

Explain the effect of ground on the radiation of an antenna.

4. (a) Describe in brief the earth station of a satellite communication system. 7

OR

Write a note on television.

- (b) Write a note on INSAT. 7

OR

Explain what is meant by fixed satellite service.

5. Answer the following in a sentence or **two** : 14

- (i) What is the need for modulation ?
 - (ii) What is the constraint on “m” to avoid negative peak clipping ?
 - (iii) Why SSB is more efficient method of transmission ?
 - (iv) What happens to the average power when a wave is frequency modulated ?
 - (v) Write two applications of a communication satellite.
 - (vi) What is the source of power in a satellite in case of an eclipse ?
 - (vii) What is the periodic time of a geosynchronous orbit ?
 - (viii) What is a dipole ?
 - (ix) Draw the radiation pattern of a ferrite rod antenna.
 - (x) Define Beamwidth of an antenna.
 - (xi) Define radiation resistance of an antenna.
 - (xii) Define phase modulation.
 - (xiii) What is meant by directivity of an antenna ?
 - (xiv) Why is the downlink frequency greater than the uplink frequency ?
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