

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

Nov – Dec 2025		
Program: B. Tech	Scheme: IIB	
Backlog Examination	TY Semester: V	
Course Code: EXC501 and	Course Name: Digital Communication	
Date of Exam: 26/11/2025	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)	Draw the block diagram of a digital communication system and briefly explain the function of the Source Encoder.		1	U
b)	Define the term error control system.		2	U
c)	Write the steps for the generation of a Linear Block Code.		3	U
Q 2	Solve any two questions out of three: (05 marks each)	10		
a)	Explain the phenomenon of Inter Symbol Interference (ISI) and one common method used to mitigate it.		4	U
b)	Explain the principle of the Integrate and Dump Receiver		5	U
c)	Explain the Generation of Binary FSK modulation with a neat diagram.		6	U
Q.3	Solve any two questions out of three. (10 marks each)	20		
a)	Explain the concept of source entropy and the properties of the AWGN channel.		1	U
b)	Design an encoder for a (7, 4) Cyclic Code using the generator polynomial $G(x) = x^3 + x + 1$. Draw the block diagram of the encoder and explain its operation.		3	Ap
c)	Draw the signal space constellation diagram for 16-ary QASK. Calculate and compare the Euclidean distance between signal points for 16-ary QASK and 16-ary PSK (M-ary PSK)		6	Ap

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

Nov – Dec 2025		
Program: B. Tech	Scheme: IIB	
Backlog Examination	TY Semester: V	
Course Code: EXC501 and	Course Name: Digital Communication	
Date of Exam: 26/11/2025	Duration: 02.5 Hours	Max. Marks: 60

Q.4	Solve any two questions out of three. (10 marks each)	20		
a)	For a (7, 4) Linear Block Code, the parity check matrix is given by: $H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$ (a) Find the Generator Matrix (G) and all the valid codewords. (b) Find the minimum Hamming distance ($d_{\min}$) and the error correction capability (t) of the code.		3	Ap
b)	For the binary data stream 10101100, sketch and label the waveforms for the following line codes: NRZ Polar, NRZ Manchester, and NRZ Bipolar (AMI format) Discuss the advantages of Manchester over NRZ Polar.		4	Ap
c)	Explain the generation and detection process of Minimum Shift Keying (MSK) modulation. Justify why MSK is considered an improvement over traditional FSK schemes by discussing its continuous phase property and its resulting spectral efficiency.		6	Ap
