15101

B. Tech 4th Semester Examination

Communication System (OS)

EC-4001

Time : 3 Hours   **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all selecting one question from each of the sections A, B, C & D. Section E is compulsory.

SECTION - A

1. (a) Explain the generation technique of an AM wave, using the square law modulator.   (10)

   (b) Explain the working of diode detector for AM demodulation.   (5)

   (c) The efficiency of an AM wave is defined by $\eta = \dfrac{P_s}{P_t} \times 100$,

   where P_s is the power carried by two sidebands and P_t is the total power of AM signal. Find the efficiency for modulation index (m_a) = 0.5.   (5)

2. (a) What are the AM receiver characteristics and also explain AM receiver with phased locked loop (PLL), briefly. (10)

   (b) How the AGC can be used in the detection of AM signal? Draw the suitable block diagram for super heterodyne radio receiver.   (10)

[P.T.O.]

SECTION - B

3. (a) The carrier frequency of a broadcast FM signal is 200 MHz. The maximum deviation is 90 kHz. If the highest audio frequency modulating the carrier is limited to 25 kHz, what is the approximate bandwidth required? (10)

   (b) Explain narrow band FM and wide band FM in detail.   (10)

4. (a) In how many ways we can detect the FM signal? Explain balanced slope detector.   (10)

   (b) What is the significance of using pre-emphasis and de-emphasis, give suitable reason with circuit diagram. (10)

SECTION - C

5. (a) What is SSB? How it can be generated using ring modulator method? What are the advantages of transmitting the SSB signal?   (10)

   (b) Mathematically and with spectral analysis, compare AM and FM.   (10)

6. (a) What is phase modulation (PM)? Derive the relationship of phase modulation (PM) and frequency modulation (FM).   (10)

   (b) How vestigial sideband is used in TV broadcasting, explain VSB in detail.   (10)

SECTION - D

7. (a) How the demodulation is done for pulse position modulated waves? Explain.   (10)

   (b) Explain the significance of natural sampling and flat top sampling in pulse amplitude modulation.   (10)

8. (a) Explain Pulse time modulation (PTM) and Pulse Width Modulation (PWM) with waveforms in detail.   (10)

   (b) With suitable expressions, draw and explain the frequency spectrum for Pulse Amplitude Modulation (PAM).   (10)

SECTION - E

9. (a) A sinusoidal modulating voltage of amplitude 5V and frequency 1 kHz is applied to a frequency modulator. The frequency sensitivity of modulator is 40 Hz/V. The carrier is 100 kHz. Calculate frequency deviator.

   (b) What is modulation and why it is needed in wireless communication ?

   (c) What is independent side band system (ISB)?

   (d) How high power linear modulator does work?

   (e) Explain briefly FM stereo multiplexing.

   (f) What are the advantages of single side band (SSB) transmission over conventional amplitude modulating (AM) signals?

   (g) Define pulse position modulation (PPM).

   (h) Why the mixing is necessary in communication systems?

   (i) Write a short note on RC phase shift method for generating the FM signal.

   (j) How the demodulation is done for PAM signals, explain briefly.   (2×10=20)