B.Tech Even Semester Examination, May, 2025

Electronics & Communication Engineering

(4th Semester)

Course No: ECC-251/ECE-401

(Analog and Digital Communication)

Full Marks: 70

Pass Marks: 28

Time: 3 hours

Note:

1. Attempt any five questions taking one from each unit.
2. Begin each answer in a new page
3. Answer parts of a question at a place
4. Assume reasonable data wherever required
5. The figure in the right margin indicates full marks for the question
6. All the mathematical symbols and abbreviations have their usual meanings.

UNIT-I

1. a. With suitable block diagram, discuss wireless communication system 10

   b. A carrier wave is represented by the expression $v(t)=10\ \sin\omega t$. Draw the waveform of an AM wave for m=0.5. 4

2. An AM transmitter radiates 9KW of power when the carrier is unmodulated and 10.125 kW when the carrier is sinusoidally modulated. Find the modulation index, percentage of modulation. Now, if another sine wave, corresponding to 40 % of modulation is transmitted simultaneously, then calculate the total radiated power. 4+4+6

Turn Over

UNIT-II

3. Derive the expressions of following FM signals

   a. NBFM

   b. WBFM 7+7

4. a. Explain FDM with suitable diagram. 7

   b. In a coin-tossing experiment, if the coin has head, one die is thrown and the result is recorded. But, if the coin has tail, two dice are thrown and their sum is recorded. Find the probability that the recorded number is 2. 7

UNIT-III

5. a. Explain TDM with suitable diagram. 7

   b. A message signal of 10 cos8ð x10^{3}t is transmitted through a PCM system. Sampling rate is 25% higher than nyquist rate. Maximum quantization error can be atmost of 0.1% of peak amplitude of message signal. Find all the parameters. 4+3

6. With suitable block diagram, discuss PCM in brief. 14

UNIT-IV

7. Discuss Amplitude shift Keying with ASK transmitter, ASK receiver, and constellation diagram. 5+5+4

8. Discuss Phase shift Keying with PSK transmitter, PSK receiver, and constellation diagram.5+5+4

UNIT-V

9. a. Consider a binary memoeryless source X with two symbols x_1 and x_2 . Prove that H(X) is maximum when both x_1 and x_2 are equiprobable. 10

   b. A discrete memoryless source (DMS) X has four symbols x_1, x_2, x_3 and x_4 with probabilities $P(x_1)=0.4$, $P(x_2)=0.3$, $P(x_3)=0.2$, and $P(x_4)=0.1$Calculate H(X). 4

10. With proper example, discuss Viterbi algorithm in brief. 14

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