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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING  
MID TERM EXAMINATION - OCT 2023**

**Semester :** Semester V - 2021

**Course Code :** EEE3014

**Course Name :** Sem V - EEE3014 - Digital Signal Processing Systems

**Program :** B. TECH

**Date :** 2-NOV-2023

**Time :** 9:30AM - 11:00AM

**Max Marks :** 50

**Weightage :** 25%

**Instructions:**

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

**PART A**

**ANSWER ALL THE QUESTIONS**

**(5 X 2 = 10M)**

1. Define Convolution. Write the applications of convolution.  
(CO1) [Knowledge]
2. What is meant by DSP processor? List few applications of DSP.  
(CO1) [Knowledge]
3. The "Fast Fourier Transform" (FFT) is an important measurement method in the science of audio and acoustics measurement. How FFT is faster than DFT?  
(CO2) [Knowledge]
4. Radix 2 FFT algorithm converts the time domain N point sequence  $x(n)$  to a frequency domain N-point sequence  $X(k)$ . State the applications of Radsix 2 FFT algorithms.  
(CO2) [Knowledge]
5. Signals need to be processed so that the information that they contain can be displayed, analyzed, or converted to another type of signal that may be of use. List the advantages of DSP over Analog signal processing systems.  
(CO1) [Knowledge]

## PART B

### ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

6. Two persons v1 & v2 starts from SP road for selling different types electronics gadgets. At the starting point(origin), each person has seven dollars with them. After one-hour salesperson x1, has sold his gadgets for seven dollars but person x2 has nine dollars. At the end of the second hour sales period, person x1 has sold for three dollars when x2 has only two dollar. Similarly, for the third hour sales period both have only one dollar sales. Now they wish to consider the amount (what they have) according to the sales period as a discrete sequence representation. Further, they wish to show the linear amount of sales as a discrete sequence to his owner. Assuming yourself as a owner estimate the linear sequence of the amount.

(CO1) [Comprehension]

7. Linear FIR (Finite Impulse Response) filtering is a commonly used technique in digital signal processing for filtering a long sequence of data. The long sequence is divided into overlapping blocks. Each block is then filtered using the FIR filter in the frequency domain. The filtered blocks are then added together, taking into account the overlap between adjacent blocks. Finally, the resulting sequence is obtained by discarding the overlapping portions. For the given signals use the above mentioned procedure and estimate the resulting sequence.

$$x(n) = \{1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 2, -1\}$$

$$h(n) = \{1, 1, 1\}$$

(CO1) [Comprehension]

## PART C

### ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

8. With the developments of data analysis technology, signal analysis methods become gradually mature and have been widely applied in the field of condition monitoring and fault diagnosis of various kinds of rotating machineries. The signal analysis could extract useful information from the original signal, and judge the operational states of the equipment based on the obtained information. Signal analysis is of great significance to the rotating machineries both for condition monitoring and fault diagnosis. The following signals has been captured from the fault diagnosis.

$$x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\} \text{ \& } x(k) = \{7, -0.707 - j0.707, -j, 0.707 - j0.707\}$$

List any two methods of analyzing the signals.

Apply the listed methods one for each given signal to compute the signal with fastest computation techniques.

(CO2) [Application]