

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2064)

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B. Tech 4th Semester Examination

Communication Systems-I (O.S.)

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) Draw the block diagram of communication system and explain each block? Describe various sources of noise in communication system. (10)
- (b) Define amplitude modulation and modulation index. Derive the relation between the output power of AM transmitter and depth of modulation. (10)
2. (a) Draw and explain the function of each of block of the super heterodyne receiver. What are the advantages of the super heterodyne receiver over TRF receiver? (10)
- (b) Of all the frequencies that must be rejected by a super heterodyne receiver, why is the image frequency so important? What is the image frequency and how does it arise? If the image frequency rejection of receiver is insufficient, what steps could be taken to improve it?(10)

SECTION - B

3. (a) With the aid of vector diagrams, explain what happens when a carrier is modulated by a single noise frequency? (8)

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- (b) Describe the method of generation of FM by Armstrong method and RC phase shift method. (12)
4. (a) Explain how the ratio detector demodulates an FM signal, proving that the output voltage is proportional to the difference between the individual input voltages to the diode. (10)
- (b) The equation of an angle modulation voltage is: $v = 10\sin(10^8t + 3\sin 10^4t)$. What form of angle modulation is this? Calculate the carrier and modulating frequencies, the modulation index and the deviation. (10)

SECTION - C

5. (a) Describe the generation of SSB by Filter method. What are the Advantages of SSB? (10)
- (b) Describe the 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) Describe the Independent side band system (ISB). What are its advantages? (10)

SECTION - D

7. (a) How can we generate Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM) signals? (10)
- (b) What is PAM modulation? Explain the modulation and demodulation of PAM signals. (10)
8. (a) What is fundamental difference between pulse modulation on one hand and amplitude and frequency modulation on other? (10)
- (b) Enumerate the difference between the PWM, PPM, and PAM in details. (10)

SECTION - E

9. (a) An AM transmitter radiates 50W when the carrier is not modulated. Determine the total power when carrier is modulate with modulation index of '1'.
- (b) What is role of mixer in super heterodyne receiver?
- (c) What is the output of envelope detector for input $A \cos 2\pi f_c t + B \sin 2\pi f_c t$?
- (d) State the difference between narrow band and wide band FM signals.
- (e) A super heterodyne receiver is tuned to 555 kHz. The local oscillator frequency is tuned to 1010 kHz, $Q=50$. Determine image frequency?
- (f) What is AGC in radio receivers? Explain.
- (g) Define sensitivity and selectivity of radio receiver.
- (h) Draw block diagram of TRF receiver.
- (i) Define modulation index and frequency deviation in FM modulation.
- (j) Draw the AM waveform of Sinusoidal signal for (i) 10% modulation (ii) 100% modulation and (iii) 150% modulation.
(2×10=20)