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**Question Paper Code: U3308**

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2024

Professional Elective

Electrical and Electronics Engineering

21EEV308 -DIGITAL SIGNAL PROCESSING SYSTEM

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

PART A - (10 x 2 = 20 Marks)

1. Compare Continuous time and Discrete Time Signals. CO1 - U
2. State sampling theorem. CO1 - U
3. Convolute the sequences  $X(n)=\{1,1\}$ ,  $h(n)=\{2,2\}$  CO2 -App
4. State any two properties of Z – Transform. CO1 - U
5. Compare radix – 2 DIT and DIF FFT algorithms. CO1 - U
6. Compute the twiddle factor for 4-point FFT. CO2 -App
7. Realize the system function in cascade form CO3 -App

$$H(z) = \frac{1 + \frac{1}{4}z^{-1}}{\left(1 + \frac{1}{2}z^{-1} + \frac{1}{2}z^{-2}\right)\left(1 + \frac{1}{2}z^{-2}\right)}$$

8. Explain frequency warping. CO1 - U
9. How is a digital signal processor applicable for motor control applications? CO1 - U
10. Give special feature of digital signal processor. CO1 - U

PART – B (5 x 16= 80 Marks)

11. (a) Analyze the given systems to check whether it is CO1 - Ana (16)
  - (i) Static or dynamic
  - (ii) Linear or non-linear
  - (iii) Time variant or time invariant
  - (iv) Casual or Non-causal(a)  $Y(n)= \cos x(n)$  (b)  $Y(n)=x(n)+n(x(n+1))$

Or

- (b) Analyze the given systems to check whether it is CO1- Ana (16)

- (i) Static or dynamic
- (ii) Linear or non-linear
- (iii) Time variant or time invariant
- (iv) Casual or Non-causal
- (a)  $Y(n) = x(n) \cdot u(n)$
- (b)  $Y(n) = x(n) \cdot \cos(\omega_0 n)$

12. (a) Find the Convolution for the sequence CO2 - App (16)
- (i)  $X(n) = \{1, 1, 1\}$ ,  $h(n) = \{1, 1, 1\}$
  - (ii)  $X(n) = \{-1, 1, 2, -2\}$ ,  $h(n) = \{0.5, 1, -1, 2, 0.75\}$
- Or
- (b) Determine the Z transform of CO2 - App (16)
- (i)  $x(n) = \cos(\Omega_0 n) u(n)$
  - (ii)  $x(n) = \sin(\Omega_0 n) u(n)$
13. (a) Analyze the given sequence for the number of points and CO3 - Ana (16)  
compute DFT using DIT algorithm.  $X(n) = \{2, 2, 2, 2, 1, 1, 1, 1\}$
- Or
- (b) Analyze the given sequence for the number of points and obtain CO3 - Ana (16)  
DFT using DIF algorithm.  $X(n) = \{1, 1, 1, 1, 1, 1, 1, 1\}$
14. (a) Obtain direct form and cascade form realization for the transfer CO4 - App (16)  
function of an FIR system given by
- $$H(Z) = \left(1 - \frac{1}{4}z^{-1} + \frac{3}{8}z^{-2}\right)\left(1 - \frac{1}{8}z^{-1} - \frac{1}{2}z^{-2}\right)$$
- Or
- (b) Realize the following using cascade and parallel form. CO4 - App (16)
- $$H(Z) = \frac{3 + 3.6z^{-1} + 0.6z^{-2}}{1 + 0.1z^{-1} - 0.2z^{-2}}$$
15. (a) Explain the following architectures with the help of block CO5 - U (16)  
diagram:
- i) Von-Neumann architecture
  - ii) Harvard architecture & Modified Harvard architecture
- Or
- (b) Explain the various types of addressing modes of digital signal CO5 - U (16)  
processor with suitable example.