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

CLASS: BTECH **SEMESTER: V**
BRANCH: ECE **SESSION: MO/2022**

SUBJECT: EC305 SIGNAL PROCESSING TECHNIQUES

TIME: 2 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q1 (a)	Define stability of a digital system. Test for the stability of the system $\mathbf{h(n)=0.2^n u(n)}$.	[2]	CO1	L1,L3
Q1 (b)	Determine the zero-input response of the system described by the difference equation $\mathbf{y(n)-3y(n-1)-4y(n-2)=0}$	[3]	CO1	L2
Q2 (a)	Find the circular convolution of x(n)= {1, 0.5} and y(n)= {0.5, 1}.	[2]	CO1	L3
Q2 (b)	For the given $\boldsymbol{x(n)=0.3^n u(n)+0.8^n u(-n-1)}$. Find $\boldsymbol{X(z)}$and show the ROC.	[3]	CO1	L3
Q3 (a)	Prove that circular convolution in time domain is equivalent to multiplication of DFTs in frequency domain.	[2]	CO1	L4
Q3 (b)	Sketch the butterfly structure for computing the FFT of the sequence x(n)={1,2,3,4,-1,-2,-3,-4} , using DIT technique.	[3]	CO1	L4
Q4 (a)	List out the difference between FIR and IIR filters.	[2]	CO2	L1
Q4 (b)	Realize the following system in Direct form II. $H(z)=\frac{1+3z^{-1}}{1-5z^{-1}+3z^{-2}}$	[3]	CO2	L3
Q5 (a)	For the given system H(z), if 2 is quantized to 2.1 and 3 is quantized to 3.1. Find the quantization errors in the poles of the system. $H(z)=\frac{1+3z^{-1}}{1-2z^{-1}+3z^{-2}}$	[2]	CO2	L2
(b)	Realize the given system in cascade form. $\boldsymbol{H(z)=\frac{1+0.25z^{-1}}{(1-2z^{-1}+0.25z^{-2})(1-3z^{-1}+0.2z^{-2})}}$	[3]	CO2	L3

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