K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

Nov – Dec 2024

B. Tech Program — Scheme II B/3E

Regular Examination: TY EXTC — Semester: V

Course Code: EXC 501 — Course Name: Digital Communication

Date of Exam: 22/11/2024 — Duration: 02.5 Hours — Max. Marks: 60

Instructions:
(1)All questions are compulsory.
(2)Draw neat diagrams wherever applicable.
(3)Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any **two** questions out of three: (05 marks each)	10		
a)	Show that (4,3) Even-parity code is a linear.		CO3	Ap
b)	Calculate Checksum Generator and Checker for following message using 2's complement: 10110001, 10101011, 00110101, 10100001		CO2	Ap
c)	Explain White Gaussian Noise, its pdf and effect of Gaussian Noise on Bipolar Signal		CO5	U
Q 2	Solve any **two** questions out of three: (05 marks each)	10		
a)	Explain optimum receiver with appropriate conclusion		CO5	U
b)	Encode the message 101 in systematic form using polynomial division and the generator $g(x) = 1+x+x^2+x^4$		CO3	Ap
c)	Generator sequences of a convolutional encoder are $g^{(1)} = 1000$, $g^{(2)} = 1001$, $g^{(3)} = 1111$. a) Sketch the encoder b) Find the code rate and constraint length c) Find the code word for the message 100		CO3	Ap
Q.3	Solve any **two** questions out of three. (10 marks each)	20		
a)	Determine: Linear block code having parity check equation— c4=d1+d2+d3, c5=d1+d2, c6=d1+d3. Calculate G and H matrix, error detection and correction capacity of the code, decode the		CO3	Ap

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	received codeword____101100			
b)	Explain Digital modulation technique with modulator, demodulator, waveforms, frequency spectrum, bandwidth, equation of error probability, constellation diagram, Merits of BASK.		CO6	U
c)	Solve: A discrete memoryless source has an alphabet of six symbols with their probabilities as shown: Symbol: M1 M2 M3 M4 M5 M6 Probability: 0.3 0.25 0.15 0.12 0.08 0.10 Determine Entropy, Efficiency and Redundancy by Shannon Fano and Huffman Encoding algorithm.		CO1	Ap
Q.4	Solve any **two** questions out of three. (10 marks each)	20		
a)	Explain Unipolar RZ and Polar NRZ line code with Waveform, Explanation, advantages, disadvantages.		CO4	U
b)	Compare Binary – ASK, FSK and PSK		CO6	U
c)	For a bit stream of 0110100110 plot the waveform of: 1. BASK 2. BPSK 3. FSK 4. QPSK 5. MSK		CO6	U

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