Total No. of Questions : 6] **SEAT No. :**

P498

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TE/Insem/APR - 25
T.E. (Electronics Engineering)
Discrete Time Signal Processing
(2012 Pattern)

Time : 1 Hour] ***[Max. Marks : 30***

Instructions to the candidates :

1) ***All answers to be written on single answer sheet.***
2) ***Assume suitable data wherever necessary.***
3) ***Figures to the right indicate marks assigned to each question.***

Q1) a) An analog signal is describe as **[6]**

$$X(t) = \text{Sin}(480\pi t)*3\text{Sin}(720\pi t)$$

i) What is Nyquist rate of this signal?

ii) If this signal is sampled with a sampling frequency Fs = 600 sample/ sec, what will be the discrete time signal obtained?

b) State the merits and demerits of Digital signal processing over Analog signal processing. **[4]**

OR

Q2) a) State sampling theorem for band pass and band limited signals. **[6]**

b) What are basic elements of DSP? Draw block diagram of DSP system and describe each element. **[4]**

Q3) a) For a sequence x(n) = {1, 2, 3, 4} compute 4 point DFT. What is DFT of $\hat{x}(n) = \{3,4,1,2\}$ if we use circular Time shift Property to find DFT? **[6]**

b) With the help of neat diagram, describe overlap and add method. **[4]**

OR

P.T.O.

Q4) a) Explain following properties of DFT. **[6]**

i) Periodicity

ii) Symmetry

b) Given two sequences x1(n) = {2,0,1,0} & x2(n) = {4,3,2,1}. Find their circular convolution. **[4]**

Q5) a) Determine Z - transform of **[6]**

i) X(n) = u(n)

ii) X(n) = Sin(ω_0n)u(n)

Comment on ROC.

b) What is relation between Z transform and Fourier transform. **[4]**

OR

Q6) a) The system is characterized by **[6]**

$$H(z) = \frac{3 - 4z^{-1}}{1 - 3.5z^{-1} + 1.5z^{-2}}$$

Determine h(n) for

i) Causal system

ii) Stable system

iii) Anti - causal system

b) State and explain following properties of Z - transform. **[4]**

i) Convolution property

ii) Time shifting property

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