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Bengaluru

Mid Term Examinations - October 2026

Date: 08/10/2026 **Time:** 11:45 AM - 01:15 PM

Course Code: ECE2508 **Course Name:** Signal Processing

Semester: Third Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2
Marks	48	42

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Define Causal system and examine whether the given system **$y(n)= x(n^2)$** is causal or non-causal by considering one positive and one negative time instant:	2	CO1	BT2
2	Examine whether the given system **y(n)= log [x(n)]** is Linear or non-Liner by considering super position principles:	2	CO1	BT2
3	**x(n)={ 1, 2, 3, 0, -3, -2, -1},** Sketch the given signal when x(0)=0 and Test for Odd signal property:	2	CO1	BT2
4	A discrete-time signal **x(n)={3, 2, 1, 4, 1, 2, 3}** is given, where **x(0)=4**. Sketch the output signal for **x(2n)** and **x(n/2)**, and identify the signal operation performed in each case.	2	CO1	BT2
5	A discrete-time signal x(n) of length N is given, apply the Discrete Fourier Transform (DFT) formula to obtain its N-point DFT. Clearly write the DFT equation for the given x(n). Also write the equation and specify the range of **n** and **k** when **N=4.** Also write the formula for X(1) computation	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Using linear convolution formula, calculate the output sequence of a linear system **(y(n)=x(n)*h(n))**, for the following discrete-time signals. Verify the obtained result using the tabular method. Where, x(n)= **{ 1, 2, 3, 4, 5} & h(n) = {1, 2, 4, 8}**. Given that in the sequence **x(0)=2 and h(0)=2**, assume the remaining samples are indexed accordingly.	10	CO1	BT2
7	Using linear convolution graphical method, calculate the output sequence of a linear system **y(n)=x(n)*h(n)**, for the following discrete-time signals. Verify the obtained result using the tabular method. Where, **x(n)= { 5, 4, 3, 2, 1} & h(n) = {1, 2, 1, 4}.** Given that in the sequence **x(0)=5 and h(0)=2**, assume the remaining samples are indexed accordingly.	10	CO1	BT2

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Using concentric circle method, Calculate the circular convolution between x1(n) & x2(n), Where **x1(n)={ 5,4,3,2,1} & x2(n)={ 1, -1, 2, 0, 3 }:**	10	CO1	BT2

9	Construct the appropriate circular convolution matrix and perform the required matrix operations to obtain the resulting output sequence. Where **x1(n)={ 1, 2 , 2, 0, 3 } & x1(n)={ 5, 4, 3, 2, 1 }**	10	CO1	BT2

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	**x(n)= { 4, 3 ,2, 1},** for the given discrete-time sequence using direct computation method (formula method) calculate 4-point Discrete Fourier Transform (DFT).	10	CO2	BT3
11	**x(n)= { 1, 3, 1, 2}** for the given discrete-time sequence using matrix method, calculate 4-point Discrete Fourier Transform (DFT) and plot the Magnitude and Phase Spectrum of X(k)	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Using Radix2 DIT FFT algorithm, Calculate the values of X(k), where X(k) is DFT of x(n). The given 8 pt sequence **x(n)= { 0, 1, 2, 3, 4, 5, 6, 7}**	10	CO2	BT3
13	Using IFFT find the x(n) when **X(k) = { 10, (-2-2j) , (-2), -2+2j }** and verify your answers using Matrix method	10	CO2	BT3