Reg. No ………………   Name ……………………..   **17P3632**

MSc DEGREE END SEMESTER EXAMINATION- NOVEMBER 2017
SEMESTER 3 : PHYSICS
COURSE : **16P3PHYT12EL ; INTEGRATED ELECTRONICS AND DIGITAL SIGNAL**
PROCESSING
(Common for Regular - 2017 / Supplementary - 2016 Admissions)

Time : Three Hours   Max. Marks: 75

Section A
Answer any 5 (1 marks each)

1. In Si technology, example for acceptor impurity is
    (a) B   (b) P   (c) C   (d) Ge

2. Fourier representation used for discrete non periodic system is
    (a) Fourier series   (b) Fourier transform   (c) DTFT   (d) DTFS

3. Fourier series is used to expand
    (a) Periodic function   (b) aperiodic function
    (c) both (a) and (b)   (d) None of the above

4. Conjugate symmetry property of DFT is
    (a) $X(k) = X(-k)$ (b) $X(k) = X^*(k)$ (c) $X^*(k) = X^*(-k)$ (d) $X^*(k) = X(-k)$

5. Value of twiddle factor W^{15} in 8-point DFT is
    (a) j (b) $0.707 + 0.707j$ (c) $-j$ (d) $-0.707 + 0.707j$

(1 x 5 = 5)

Section B
Answer any 7 (2 marks each)

6. What is Schottky transistor?

7. What are the four advantages of integrated circuits?

8. Give the order of magnitude of the following: a) the substrate thickness; b) the epitaxial thickness; c) the diffusion temperature; and d) the surface area of the transistor

9. Write a short note on insulators in IC.

10. Define Energy and Power discrete time signals.

11. Write a short note on periodic signals with examples.

12. What are the differences between FIR and IIR systems?

13. Describe the working principles of a sample-and-hold circuit.

14. What do you mean by transformation?

15. What do you mean by Region of Convergence (ROC)?

(2 x 7 = 14)

Section C
Answer any 4 (5 marks each)

16. Explain the two types of metal – semiconductor junctions possible.

17. Determine whether the following signal is periodic or not. If periodic find the common period.
$$x(t) = 3\cos(t/2) + 5\sin(t/3).$$

18. Define sampling. State and establish Nyquist sampling theorm. Hence explain Aliasing.

19. Explain the relationship between z-transform and Fourier transform.

20. What are butterfly diagrams? How are they useful in the computation of FFT algorithms? Explain.

21. Find the ZT and ROC of non causal sequence defined by x(n) = u(-n).

(5 x 4 = 20)

Section D
Answer any 3 (12 marks each)

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

23. Discuss the following in connection with IC fabrication:-
    a) Etching   b) semiconductor contact   c) inductors in IC   d) integrated diode structures.

24. What are FIR filters? Discuss the frequency response of linear phase FIR filters when impulse response is symmetrical and N (no. of samples) is even.

25. Explain the convolution and correlation of DT and CT signals.

26. 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) $x(n) = \delta(n) - \delta(n-1)$.

27. Define Z-transform. Explain poles, zeroes and ROC. Also discuss the properties of Z- transform.
    Explain decimation in frequency Fast Fourier Transform algorithm.

(12 x 3 = 36)