

Paper ID [EC301]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Semester - 5th)

ANALOG COMMUNICATION SYSTEMS (EC - 301)

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

Section - A

Q1) **(10 × 2 = 20)**

- a) Modulation Index of AM.
- b) Frequency Deviation of FM.
- c) Selectivity.
- d) Transistor Mixer.
- e) Sample and Hold Circuits.
- f) SPATTER
- g) Relation between SNR & BW.
- h) Multiplexing.
- i) Pulse Position Modulation.
- j) Narrow banding.

Section - B

(4 × 5 = 20)

Q2) What do you mean by a word Communication in general? Explain an electronic communication systems block diagram.

Q3) Explain the Quadrature Detector Circuit with the help of block diagram.

Q4) (a) Obtain a General expression for average power in a complex wave in a amplitude modulated wave where total modulation index is give by $m_1^2 = m_1^2 + m_2^2 + m_3^2 + m_4^2 + \dots + m_n^2$, where modulation Index m_1, m_2, m_3, \dots are defined for each harmonic frequency.

- (b) An AM Voltage is represented by the expression

$$V = 5[1+0.6 \cos(6280t)]\sin(2\pi \times 10^4t) \text{ volts}$$

State: (i) Modulation Depth (ii) f_m (iii) period of Carrier wave (iv) the peak instantaneous value of the modulated wave.

Expand the expression and calculate the rms voltage of lower side frequency component. The modulated wave is applied across the resistance of 1 K Ohms, what is the power dissipated?

- Q5) (a) Describe FM stereo system and mono system.

- (b) For a FM wave presented by voltage equation

$$V_{FM}(t) = 10\sin(8 \times 10^8t + 7\sin 6 \times 10^4t)$$

Determine the carrier frequency, modulating frequency, modulating index, maximum deviation, power dissipated in 8 ohm load.

- Q6) Explain the High-level Amplitude Modulation Technique with suitable diagram.

Section - C

(2 × 10 = 20)

- Q7) What is Filter method? Describe the working of Filter method. What is the principle for Generation of SSBSC waves?

- Q8) (a) An amplitude modulated wave is represented by

$$V_{CM} = V_c [1 + 0.4\cos(2\pi \times 10^3t)]\sin(2\pi \times 10^7t)$$

The wave is passed through a filter which removes the Carrier. Then this carrier is re inserted with a phase change of 90 degree. Show that the resulting wave is phase modulated. Determine the peak deviation, peak frequency deviation, depth of residual amplitude modulation and frequency of the residual amplitude modulation.

- (b) Obtain Compare AM and FM methods.

- Q9) (a) Explain the working of PLL FM Detector.

- (b) A PM transmitter is operating at a carrier of 100 MHz with a carrier voltage of 8 V, the Modulation Signal has an amplitude of 3V and a frequency of 6kHz, resulting in deviation of 60kHz. Write the voltage equation for the following conditions.

- (i) Original Values.
- (ii) Audio amplitude increased to 4 V.
- (iii) Audio frequency increased to 8kHz.
- (iv) Audio changed to 2V and 3 kHz.