## M. Sc. DEGREE END SEMESTER EXAMINATION - OCTOBER 2022
SEMESTER 3 : PHYSICS
COURSE : **16P3PHYT12EL : INTEGRATED ELECTRONICS AND DIGITAL SIGNAL PROCESSING**
(For Supplementary - 2016/2017/2018/2019/2020 Admissions)

Time : Three Hours   Max. Marks: 75

PART A
Answer any 5 (1 mark each)

1. One which is used for n-type doping is
    a)PH_3 b)B_2H_6 c) C_6H_6 d) both a) and c)

2. Even part of the signal can be correctly expressed as
    a) $[x(n) + x(-n)]/2$ b) $[x(n) - x(-n)]/2$ c) $[x(n) + x(-n)]*2$ d) $[x(n) - x(-n)]*2$

3. The signal $x(n = cos2n \, u(n)$ is
    a) periodic and causal   b) aperiodic and causal
    c) periodic but not causal   d) aperiodic and non-causal

4.   System which contains N-poles and M-zeroes according to the equation

          is called
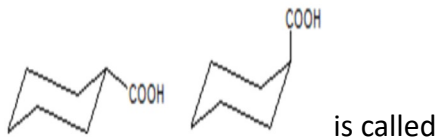
    a. Zero system   b) pole system   c) pole-zero system   d) None of the above.

5.   An all pole system has ____
    a) Finite response impulse   b)   infinite impulse response
    c) both a) and b)   d)   None of the above.

                                                                             (1 x 5 = 5)

PART B
Answer any 7 (2 marks each)

6.   What is integrated resistor?
7.   Plot the graph showing the variation in concentration of diffusants with distance from the surface during infinite source diffusion.
8.   How impurities are diffused in developing ICs ?
9.   Why do we use aluminium as an ohmic contact or interconnection in IC fabrication?
10. Explain Causal system.
11. What are the different types of FIR system. Explain with examples.
12. Explain the non linear characteristics of IIR filters.
13. Define i. CTFT   ii. DTFT.
14. What is decimation in time FFT alogorithm?
15. What do you mean by transformation?

                                                                             (2 x 7 = 14)

PART C
Answer any 4 (5 marks each)

16. (a) Sketch the cross section of a junction capacitor. (b) Draw the equivalent circuit, showing all parasitic elements.
17. Define sampling. State and establish Nyquist sampling theorm. Hence explain Aliasing.

18. Describe the following signals
    i)unit sample sequence δ(n),   ii) unit step signal and iii) unit ramp signal.

19. Find the direct and inverse coefficients of discrete time Fourier series.

20. What is twiddle factor? State and establish the symmetry and periodic property exhibited by twiddle factor.

21. What is FFT? Describe the amount of reduction in computation on using FFT to compute DFT?

(5 x 4 = 20)

PART D
Answer any 3 (12 marks each)

22.1.   Explain with simple example the five steps in fabricating a monolithic integrated circuit.

OR

2.   Discuss the various steps involved in the fabrication of an npn transitior in VLSI technology?

23.1.   Establish the properties of Cross correlation and Auto correlation sequences

OR

2.   Determine if the system described by the following input –output equations is linear or nonlinear.(i). y(n)=x(n) +1/{x(n-1)}(ii). y(n) = x^2(n) (iii). y(n) = n x(n). (iv) y(n)= 2x(n)+1/{x(n-1).

24.1.   Explain any five properties of Discrete Fourier Transform. Describe with examples. Also find the DTFT of the following sequences:
    a) $x(n) = (1/2)^n u(-n)$ b) $x(n) = \delta(n) - \delta(n-1)$.

OR

2.   Find the DFT of a sequences x(n)=(1,2,3,4,4,3,2,1)using DIT algorithm.

(12 x 3 = 36)