QP CODE : 22975

(3 hours) **Total Marks: 80**

N.B. 1. Question **No. 1** is compulsory
2. Attempt any **three** out of remaining
3. Assume suitable data if **necessary** and justify the assumptions
4. Figures to the **right** indicate full marks

Q1 A Evaluate DFT of $x(n)=\cos(0.25\prod n)$. 05

B Determine the energy and power of signal given by $x(n) = (1/3)^n u(n)$. 05

C Find the circular Convolution of the following causal signals 05
$x_1(n)= \{ 3, 2, 4, 1\}$ and $x_2(n)=\{ 2, 1, 3 \}$

D Define BIBO Stable system. 05

Q2 A State the following DFT properties: 10
1.Linearity
2.Periodicity
3.Scaling
4.Convolution
5.Time Reversal

B Consider the following analog signal 10
$x(t)=5 \cos 2\prod (1000 t) + 10 \cos 2\prod(5000t)$ to be sampled.
I) Evaluate the Nyquist rate for this signal.
II) If the signal is sampled at 4 kHz , will the signal be recovered from its samples?

Q3 A For the causal LTI digital filter with impulse response given by 10
$h(n) = \delta(n) - 2\delta(n-1) + \delta(n-2) +2\delta(n-3)$ sketch the magnitude response of the filter.

B Design radix 2FFT flow graph for $x(n)=\{2, 1, 3, 1\}$ 10

Q4 A Check whether the system $y[n] = x[n] + 2x[n-2]$ is: 10
i)Static or Dynamic
ii)Linear or Non-linear
iii)Causal or Non-Casual
iv) Shift variant or Shift Invariant

B Compute linear convolution of the causal sequences $x[n]= \{3, 4, 2, 1, 2, 2, 1, 1\}$ 10
and $h[n]=\{1, -1\}$ using overlap add method.

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Q5 A For $x(n) = \{3, \underset{\uparrow}{2}, 1, 6, 4, 5\}$, plot the following Discrete Time signals: 10

1.) $x(n+1)$ 2.) $x(-n)u(-n)$ 3.) $x(n-1)u(-n-1)$

4.) $x(n-1)u(n)$ 5.) $x(n-2)$

B Perform Cross correlation of the causal sequences 10
$x(n)= \{3, 3, 1, 1\}$ $y(n) = \{1, 2, 1\}$

Q6 A Write a detailed note on TMS 320 10

B Explain the significance of Carl's Correlation Coefficient Algorithm in digital signal processing. Evaluate Carl's Coefficient for two causal sequences $x[n]=\{1, 3, 4, 2\}$ and $y[n]=\{1, 2, 2, 1\}$. 10

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