	Reg. No. :	
	Question Paper Code: U3B03	
	B.E./B.Tech. DEGREE EXAMINATION, NOV 2022	
	Third Semester	
	Biomedical Engineering	
21UBM303- PRINCIPLES OF SIGNALS AND SYSTEMS		
	(Regulations 2021)	
Dura	ation: Three hours Maximum: 100) Marks
	Answer All Questions	
PART A - $(10x 2 = 20 \text{ Marks})$		
1.	Sketch the given signal.	CO2- Ana
	u[n+2] - u[n-3]	
2.	Is the signal $x(t)=10\cos(2\pi t) + \sin(5\pi t)$ a periodic signal. If it is, determine the fundamental period?	CO2- Ana
3.	State Convolution property for laplace transforms.	CO1- U
4.	Define fourier transform pair.	CO1- U
5.	Define LTI-CT systems.	CO1- U
6.	What are the tools used for analysis of LTI-CT systems?	CO1- U
7.	Define Sampling theorem.	CO1- U
8.	Write the main condition to avoid aliasing?	CO1- U
9.	Illustrate the relationship between impulse response and transfer function of a DT-LTI system.	CO3- App
10.	Is the discrete time system described by the difference equation $y(n) = x(-n)$ causal?	CO3- App
	PART – B $(5 \times 16 = 80 \text{Marks})$	
11.	(a) Classify the different types of systems and explain them. CO	3-App (16)

- (b) For each of the following input-output relationship, check whether CO3-App (16) the corresponding system is linear, time invariant and causal.
 (a) y(t)=t²x(t-1)
 (b) y[n]=x²[n-2]
- 12. (a) Determine the trigonometric Fourier series for the periodic signal x CO3-App (16) (t) shown in the figure.



Or

- (b) Calculate the Laplace Transform of the following signals and sketch CO3-App (16) the ROC
 (i) x(t) =e^{-2t} u(t).
 (ii) x(t) = e^{-at}u(t)+e^{-bt} u(-t)
- 13. (a) An LTI system is represented by $d^2y(t)/dt^2 + 5 dy(t)/dt + 6y(t) =$ CO3-App (16) dx(t)/dt + x(t) with initial conditions y(0)=1, y'(0)=3. Conclude the output of the system, when the input is x(t)=u(t).

- (b) Examine the convolution y(t) of the given signals. CO3-App (16) (i) $x(t)=\cos t u(t)$, h(t)=u(t)(ii) x(t)=u(t), h(t)=u(t)(iii) x(t) = u(t+1); h(t) = u(t-2)(iv) $x(t) = e^{-at}u(t) h(t) = e^{-bt}u(t)$
- 14. (a) Consider the analog signal x(t)= 5sin4000πt+12cos2000πt. CO3-App (16)
 (i) Discuss the Nyquist sampling rate.
 (ii) If the analog signal is sampled at Fs = 5000 Hz, Formulate the discrete time signal obtained by sampling.

(b) Find the impulse response of the discrete time system described by CO3-App (16) the difference equation

y(n-2) - 3y(n-1) + 2y(n) = x(n-1)

15. (a) Determine the system function and output response y(n) of a linear CO3-App (16) time invariant discrete time system specified by the equation y(n)- 1.5 y(n-1)+ 0.5 y(n-2)=2x(n)+ 1.5 x(n-1)

Or

(b) Obtain the direct form I and Direct form II realization of the system CO3-App (16) described by the difference equation y(n) + 0.75y(n-1)-0.125y(n-2) = x(n) + 7x(n-1) + x(n-2).

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