

PART B — (5 × 16 = 80 marks)

11. (a) (i) Determine the 8 point DFT of the sequence

$$X(n) = \{0, 0, 1, 1, 1, 0, 0, 0\} \quad (8)$$

- (ii) What is decimation in frequency algorithm? Write the similarities and differences between DIF and DIT algorithms. (8)

Or

- (b) With appropriate diagrams discuss how overlap – save method and overlap – add method are used. (16)

12. (a) Explain in detail the steps involved in the design of IIR filter using bilinear transformation. (16)

Or

- (b) (i) Convert the analog filter with system function $H_a(s) = \frac{s+0.1}{(s+0.1)^2+16}$ into a digital IIR filter by means of the bilinear transformation. The digital filter is to have a resonant frequency of $\omega_r = \frac{\pi}{2}$. (10)

- (ii) Draw the structure for the IIR filter in direct form – II for the following transfer function. (6)

$$H(z) = \frac{(2+3z^{-1})(4+2z^{-1}+3z^{-2})}{(1+0.6z^{-1})(1+z^{-1}+0.5z^{-2})}$$

13. (a) Explain the principle and procedure for designing FIR filter using rectangular window. (16)

Or

- (b) Design a FIR linear phase digital filter for the response

$$H(\omega) = \begin{cases} 1 & \text{for } |\omega| \leq \frac{\pi}{6} \\ 0 & \text{for } \frac{\pi}{6} < |\omega| \leq \pi \end{cases} \quad (16)$$

14. (a) (i) Explain the various formats of the fixed point representation of binary numbers (8)
(ii) What is meant by finite word length effects on digital filters? List them. (8)

Or

- (b) Find the output round off noise power for the system having transfer function $H(z) = \frac{1}{(1-0.5z^{-1})(1+0.4z^{-1})}$ which is realized in cascade form. Assume word length is 4 bits. (16)
15. (a) Explain in detail the two basic operations in multi-rate signal processing. (16)

Or

- (b) (i) Draw and explain the block diagram of subband coding system. (8)
(ii) Discuss about the musical sound processing (8)

