Sub Code: ECT 052 **ROLL NO……..……..**

ODD SEMESTER EXAMINATION, 2024 – 25

3rd Year, Vth Semester, B.Tech. – Electronics & Communication Engineering

Digital Communication

Duration: 3:00 hrs **Max Marks: 100**

Note: - Attempt all questions. All Questions carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption made in the answer. The part (a) of each question have two questions with 5 marks each and (b) & (c) parts are of 10 marks each.

Q 1.	Answer any two parts of the following. (10x2= 20) a) i) Explain the following terms: 1. Entropy 2. Binary symmetric channel ii) Consider an AWGN channel with 6 KHz bandwidth and noise power spectral density $n/2 = 10^{-12}$ w/Hz and signal power is 0.2 mW. Calculate the capacity of the channel. b) A discrete source emits 6 symbols with probabilities 1/2, 1/8, 1/4, 1/4, 1/16 and 2/8. Determine entropy H(X) and Information rate R c) A discrete memory less source has an alphabet of seven symbols with probabilities [0.15, 0.32, 0.62, 0.15, 0.14, 0.12, 0.16]. Compute the Huffman code for this source, moving a combined symbol as high as possible. Compute the efficiency of the code.
Q 2.	Answer any four parts of the following. (10x2= 20) a) (i) Explain Differential Pulse Code modulation in detail. ii) Explain Adaptive delta modulation technique. b) Explain Delta Modulation with the help of block diagram. Give a brief idea about slope overload and granular noise distortion. c) Explain different line coding techniques with the help of suitable example.
Q 3.	Answer any two parts of the following. (10x2= 20) a) Explain the following terms: i) Companding ii) Nyquist rate b) Explain the Eye diagram or Eye pattern in digital communication with the help of neat diagram. c) Explain why the matched filter is called as an optimum filter. Also, derive the impulse response of the matched filter.
Q 4.	Answer any two parts of the following. (10x2= 20) a) i) Draw the structure of Differential PSK Modulation scheme and explain its operation. (5 marks) ii) Explain the working of BPSK modulation and demodulation. b) Discuss the generation and detection of coherent QPSK signals with neat block diagrams. (10 marks) c) Explain Binary Frequency shift keying (BFSK) and Binary phase shift keying (BPSK) mechanism with the help of neat sketch.

Q 5.	Answer any two parts of the following. (10x2= 20) a) i) Explain hamming codes and discuss the syndrome decoding method to correct errors. (ii) Explain Convolution encoding mechanism with the help of a suitable example. b) Explain the concept of linear block codes and define the following: i. Code rate ii. Code efficiency iii. Data rate iv. Weight of the code c) Explain the concept of cyclic codes and generate a non-systematic and systematic code word for a (7,4) cyclic code if the generator polynomial is given as $G(P)= P^3+P^2+1$ and the message is [1100].

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