



PRESIDENCY UNIVERSITY

BENGALURU

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End - Term Examinations - MAY /JUNE 2026

Date: 22-05-2026

Time: 01:00pm – 04:00pm

School: SOE	Program: B. Tech	
Course Code: ECE3169	Course Name: Digital Communication	
Semester: VI	Max Marks: 100	Weightage: 50%

CO - Levels	C01	C02	C03	C04	C05	C06
Marks	15-20	20-25	20-25	15-20	15-20	15-20

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.

10Q x 2M=20M

1.	What is signal reconstruction?	2 Marks	L1	C01
2.	What is the use of source encoder in digital communication?	2 Marks	L1	C01
3.	What is practical aspects of sampling?	2 Marks	L2	C02
4.	Define Differential PCM (DPCM).	2 Marks	L2	C02
5.	What is Delta Modulation (DM)?	2 Marks	L2	C03
6.	State Nyquist criterion for zero ISI.	2 Marks	L2	C03
7.	What is eye pattern?	2 Marks	L2	C04
8.	What is the use of PN sequence in spread spectrum modulation?	2 Marks	L2	C04
9.	What is chip rate?	2 Marks	L2	C05
10.	What is Frequency Hopping Spread Spectrum (FHSS)?	2 Marks	L2	C06

Part B

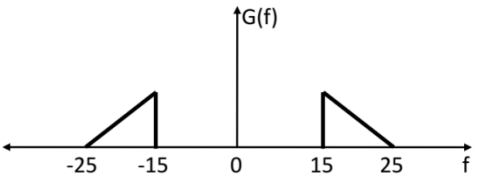
Answer the Questions.

4Qx 20M = 80M

11.	a.	Explain the block diagram of a digital communication system with functions of each block.	10 Marks	L3	CO1
	b.	The signal $g(t) = 2\cos(4\pi t) \cdot \cos(500\pi t)$ is sampled at the rate of 600 samples/sec (i) Determine the spectrum of resulting sampled signal (ii) What is the Nyquist rate for $g(t)$ (iii) What is the cutoff frequency ideal low pass filter?	10 Marks	L3	CO2

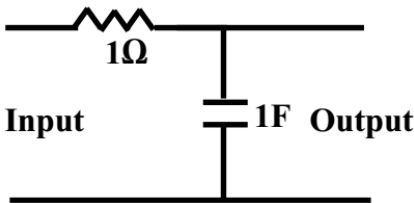
Or

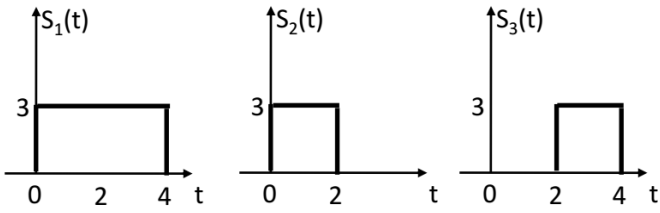
12.	a.	48 voice signals are time division multiplexed and then uniformly sampled using natural sampling, the width of each pulse is $1\mu s$. The multiplexing operation includes provision for synchronization by adding one extra pulse of sufficient amplitude and also $1\mu s$ duration, the highest frequency component of each voice signal is 3.4 kHz. (i) Assuming a sampling rate of 8kHz, calculate spacing between successive pulses of the multiplexed signal (ii) Repeat the calculation assuming Nyquist rate of sampling	10 Marks	L3	CO1
	b.	Three independent message sources of bandwidth 2kHz, 3kHz and 3kHz are to be transmitted using TDM scheme. Determine (i) The speed of the commutator if each signal is sampled at its Nyquist rate (ii) Minimum transmission bandwidth (iii) Give the commutator arrangement	10 Marks	L3	CO2

13.	a.	Explain coherent FSK digital modulation technique with block diagram and associated waveforms?	10 Marks	L3	CO3
	b.	A band pass signal $g(t)$ with a spectrum shown in Fig. 2 is ideally sampled. Sketch the spectrum of sampled signal at $f_s=25\text{Hz}$ and 40Hz and indicate how the signal can be recovered  Fig. 2	10 Marks	L3	CO3

Or

14.	a.	Explain QPSK modulation and demodulation with constellation diagram and mathematical representation	08 Marks	L2	CO5
	b.	A binary input sequence is $b_k=\{0,0,1,1,0\}$. Convert the binary sequence to polar form and determine the duobinary encoded sequence?	12 Marks	L2	CO4

15.	a.	Explain Frequency Hopping Spread Spectrum (FHSS) and compare it with DSSS.	10 Marks	L3	C05
	b.	A binary data sequence is 00110010..... Sketch the waveform for the following format (i)NRZ unipolar (ii) RZ polar (iii) NRZ Bipolar (iv) Manchester coding	10 Marks	L2	C02
Or					
16.	a.	Explain Gram-Schmidt orthogonalization procedure and geometric representation of signals with examples.	12 Marks	L2	C03
	b.	A periodic sequence consisting of 1s and 0s is applied to the (normalized) low pass RC filter shown in Fig3. The filter output is sampled at mid points of the signaling intervals and then compared to a threshold of zero volts. If the threshold is exceeded, a decision is made in favor of symbol 1; otherwise the decision is made in favor of symbol 0. Using this procedure construct the resulting binary sequence for the following three values of bit duration (i) $T_b = 3s$ (ii) $T_b = 1s$ (iii) $T_b = 0.25s$	08 Marks	L2	C02
					
Fig.3					

17.	a.	Explain eye pattern and its significance in analyzing digital communication systems.	12 Marks	L2	C04
	b.	A PN sequence is generated using linear feedback shift register with number of stages equal to 8. The chip rate is 10^6 per second. Determine the following (i) Length of the PN sequence (ii) Chip duration of the PN sequence (iii) Period of the PN sequence	08 Marks	L3	C03
Or					
18.	a.	Explain raised cosine spectrum to minimize ISI?	10 Marks	L3	C05
	b.	Three signals $S_1(t)$, $S_2(t)$ and $S_3(t)$ are as shown in Fig. 4. Apply Gram-Schmidt orthogonalization procedure to obtain ortho normal basis functions	10 Marks	L3	C06
					
Fig. 4					