

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Winter Examination - 2023

Course: B. Tech.

Branch: Electrical Engg Semester: VII

Subject Code & Name: BTEEE705A & Digital Signal Processing

Max Marks: 60

Date: 09/02/2023

Duration: 3 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected 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. 12

A) Enlist advantages of digital signal processing over analog signal processing 6

B) Differentiate between 6

- i) Deterministic Vs Random signals
- ii) Multichannel Vs Multidimensional signal
- iii) Continuous Valued Vs Discrete valued Signal

C) State & Prove Sampling Theorem 6

Q.2 Solve Any Two of the following. 12

A) Give the classification of Discrete time systems 6

B) Perform the convolution sum of the following sequences 6

$$h(n)=(1,2,1,-1) \quad \& \quad x(n)=(1,2,3,1)$$

C) Explain properties of convolution sum 6

Q. 3 Solve Any Two of the following. 12

A) Determine the Z transform of the unit step function 6

B) Explain differentiation property & time shifting property of Z transform 6

C) Determine Inverse Z transform of $X(Z)$ 6

$$X(Z) = \frac{Z}{(3Z^2 - 4Z + 1)} \quad \text{Where ROC } |Z| > 1$$

Q.4 Solve Any Two of the following. 12

A) Explain Frequency shifting & Periodicity properties of the Fourier transform 6

B) Find Fourier transform of the following signal 6

$$X(n) = \begin{cases} 1/3 & \text{for } n \text{ value between -1 to 1} \\ 0 & \text{elsewhere} \end{cases}$$

C) Perform circular convolution of the following sequences 6

$$x_1(n) = (1, 2, 5, 3) \quad \& \quad x_2(n) = (2, 3, 1, 4)$$

Q. 5 Solve Any Two of the following. 12

- A)** Explain any two properties of DFT 6
- B)** Differentiate between IIR & FIR systems 6
- C)** A filter is described by $Y(n) - 3/4Y(n-1) + 1/8Y(n-2) = X(n) + 1/2X(n-1)$ 6

Draw (i) Direct form -I (ii) Direct form-II realizations

*** End ***