

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2025)

CLASS: BTECH
BRANCH: ECE

SEMESTER : V/ADD
SESSION : MO/2025

SUBJECT: EC301 DIGITAL COMMUNICATION

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

		CO	BL
Q.1(a) State the low pass sampling theorem. What causes the aliasing?	[1+1]	3	2
Q.1(b) Given the signal $m(t) = 10 \cos 2000\pi t \cos 8000\pi t$. Find the minimum sampling rate based on the band pass sampling theorem.	[3]	1	2,3
Q.2(a) Explain the need of commanding. Draw an input-output characteristics which provides compression.	[1+1]	1	2
Q.2(b) A binary channel with bit rate $R_b = 36000$ bits per second is available for PCM voice transmission. Find appropriate values of the sampling rate, number of quantization level, and the binary digits n, assuming $f_M = 3.2$ kHz.	[3]	1	3
Q.3(a) What are the limitations of a Delta modulator?	[2]	2	4
Q.3(b) Draw the waveforms for the sequence 10110010 using polar return to zero, AMI and Manchester signaling.	[1+1+1]	1	3
Q.4(a) How is orthogonality of two signals defined?	[2]	2	1
Q.4(b) Draw the signal space diagram of signals $x_1(t), x_2(t), x_3(t)$ given by $x_1(t) = A\sqrt{T}u_1(t)$ $x_2(t) = \frac{3}{2}A\sqrt{T}u_1(t) + \frac{1}{2}A\sqrt{T}u_2(t)$ $x_3(t) = \frac{3}{2}A\sqrt{T}u_1(t) - \frac{1}{2}A\sqrt{T}u_2(t)$	[3]	3	3
Q.5(a) Prove that the correlator and matched filters give identical reception performance.	[2]	3	4
Q.5(b) In a data transmission system, '0' and '1' are represented by the presence and absence of the waveform shown in the figure. Show a graphical representation of the response of the Matched filter.	[3]	3	2

