CBCS SCHEME

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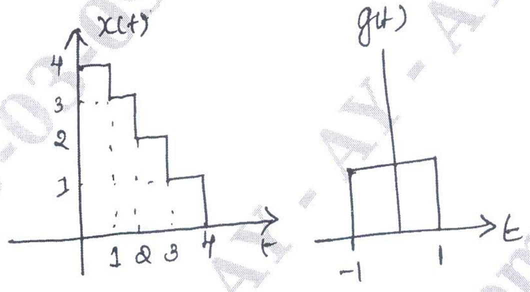
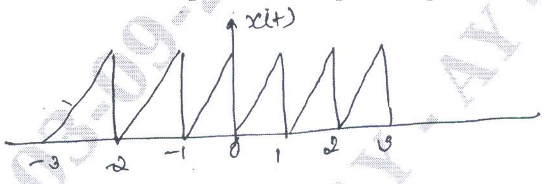
BMT306B

Third Semester B.E./B.Tech. Degree Examination, June/July 2024
Signals and Systems

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define signal and system. Explain the classification of signals with an example.	10	L2	CO1
	b.	Two signals x(t) and g(t) are shown in Fig Q1(b) express x(t) signals interms of g(t)  Fig Q1(b)	10	L3	CO1
		OR			
Q.2	a.	Explain all basic elementary signals with mathematical representation and waveform.	10	L3	CO1
	b.	Determine whether the following systems one linear, time-invariant, causal, BIBO stable and memory i) $y(n) = 0.5^n x(n)$ ii) $y(n) = x\left(\frac{n}{2}\right)$	10	L3	CO1
		Module – 2			
Q.3	a.	Obtain the convolution of two continuous time signals $x(t) = 1$ for $0 \le t \le 1$, 0 otherwise; $h(t) = t$ for $0 \le t \le 2$, $= 0$ otherwise	10	L3	CO
	b.	Two discrete time LTI system are connected in cascade determine the unit sample response of the connection $h_1 = (1/2)^n u(n)$ $h_2(n) = (1/4)^n u(n)$	10	L3	CO2
		OR			
Q.4	a.	Determine the convolution of two sequences x(n) = {1, 2, 2, 3} and h(n) = {2, -1, 3}	10	L3	CO2
	b.	Derive the expression for convolution sum formula.	10	L3	CO2
		Module – 3			
Q.5	a.	Explain 3 important properties of convolutes integral.	10	L3	CO3
	b.	Evaluate the total response of as LTI system described by the differential equation given below $y''(t) + 5y'(t) + 6y(t) = 2e^{-t}u(t)$; $y(0) = 0, y'(0) = 1$.	10	L3	CO3

		OR			
Q.6	**a.**	Draw direct form – and direct form – II implementation for the following difference equation $y(n)+\frac{1}{4}y(n-1)-\frac{1}{8}y(n-2)=2x(n)+3x(n-1)$	10	L3	CO3
	b.	Find the total response of the LTI system described by the differences equation given below : $y(n)+4y(n-1)+3y(n-2)=u(n)$; $y(-1)=0$; $y(-2)=1$.	10	L3	CO3
		Module – 4			
Q.7	**a.**	Explain the following properties of Fourier series with proof. i) Linearity ii) Translation iii) Frequency shift	10	L3	CO4
	b.	Find the complex Fourier coefficient for the periodic waveform x(t) shown in Fig Q7(b). Also draw the amplitude and phase spectra  Fig Q7(b)	10	L3	CO4
		OR			
Q.8	**a.**	Find the complex Fourier coefficient for x(t) given below : i) $x(t)=\cos\left(\frac{2\pi}{3}t\right)+2\cos\left(\frac{5\pi}{3}t\right)$ ii) $x(t)=\|\sin(\pi t)\|$	10	L3	CO4
	b.	Obtain the modulation or multiplications theorem of Fourier series.	10	L3	CO4
		Module – 5			
Q.9	**a.**	Explain the following properties of Fouerier Transform with proof. i) Time differentiation ii) Time Reversal iii) Scaling.	10	L3	CO5
	b.	Find the Fourior transform of the following signals. i) $x(t)=u(-t)$ ii) $x(t)=e^{at}u(t)$	10	L3	CO5
		OR			
Q.10	**a.**	Find to Fourier Transform of the signal $x(t)=\delta(t+0.5)-\delta(t-0.5)$. Also plot the magnitude and phase spectra.	10	L3	CO5
	b.	Using the properties of Fourier transform, find the Fourier transform of the following signal i) $x(t)=\sin(\pi t)\,e^{-2t}u(t)$ ii) $x(t)=\frac{d}{dt}[te^{-2t}\sin t\,u(t)]$	10	L3	CO5

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