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B.Tech DEGREE EXAMINATION, NOVEMBER 2023

Third Semester

18EIC205T - SIGNALS, SYSTEMS AND COMMUNICATION

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

PART - A (20 × 1 = 20 Marks) — Answer **all** Questions

		Marks	BL	CO
1.	Identify the type of systems that are characterized by input and the output quantized at certain levels (A) analog (B) discrete (C) continuous (D) Digital	1	1	1
2.	if x (-t) = -x (t) then the signal is said to be _____ (A) Non periodic signal (B) Periodic signal (C) Odd signal (D) Even signal	1	1	1
3.	All real-time systems concerned with the concept of causality are (A) non-causal (B) causal (C) memoryless (D) neither causal nor non-causal	1	1	1
4.	The component present in all causal systems is _____ (A) memory (B) time invariance (C) stability (D) de	1	1	1
5.	The impulse response of a CT, LTI system is h(t)=e - tu(t-2). The given system is _____. (A) causal (B) unstable (C) non-causal (D) causal and stable	1	1	2
6.	What is the nature of the function, y(n)=y(n-1)+x(n)? (A) Integrator (B) Differentiator (C) subtractor (D) Accumulator	1	1	2
7.	Identify the properties of continuous time Fourier series? (A) Linearity, time-shifting (B) Linearity, time shifting, frequency shifting (C) Linearity, time shifting, frequency shifting, time reversal, time scaling, periodic convolution (D) Linearity, time shifting, frequency shifting, time reversal, time scaling, periodic convolution, multiplication, differentiation	1	1	2
8.	The inverse Fourier transform of δ(ω) is _____ (A) 1/2π (B) 2π (C) 1/π (D) π	1	1	2
9.	The time system which operates with a continuous time and produces a CT output signal is _____. (A) CTF system (B) DTF system (C) Time invariant system (D) Time variant system	1	1	3

10.	Bandwidth of the gate function is _____. (A) τ Hz (B) $1/\tau$ Hz (C) 2τ Hz (D) $2/\tau$ Hz	1	1	3
11.	Identify when DTFT and ZT are equal? (A) $\sigma=0$ (B) $\gamma=1$ (C) $\sigma=1$ (D) $\gamma=0$	1	1	3
12.	The period of the signal $x(t)=10\sin 12\pi t + 4\cos 18\pi t$ is ____. (A) $\pi/4$ (B) 1/6 (C) 1/9 (D) 1/3	1	1	3
13.	What does AGC stand for? (A) Automation gain control (B) Automation gear control (C) Amplitude gain control (D) Automotive gear control	1	1	4
14.	Why is AM used for broadcasting in the communication system? (A) It avoids receiver complexity (B) It is more immune to other modulation systems (C) It requires less transmitting power (D) No noise disturbances	1	1	4
15.	Sensitivity is defined as the_____ (A) ability of receiver to amplify weak signals (B) ability to reject unwanted signals (C) ability to convert incoming signal into Image Frequency (D) ability to suppress high frequency signals	1	1	4
16.	The amount of frequency deviation in FM signal depends on _____ (A) Amplitude of the modulating signal (B) Carrier frequency (C) Modulating frequency (D) Transmitter amplifier	1	1	4
17.	Unauthorised access of information from a wireless device through a Bluetooth connection is called _____ (A) bluemaking (B) bluesnarfing (C) bluestring (D) bluescoping	1	1	5
18.	Bluetooth supports _____ (A) point-to-point connections (B) point-to-multipoint connection (C) both point-to-point connections and point-to-multipoint connection (D) multipoint to point connection	1	1	5
19.	In wireless ad-hoc network _____ (A) access point is not required (B) access point is must (C) nodes are not required (D) all nodes are access points	1	1	5
20.	In wireless distribution system _____ (A) multiple access point are inter-connected with each other (B) there is no access point (C) only one access point exists (D) access points are not required	1	1	5

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	Illustrate whether the $y(t)= t\,x(t)$ is time-invariant or not.	4	2	1
22.	Interpret the Fourier transform of the rectangular pulse and sketch the signal.	4	2	2
23.	Summarize the properties of Laplace transform.	4	2	3
24.	List the different types of modulation systems.	4	2	4

25.	The maximum peak-to-peak voltage of an AM wave is 16 mV and the minimum peak-to-peak voltage is 4 mV. Calculate the modulation factor.	4	2	5
26.	Define Carson's rule and modulation.	4	2	4
27.	Interpret the FT of $X(t) = e^{-at} u(t)$.	4	2	3

PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

		Marks	BL	CO
28.	(a) Determine whether the following systems are: Memoryless, Stable, Causal, Linear, Time-invariant. i) y(n)= nx(n) ii) y(t)= x(t)	12	3	1
	(OR)			
	(b) Explain about the different types of systems with suitable examples.			
29.	(a) Determine the Laplace transform ROC of the following continuous time signal $X(t)=e^{-5t}u(t) + e^{-7t}u(t)$	12	4	2
	(OR)			
	(b) Determine the inverse Laplace transform of X(S)=(S+3)/(S+1)(S+2).			
30.	(a) Determine the Fourier series of the representation of the signal. $X(t)=2+\cos(4t) + \sin(6t)$.	12	3	3
	(OR)			
	(b) Determine the FT of cosine wave X(t) = A cost.			
31.	(a) Illustrate the generation of AM signal using direct method with neat diagrams.	12	2	4
	(OR)			
	(b) Explain the following in detail: (i) Modulation index. (4 Marks) (ii) construction of PWM signal with diagrams.(8 Marks)			
32.	(a) Summarize the working and architecture of Zigbee protocol.	12	2	5
	(OR)			
	(b) Explain the following in detail: i) Wimax. (ii) Bi-directional communication.			

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