BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2023)

CLASS: BTECH **SEMESTER : VII**
BRANCH: ALL **SESSION : MO/2023**

SUBJECT: EC437 INTRODUCTION TO SIGNAL PROCESSING

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	For each of the following input-output relationship, determine whether the corresponding system is a linear time invariant system. (a)$y(t) = t^2x(t-1)$ (b) $y[n]=x^2[n-2]$	[2]	1	3
Q.1(b)	Let x[n]=0 for n<-2 and n>4. For each of the following signals , find the value of n for which it is guaranteed to be zero. (a) x[n-3] (b) x[n+4] (c) x(-n+2)	[3]	1	4
Q.2(a)	Determine whether the following discrete-time sequences are periodic or not? If the sequence is periodic, find its fundamental period. (a) Sin (2πn/3)+ Cos (2πn/5) (b) Cos (n/6)Cos (nπ/6)	[2]	1	4
Q.2(b)	Discuss orthogonality of vectors. State whether set of vectors {A, B, C} is orthogonal or not. A= (4,3,2) B = (-1,0,2) C =(0,2,-3)	[3]	1	3
Q.3(a)	State initial value theorem with respect to Laplace transform.	[2]	2	1
Q.3(b)	Solve the following differential equation by using Laplace transform. y''(t)+3y'(t)+2y(t)=x(t) if y(0-)=2 , y'(0)=1 and x(t)=exp(-t)u(t)	[3]	2	3
Q.4(a)	Discuss Dirichlet's conditions and its significance.	[2]	2	1
Q.4(b)	Calculate the Fourier transform of the following signals. (a) exp(5t)u(t) (b) t exp(-2t)u(t)	[3]	2	3
Q.5(a)	What is the relationship between ZT and DTFT ?	[2]	3	2
Q.5(b)	Write the properties of ROC of Z transform of any sequence.	[3]	3	1

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