

CRM08	Rev 1.10	EC	24/06/21
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ONLINE CONTINUOUS INTERNAL EVALUATION- 2

Dept:EC	Sem / Div:4 A &B	Sub:Signals and Systems	S Code:18EC45
Date:26/06/21	Time:9.30-11:00am	Max Marks: 50	Elective:N

Note: Answer any 2 full questions, choosing one full question from each part.

QN	Questions	Marks	RBT	COs
PART A				
1 a	Determine whether the following systems represented by input-output relations are Linear, Memory-less, Causal and Stable. (i) $y[n]=nx^2(n)$ ii) $y(t)=\sin(6t)x(t)$	8	L2	CO2
b	Let $x[n]=u[n]-u[n-5]$, be the input signal applied to a Linear and Time-Invariant (LTI) discrete-time system and $h[n]=a^n(u[n]-u[n-7])$, be the impulse response of the system. Obtain the output signal, $y[n]$.	9	L3	CO2
c	The input signal $x(t)=e^{-t}u(t)$ to a LTI system whose impulse response is given by $h(t)=\begin{cases} 1-t, & 0 \leq t \leq 1 \\ 0, & \text{otherwise} \end{cases}$ Calculate the output $y(t)$.	8	L3	CO2
OR				
2 a	Following signals represent input and impulse response of a continuous-time Linear and Time-Invariant (LTI): $x(t)=u(t)-u(t-3)$ $h(t)=e^{-2t}[u(t+1)-u(t-1)]$ obtain the output for the applied input.	8	L3	CO2
b	Derive the expression for convolution sum. Perform Convolution operation on the following signals: $x[n]=\delta[n+1]-\delta[n]+\delta[n-3]$ and $h[n]=\delta[n]-\delta[n-2]$ Sketch the resulting signal.	9	L2	CO2
c	Determine whether the following systems represented by input-output relations are Time-Invariant and Invertible: (i) $y(t)=x\left(\frac{t}{2}\right)$ ii) $y(t)=x(2t+3)$ iii) $y[n]=nx[n]$	8	L3	CO2
PART B				
3 a	Show that commutative, distributive and associative laws holds good with respect to convolution operator in continuous-time domain.	10	L2	CO2
b	Show that the step response of an LTI system is running integral of impulse response.	6	L2	CO2
c	Obtain the step response for the following systems represented by impulse response: I) $h(t)=e^{- t }$ ii) $h(n)=\left(\frac{1}{2}\right)^n$ iii) $h(t)=tu(t)$	9	L3	CO2
OR				
4 a	Determine whether the following systems represented by impulse responses are memory-less, causal and stable : (i) $h[n]=u[n-1]-u[n-5]$ (ii) $h[n]=0.5^{ n }$ (iii) $h(t)=e^{-t}u(-t)$ (iv) $h(t)=u(t-1)$	10	L3	CO2

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b	An LTI system is characterized by the impulse response $h[n]=\left(\frac{1}{2}\right)^n u[n]$, find the response of the system for the input $x[n]=\left(\frac{1}{4}\right)^n u[n]$.	6	L3	CO2
c	State and prove the following properties of Continuous-Time Fourier Series:(i) Frequency shifting (ii) Time differentiation (iii) Linearity	9	L2	CO3