

Seat No. : _____

NE-107
December-2015
B.Sc., Sem.-V
Core Course-304 : Electronics

Time : 3 Hours]

[Max. Marks : 70

- Instructions :** (1) All questions are compulsory.
(2) Symbols have their usual meaning.

1. (a) Define amplitude modulation. Derive an expression for amplitude modulated wave. Explain the sideband frequencies. Also obtain expression for total power output of the modulated wave. **9**

OR

Explain the linear diode detector and also explain diagonal peak clipping.

- (b) A broadcast transmitter radiates 1.08 kW when the modulation depth is 40%. Calculate the total power when modulation index has been raised to 70%. **5**

OR

An amplitude modulated voltage is represented by the expression,

$e_m = 5(1 + 0.5 \cos (6.280 t)) \cos (2\pi 10^6 t)$. This wave is transmitted by antenna having resistance of 100 Ω . Determine :

- (i) Modulation index
(ii) Frequency of LSB and USB
(iii) Amplitude of LSB and USB
(iv) What will be the power of a carrier wave?
2. (a) Explain frequency modulation and derive the expression for the FM wave. **9**

OR

Explain the sideband frequencies produce in the FM wave. Also explain the power relation in FM.

- (b) In FM system modulating frequency is 1000 Hz, maximum carrier frequency is 100.05 MHz and minimum frequency is 99.95 MHz. 5

- (i) What is frequency modulation index ?
(ii) What is peak frequency deviation ?

OR

An FM wave is represented by $e = 10 \sin (3.14 \times 10^8 t + 5 \sin 6280 t)$ V. calculate the peak frequency deviation and modulation index. What power will the wave dissipate in a 100 ohm load ?

3. (a) Explain basic principle of Antenna. How does it transmit the electromagnetic wave ? 7

OR

Explain the principle of loop aerial and obtain the expression for the output voltage.

- (b) Write a short note on Yagi antenna. 7

OR

Explain the following terms related to Antenna :

- (i) Antenna pattern
(ii) Radiation resistance
(iii) Radiation efficiency
(iv) Beam width

4. (a) Draw block diagram of satellite communication Earth Station and explain it. 7

OR

Write a note on Indian Domestic Satellite (INSAT).

- (b) Write a note on 7
(i) Satellite System
(ii) Fixed Satellite Service

OR

Explain :

- (1) End links, and
(2) SCPC, in satellite communication.

5. Answer the following question in short. (Each question carries 1 marks)

14

- (1) What is the maximum allowed bandwidth of an AM system ?
 - (2) In AM the carrier wave is $e_c = 10 \sin 2\pi 105t$ and one of the side frequency is $e = 3 \cos 1.96 \pi 105t$. Write the expression for other sideband.
 - (3) Draw the trapezoidal pattern for $m_a = 100\%$.
 - (4) In trapezoidal pattern of AM wave, the length of one side of pattern is 5 unit and other side is of 3 unit. What is the modulation index of AM wave ?
 - (5) Give the Carson's rule of bandwidth for FM.
 - (6) A FM wave has $m_f = 4$. How many significant side bands will be in FM wave ?
 - (7) What is phase modulation ?
 - (8) What is the significant side band in FM ?
 - (9) What is a folded dipole ?
 - (10) Draw the current and voltage distribution of standing wave in antenna.
 - (11) Draw the radiation pattern of Ferrite rod Antenna.
 - (12) Which frequency range is used for transmission in satellite ?
 - (13) What is a LNA ?
 - (14) What is the band width of a transponder used in INTELSAT satellite ?
-

