Punjab Engineering College (Deemed to be university)
End-Term Examination

Programme: B.E(ECE) **Year/Semester:22231**
Course Name: Analog & Digital Communication **Course Code: EC 1351**
Maximum Marks: 50 **Time Allowed: 3 hrs**
Note:

- **All questions are compulsory.**
- **The candidates, before starting to write the solutions, should please check the question paper for any discrepancy and also ensure that they have been delivered the question paper of right course code.**

Sr. No.	Questions	Marks	Bloom's Level	Mapped CO
1	(a) Define mutual information of two random variables, X and Y. (b) Let us consider a binary source with source alphabet, S={S1,S2} with probabilities {7/16,9/16}, calculate the entropy for this source.	1+2	L1 & L4	CO-4
2	(a) Describe the block diagram of a digital communication system. (b) Illustrate the difference between digital baseband and pass-band communication.	3+1	L2 & L3	CO-3
3	Explain Phase locked loop for FM demodulation in detail. Also discuss lock range and capture range.	5	L3	CO-1
4	Describe the process of sampling and quantization for a continuous time band limited signal with a maximum frequency of f_m.	5	L2	CO-2
5	Discriminate AM and DSB-SC modulation. Give the percentage power saving in DSB-SC modulation as compared to AM.	5	L5	CO-1
6	Explain Delta modulation. Comment on slope overload noise and granular noise.	5	L3	CO-2
7	Explain Quadrature phase shift keying along with its constellation diagram. Determine its bandwidth requirement and energy per symbol.	5	L4	CO-3

8	Consider the random variable: $X = \begin{pmatrix} x_1 & x_2 & x_3 & x_4 & x_5 & x_6 & x_7 \\ 0.50 & 0.26 & 0.11 & 0.04 & 0.04 & 0.03 & 0.02 \end{pmatrix}$ (a) Develop a binary Huffman code for X. (b) Evaluate the code efficiency.	3+2	L5 & L6	CO-4
9	Examine the use of Minimum shift keying in eliminating phase discontinuities.	5	L1	CO-3
10	Consider a (7,4) linear block code defined by the generator matrix: $\vec{G} = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$ (a) Find all the possible codewords. (b) Determine whether the given code is a hamming code or not. (c) Estimate the minimum hamming distance for this code. Determine the error detecting and correcting capability of the code. (d) Find the parity check matrix, H of the code. (e) If the received codeword is r = [1 1 0 1 0 1 1], compute the syndrome and correct the error if any.	2+1+3+1+1	L3 & L5	CO-4