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Mid-Term Examinations - November 2024

Semester: III

Date: 06/11/2024

Course Code: EEE2026

Time: 11.45am to 01.15pm

Course Name: Signals and systems

Max Marks: 50

Program: B.Tech

Weightage: 25%

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.

5Qx2M =10M

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|---|---|---------|----|-----|
| 1 | List the properties of Time Scaling. | 2 Marks | L1 | CO2 |
| 2 | Recall the concept of non-periodic signals | 2 Marks | L1 | CO1 |
| 3 | Recall the concept of fourier transform? | 2 Marks | L1 | CO1 |
| 4 | List any two dirichlet conditions | 2 Marks | L1 | CO1 |
| 5 | What sequence is followed for time based operation on signals | 2 Marks | L1 | CO2 |

Part B

Answer ALL Questions. Each question carries 10 marks.

4QX10M=40M

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|---|--|---------|----|-----|
| 6 | 6a. A manufacturer has designed an inverter for integrating solar system to grid. The output waveform of an inverter circuit is a square wave of peak amplitude A. The rising edge from negative peak to positive peak is at the origin and falling edge from positive peak to negative peak is at half time period. Summarize about the harmonics that would be present in this signal along with the formulas of fourier coefficients. | 5 Marks | L2 | CO2 |
| | 6b. Explain in details about the procedure for identifying half wave symmetric signals. | 5 Marks | L2 | CO2 |

or

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|---|--|---------|----|-----|
| 7 | 7a. Explain the concept of Fourier series and its role in representing continuous-time periodic signals. | 5 Marks | L2 | CO2 |
|---|--|---------|----|-----|

	7b.	Relate fourier series and fourier transform by highlighting the key differences.	5 Marks	L2	CO2
8	8a.	Model an electric circuit for explanation of the concept of negative infinite time, positive infinite time and zero time.	5 Marks	L3	CO1
	8b.	Relate the concept of a pure inductor supplied by a constant voltage source to signals.	5 Marks	L2	CO1
		or			
9	9a.	Relate the concept of spark plug in automobiles to signals.	4 Marks	L1	CO1
	9b.	Model an electric circuit for explanation of the concept of time advance and time delay.	6 Marks	L3	CO1
10	10a.	Identify ramp signal falls under the category of energy, power or NENP signal and compute the energy and power of Ramp signals.	4 Marks	L3	CO1
	10b.	The flux waveform in a transformer core is trapezoidal in nature whose equation is given by $2r(t)-2r(t-2)-2r(t-4)+2r(t-6)+2r(t-8)$. Show the rough diagram of the waveform.	3 Marks	L2	CO1
	10c.	Recall the relation between unit step signal and ramp signal.	3 Marks	L2	CO1
		or			
11	11a.	Outline the various classification of systems.	5 Marks	L1	CO1
	11b.	Explain the concept of Linear Time invariant systems with an example.	5 Marks	L2	CO1
12	12a.	Put contrast on the concept of convolution	4 Marks	L2	CO2
	12b.	Interpret the convolution of $x(t)=u(t+2)-u(t-2)$ and $h(t)=u(t+2)-u(t-2)$ by using properties of convolution	6 Marks	L2	CO2
		or			
13	13a.	Relate fourier series and fourier transform, highlighting the key differences by providing equations and explanations.	6 Marks	L2	CO2
	13b.	Show convolution of two time shifted unit step signals. (consider one signal is time delayed by 2 units and another signal time delayed by 4 units)	4 Marks	L1	CO2