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| 16. What is the relationship between Z-Transform and DFT? | 2 | K1 | CO3 |
| 17. What is prewarping? Why it is needed? | 2 | K2 | CO4 |
| 18. What is the relationship between analog and digital frequency in impulse invariant transformation? | 2 | K1 | CO4 |
| 19. List the desirable characteristics of DSP Processor. | 2 | K1 | CO5 |
| 20. Mention the Addressing Format of DSP Processor. | 2 | K1 | CO5 |
| 21. Realize the following Causal linear phase FIR system function
$H(z) = 2/3 + z^{-1} + (2/3) z^{-2}$ | 2 | K2 | CO4 |
| 22. State the properties of Chebyshev (Type I) filter. | 2 | K1 | CO4 |

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

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| 23. a) | Check whether the following signals are variant or invariant, casual or dynamic, stable or unstable or time non-casual, Static systems. | 11 | K3 | CO1 |
| | i. $y(t) = \sin x(t)$ | | | |
| | ii. $y(t) = tx(t)$ | | | |

OR

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|----|---|----|----|-----|
| b) | Check whether the following signals are variant or invariant, casual or dynamic, stable or unstable or time non-casual, Static systems. | 11 | K3 | CO1 |
| | i. $y(n) = x(n) + nx(n-1)$ | | | |
| | ii. $y(n) = x(n) - x(n-1)$ | | | |
| | iii. $y(n) = nx^2(n)$ | | | |

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| 24. a) | Find the z transform of | 11 | K3 | CO2 |
| | i. $x(n) = e^{-an} u(n)$ | | | |
| | ii. $x(n) = (0.8)^n u(-n-1)$ | | | |
| | iii. $x(n) = (-a)^n u(-n-1)$ | | | |
| | iv. $x(n) = \{2, 4, 5, 7, -3\}$ | | | |

OR

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| b) | Find DTFT of | 11 | K3 | CO2 |
| | i. $x(n) = \sin(n\pi/2) u(n)$ | | | |
| | ii. $x(n) = a^n \cos(n\pi/2) u(n)$ | | | |

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| 25. a) | State and prove any four properties using DTFT and Z Transform. | 11 | K2 | CO2 |
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| b) | Find the inverse Z transform of $X(Z) = 1/1 - 1.5Z^{-1} + 0.5Z^{-2}$ if region of convergence (i) $ z > 1$ and (ii) $ z < 0.5$. | 11 | K2 | CO2 |
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| 26. a) | Explain linear filtering by FFT using save-add method and also find the output $y(n)$ of a filter whose impulse response is $h(n) = \{1, 1, 1\}$ and input signal $x(n) = \{3, -1, 0, 1, 3, 2, 0, 1, 2, 1\}$. Using Overlap add and verify the same using overlap save method. | 11 | K3 | CO3 |
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OR

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| b) | Compute the eight point DFT of the sequence $x(n) = \{1, 0 \leq n \leq 7, \text{ otherwise}\}$ By using the decimation in frequency FFT algorithm. | 11 | K3 | CO3 |
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| 27. a) | Design a linear phase FIR filter of length $M=15$ which has asymmetric unit sample response and a frequency response that satisfies the condition. | 11 | K3 | CO4 |
|--------|--|----|----|-----|

$$H_r \left(\frac{2\pi k}{15} \right) = \begin{cases} 1, & \text{for } k = 0, 1, 2, 3 \\ 0, & \text{for } k = 4, 5, 6, 7 \end{cases}$$

OR

- b) The desired frequency response of low pass filter is given by 11 K3 CO4
$$H_d(e^{j\omega}) = \begin{cases} e^{-2j\omega} & -\pi/6 \leq \omega \leq \pi/6 \\ 0, & \pi/6 \leq \omega \leq \pi \end{cases}$$

Design a filter using hamming window and Plot its magnitude response.

28. a) Explain in detail about the Architecture of DSP Processor. 11 K2 CO5

OR

- b) Explain the Multiplier and Accumulator Concept of DSP Processor. 11 K2 CO5