BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

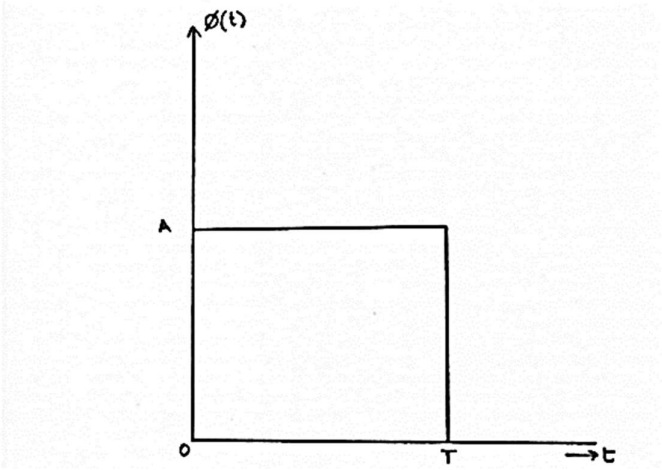
CLASS: B.TECH **SEMESTER : VI**
BRANCH: ECE **SESSION : SP/2023**

SUBJECT: EC353R1 DIGITAL COMMUNICATION

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	What do you mean by 'slope overload distortion in the Delta Modulation system? Assuming a sinusoidal message signal and no slope overload, derive an expression for the maximum value of the destination signal-to-quantization noise ratio.	[5]	1	3
Q.1(b)	In a binary PCM system, the output signal-to-quantization noise ratio is to be held to a minimum value of 40 dB. Determine the number of required levels and find the corresponding output signal-to-quantizing noise ratio.	[5]	1	2
Q.2(a)	What is an 'integrate-and-dump' circuit? Show that it is the matched filter for the rectangular pulse of duration T sec.	[5]	2	3
Q.2(b)	The figure shows a finite energy signal Φ(t). (i) Sketch the impulse response $h_{opt}(t)$ of the optimum filter matched to Φ(t) and (ii) Determine the value of the output of the matched filter at t = T, assuming noise is zero and input is Φ(t).	[5]	2	5



Q.3(a)	With the help of a neat schematic block diagram, explain the working of a DPSK transmitter and receiver.	[5]	3	2
Q.3(b)	Find the symbol rate for BPSK, QPSK, 8-PSK, and 16-PSK digital modulation schemes if the bitrate is 256 Mbps.	[5]	3	3
Q.4(a)	Explain the terms: Entropy, Information rate, and Channel capacity. Show that the entropy is maximum when all the symbols of a discrete memoryless source are equiprobable.	[5]	4	2
Q.4(b)	A standard 4 kHz telephone channel has SNR = 25 dB at the receiver input. Calculate its information-carrying capacity. If bandwidth is doubled, how much does the capacity increase, assuming the transmitted signal power remains constant?	[5]	4	3
Q.5(a)	Explain with the help of a block diagram Direct Sequence Spread Spectrum (DSSS)	[5]	5	2
Q.5(b)	What are the advantages and disadvantages of the Frequency Hopping Spread Spectrum technique?	[5]	5	2

::::::27/04/2023::::::M