

[Total No. of Questions - 9]
(2063)

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B.Tech 4th Semester Examination

Communication Systems-I

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 each from section A, B, C & D. Section-E is compulsory.

SECTION - A

1. (a) Define Amplitude Modulation and modulation Index. Use a sketch of sinusoidal modulated AM waveform to help the definition and derive the relation between the output power of an AM transmitter and the depth of modulation? (10)
- (b) Explain the working of Double Heterodyne radio receiver systems for AM demodulation with suitable diagrams? (10)
2. (a) Explain the working of envelope detector for AM demodulation? Enumerate the drawbacks of such detector? (10)
- (b) Draw the circuit of square law diode detector and explain its working with suitable diagram. A 360W carrier is

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simultaneously modulated by two audio waves with modulation percentage of 55 and 65 respectively. What is the total sideband power radiated?

(10)

SECTION - B

3. (a) Explain with the help of a block diagram Armstrong's systems of generating FM waves? (10)
- (b) The carrier frequency of a broadcast FM signal is 100 MHz. Maximum deviation is 75 kHz. If the highest audio frequency modulating the carrier is limited to 15 kHz. What is the approximate bandwidth required? (10)
4. (a) What are different methods of FM detection? Explain briefly the Foster-Seeley discriminator. (10)
- (b) Explain how phase locked loop (PLL) can be used as an FM demodulator? (10)

SECTION - C

5. (a) With the help of a block diagram explain the principle of obtaining single sideband suppressed carrier signals using filter method and ring modulator method. (10)
- (b) What is Vestigial Sideband (VSB) transmission? How is it used in TV broadcast? (10)
6. (a) Explain the basic difference between frequency and phase modulation with the help of simple mathematical expressions. (10)

- (b) Explain the advantage of FM over AM? Compare AM with FM with special reference to power requirements, Signal to Noise Ratio (SNR) and bandwidth required? (10)

SECTION - D

7. (a) How can we generate Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM) signals? (8)
- (b) Discuss the method of synchronization in pulse position modulated systems. Describe the principle of Pulse Position Modulation (PPM)? (12)
8. (a) With the help of suitable mathematical expression, draw and explain the frequency spectrum for pulse amplitude modulated waveform? (10)
- (b) Explain the process of demodulation of Pulse Position Modulated waves? (10)

SECTION - E

9. (a) What is the need of modulation in communication systems?
- (b) Define sensitivity and selectivity of a radio receiver.
- (c) What is the need for pre-emphasis in FM modulation?

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- (d) State the difference between narrow band and wide band FM signals?
- (e) What are the advantages of Single Side Band (SSB) transmission over conventional AM signals?
- (f) In an FM system, if modulation index is doubled by halving the modulating frequency, what will be the effect on the maximum deviation?
- (g) What is the need of mixers in communication systems?
- (h) What is double spotting in radio receiver? How it can be reduced?
- (i) State modulation index for AM and FM signals?
- (j) Define the Pulse time modulation? **(2×10=20)**