

BACHELOR OF TECHNOLOGY (C.B.C.S.) (2014 COURSE)  
B.Tech.Sem - VI ELECTRONIC : WINTER- 2022  
SUBJECT : DIGITAL SIGNAL PROCESSING

Day : Thursday  
Date : 24-11-2022

W-13388-2022

Time : 10:00 AM-01:00 PM  
Max. Marks : 60

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Assume suitable data if necessary.

**Q.1** Perform the circular convolution of the following sequences using concentric circle method. [10]  
 $x(n) = \{3, 2, 4, 1\}$ ,  $h(n) = \{1, 2, 1, 2\}$ .

**OR**

State and explain following properties of DFT: [10]  
i) Linearity                      ii) Periodicity                      iii) Multiplication  
iv) Circular convolution                      v) Time reversal

**Q.2** Compute 8-point DFT of the following sequence using radix-2 DIT-FFT algorithm: [10]  
 $x(n) = \{1, 0, 1, 0, 1, 0, 1, 0\}$ .

**OR**

Evaluate IDFT of the sequence [10]  
 $X(k) = \{4, 1-j2.414, 0, 1-j0.414, 0, 1+j0.414, 0, 1+j2.414\}$

**Q.3** A LPF has the desired frequency response as given below: [10]

$$H_d(e^{j\omega}) = e^{-j3\omega} \quad ; \quad 0 \leq \omega \leq \frac{\pi}{2}$$
$$= 0 \quad ; \quad \frac{\pi}{2} \leq \omega \leq \pi$$

Determine the filter coefficients  $h(n)$  for  $M = 7$  using frequency sampling method.

**OR**

- a) Explain in detail Gibb's phenomenon. [05]
- b) Obtain cascade and direct form realization with minimum number of multipliers. [05]

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

P.T.O.