



23144689

QP CODE: 23144689

Reg No :

Name :

M Sc DEGREE (CSS) EXAMINATION, NOVEMBER 2023

Third Semester

Faculty of Science

M Sc PHYSICS

Elective - PH800301 - DIGITAL SIGNAL PROCESSING

2019 ADMISSION ONWARDS

C1BF645A

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. *What is signal processing? List the different units of a Digital Signal Processing system.*
2. *Determine the values of energy and power of the discrete time signal $x(n) = \sin(n\pi/4)$*
3. *What are causal and noncausal systems?*
4. Explain the cross correlation coefficient.
5. Write the expressions of trigonometric Fourier series and exponential Fourier series and compare the coefficients.
6. What is the relationship between DFT and FFT?
7. What are the desirable properties required for the conversion techniques are to be effective, in the design of IIR filters from analog filters?
8. What is the mapping procedure between z-plane and s- plane in the method of mapping of differentials? What are its characteristics?
9. Give the bilinear transform equation between s- plane and z- plane.
10. What is Gibbs phenomenon? How it is related to truncation?

(8×1=8 weightage)





Part B (Short Essay/Problems)

Answer any **six** questions.

Weight 2 each.

11. Describe the Aliasing effect with an example.
12. Draw a finite discrete time signal in graphical form. Express it in other possible representations. Also draw the delayed and time-reversed form of the signal.
13. Represent the sequence $x(n) = \{4, 2, -1, 1, 3, 2, 1, 5\}$ as a sum of shifted unit impulses. Explain the term causality.
14. Explain the relationship between DFT and Fourier transform.
15. Determine the z transform and ROC of the signal $x(n) = a^n u(n)$
16. Find the z transform and ROC of the causal sequence $x(n) = \{1, -2, 1, 3, 4\}$.
17. What are the steps to design a digital filter using impulse invariance method?
18. Realize $y(n) + y(n+1) + 1/4 y(n-2) = x(n)$ in cascade form network.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. Make a model of savings account as a discrete time system.
20. Define DFT. Explain its properties.
21. Determine the pole zero plot for the system described by difference equation (1) $y(n) - 3/4 y(n-1) + 1/8 y(n-2) = x(n) - x(n-1)$ (2) $y(n) = 5/6 y(n-1) - 1/6 y(n-2) + x(n) - x(n-1)$
22. Obtain the direct form I realization for the systems described by the following difference equations,
(i) $y(n) = 2y(n-1) + 3y(n-2) + x(n) + 2x(n-1) + 3x(n-2)$.
(ii) $y(n) = 0.5 y(n-1) + 0.06 y(n-2) + 0.3x(n) + 0.5 x(n-1)$.

(2×5=10 weightage)

