

QP Code : 5434

(3 Hours)

[Total Marks: 80]

N.B:

- (1) Question No.1 is compulsory
 (2) Attempt any THREE questions out of remaining FIVE questions
 (3) Assume data wherever required.

Q1) (a) Sketch the signal $X(t) = \Pi(t-1)/2 + \Pi(t-1)$ (5*4)

b) Find the initial value and final value of

$$X(Z) = \frac{Z}{4Z^2 - 5Z - 1} \quad \text{ROC: } |Z| > 1$$

c) State Sampling theorem and how aliasing error occurs?

d) Compute circular convolution of the following two sequence using DFT

$$X_1(n) = \{2, 1, 2, 1\} \quad \text{and} \quad X_2(n) = \{1, 2, 3, 4\}$$

Q2) (a) Determine the energy and power for the given time signals $x(t) = 3 \cos 5\Omega_0 t$ b) Determine the period of the signal $x(t) = 0.1 e^{-j(2\pi/3)t} + 0.3 \sin \pi t$

(c) Find the Z transform of the given function.

$$X(n) = (1/4)^n u(n) + (1/5)^n u(-n-1) \quad (20)$$

Q3) (a) Obtain the magnitude and phase response of the following system by analytical method
 $h(n) = \{1, 1/2\}$ (10)b) A LTI is described by $2y(n) + 3y(n-1) + y(n-2) = u(n) + u(n-1) - u(n-2)$. Find response of system. When initial condition are given $y(-1) = 2$, $y(-2) = -1$ and until step is applied at the input. (10)

Q4) (a) Determine the inverse transform of the function. (10)

$$X(Z) = \frac{z^4 + Z^2}{(Z^2 - \frac{3}{4}Z + \frac{1}{8})} \quad |Z| > 1/2$$

$$X(Z) = \frac{1 - aZ^{-1}}{(Z^{-1} - a)} \quad |Z| > 1/a$$

(b) Write any three properties of Fourier Transform (10)

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- Q5) (a) A difference equation of the system is given below $y(n) = 0.5 y(n-1) + x(n)$ Determine the (i) system Function (ii) pole Zero plot (iii) Unit sample response of the system (10)
- (b) Define and Derive power Spectral Density (10)
- Q6) (a) Discuss the properties of DFT. (20)
- (b) Using Radix -2 DIT – FFT algorithm compute 8 point DFT of $x(n) = \{0, 1, 1, 1, 1, 1, 1, 1\}$