DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination – Summer 2022

Course: B. Tech. **Branch: Electronics Engineering** **Semester: IV**

Subject Code & Name: Signals and Systems (BTEXC402)

Max Marks: 60 **Date: 18/08/2022** **Duration: 3.45 Hr.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected to answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		
A)	Define and explain the following with a neat sketch: i) Unit Impulse, ii) Unit step iii) Ramp and Unit Ramp	CO1	6
B)	State and prove the properties of the Unit Impulse.	CO1	6
C)	Sketch the Continuous-time signal $x(t) = 2\sin(\pi t)$ for an interval $0 \le t \le 4$. Sample the Continuous-time signal with sampling period T=0.2 Sec. and sketch the sampled or discrete signal.	CO1	6
Q.2	**Solve Any Two of the following.**		
A)	Sketch the following signals i) $e^{2n}\delta(n-2)$, for $-4 \le n \le 4$ ii) $(0.6)^n u(n+2)$, for $-4 \le n \le 4$ iii) $(0.4)^n \sin(0.3n)$, for $-5 \le n \le 5$	CO2	6
B)	Find the period following signals: a) $x(t)=10\sin(70\pi t)$, b) $x(t)=\cos(30\pi t+\pi/8)$, c) $x(t)= \sin(15\pi t)\, u(t)$,	CO2	6
C)	Obtain the convolution of the CT signals using the graphical method and also sketch the results of $x(t)=u(t)$, and $h(t)=e^{-t}$, for $t \ge 0$,	CO2	6
Q. 3	**Solve Any Two of the following.**		
A)	Explain the Dirichlet condition for the existence of the Fourier series.	CO3	6
B)	State the different properties of continuous time Fourier series	CO3	6
C)	Find the DTFS representation of the following and plot the amplitude and phase spectrum of $x(n)=5+\sin(n\pi/2)+\cos(n\pi/4)$	CO3	6

Q.4 Solve Any Two of the following.

A)	Find the Discrete Time Fourier Transform of the following a) $x(n)=\{2,-2,1,3,4\}$, b) $x(n)=2^n u(n)$,	CO3	6
B)	Find the inverse Discrete Time Fourier Transform of the following a) $X(e^{j\omega})= 1, \pi/3 \leq \lvert\omega\rvert$, b) $X(e^{j\omega})= -e^{j\omega}$, for $-\pi \leq \omega \leq \pi$,	CO3	6
C)	Explain the Concept of sampling and reconstruction in the frequency domain.	CO4	6

Q. 5 Solve Any Two of the following.

A)	Find the Laplace transform and ROC of the following a) $x(t)=e^{-3t}u(t)$, b) $x(t)=-e^{-2t}u(-t)$,	CO5	6
B)	Define the ROC and properties of the ROC in Z transform	CO5	6
C)	Find the Z transform and ROC of the following a) $x(n)=\{2,3,4,6,2,1,5,3\}$, for $-3 \leq n \leq 4$, b) $x(n)=u(n-2)$,	CO5	6

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