



QP CODE: 23002673



23002673

Reg No :

Name :

M Sc DEGREE (CSS) EXAMINATION, MARCH 2023

Third Semester

Faculty of Science

M Sc PHYSICS

Elective - PH800301 - DIGITAL SIGNAL PROCESSING

2019 ADMISSION ONWARDS

0D628299

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. List any five applications of Digital Signal Processing.
2. Compare real exponential and complex exponential CT signals.
3. Differentiate between the shifting and time-reversal operations of discrete time signals.
4. What are the different types of discrete time exponential sequence? Draw the different types of exponential sequences.
5. Show that there are only N independent harmonics for a discrete time Fourier series.
6. Briefly explain the development of DFT from DTFT.
7. Differentiate between analog filter and digital filter.
8. What do you mean by aliasing problem in impulse invariant method of IIR filter design?
9. What are the properties of bilinear transformation?
10. Distinguish between recursive realization and non-recursive realization.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

Weight 2 each.

11. Describe continuous time, discrete time and digital signals with one example each.





12. Describe the mathematical model of continuous time systems.
 13. *What are linear and non-linear systems? Determine if the system described by the following input-output equations is linear or non-linear: (i) $y(n) = x^2(n)$ (ii) $y(n) = n x(n)$*
 14. Calculate the 8 - point DFT of sequence $x(n) = \{1, 1, 2, 1, 2, 1, 2, 1\}$ by radix 2 DIT FFT.
 15. Prove the convolution theorem for z transform
 16. Find the stability of system whose impulse response $h(n) = (1/2)^n u(n)$.
 17. **Why the approximation of derivative technique is restricted to the design of low pass filters?**
 18. Discuss the frequency response of a linear phase FIR filter with antisymmetrical impulse response with even value of periodicity.
- (6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

Weight 5 each.

19. Determine the convolution sum of sequences $x(n) = \{3, 2, 1, 2\}$ and $h(n) = \{1, 2, 1, 2\}$.
20. What is FFT? Explain the different stages of computation in 8-point DFT using Radix-2 DIT FFT?
21. Evaluate the frequency response of the system described by the system function 1) $H(z) = 1/(1 - 0.5z^{-1})$. 2) $1/(1 - 3z^{-1})$. 3) $1/(1 + 2z^{-1})$.
22. Describe the direct form II realization in IIR digital filters.

(2×5=10 weightage)

