Reg. No ..... Name **18P3632**

MSc DEGREE END SEMESTER EXAMINATION - OCTOBER 2018

SEMESTER 3 : PHYSICS

COURSE : **16P3PHYT11EL : MICROELECTRONICS AND SEMICONDUCTOR DEVICES**

(For Regular - 2017 Admission & Supplementary - 2016 Admission)

Time : Three Hours Max. Marks: 75

Section A
Answer the following (1 marks each)

1. The 8085 microprocessor has ___logic pins
   (a) 30 (b) 20 (c) 40 (d) 32
2. With 12 lines, the number of memory locations that can be created in 8085 microprocessor
   (a) 32 kb (b) 64 kb (c) 16 kb (d) 4 kb
3. The knee voltage of a Schottky diode will be ..... than that of a semiconductor diode
   (a) lower (b) higher (c) an order of magnitude lower (d) an order of magnitude higher
4. Physical address of 8086 microprocessor is _____ bit long.
   (a) 20 bit (b) 16 bit (c) 12 bit (d) 18 bit
5. The 8051 microcontroller CPU is ..... bit
   (a) 4 (b) 8 (c) 16 (d) 32

(1 x 5 = 5)

Section B
Answer any 7 (2 marks each)

6. What is flash memory?
7. Write note on virtual memory and cache memory.
8. Write note on cache memory.
9. Write a note on the classification of heterojunctions.
10. What is a graded heterojunction? Why are they relevant?
11. Compare a pn homojunction and a Schottky junction.
12. Give the flag format of 8086 microprocessor.
13. Define OFFSET address of 8086 microprocessor.
14. Write a note on Harvard and Neumann architectures.
15. What are microcontrollers?

(2 x 7 = 14)

Section C

Answer any 4 (5 marks each)

16. Draw the timing diagram of 8085 memory read cycle.
17. Calculate the theoretical barrier height, built in potential barrier and maximum electric field in a tungsten to n-type silicon Schottky diode at T=300 K and doping concentration of Nd = $3 \times 10^{16}/cm^3$ (ϕ_m= 4.55 V, X = 4.01 V, Nc = 2.8×10^{19} $/cm^3$).
18. The Schottky barrier height of a silicon Schottky junction is 0.59 V, the effective Richardson constant is 114 $A/K^2\text{-}cm^2$ and the cross sectional area is 10^{-4} cm^2. Obtain the ideal reverse saturation current and the reverse current for V = 0.3 V and T = 300 K.
19. What are different segment registers in 8086 microprocessor?
20. Explain memory organization in 8086 microproessor.
21. Add the unsigned numbers found in internal RAM locations 25H, 26H and 27H together and put the result in RAM locations 31H (MSB) and 30H (LSB).

(5 x 4 = 20)

Section D

Answer the following (12 marks each)

22.1. Explain the addressing modes in detail citing examples in 8085.

OR

2. With a schematic diagram explain how an 8 bit microprocessor can be interfaced to 6k RAM (six 1k×8 bit) using linear select decoding technique.

23.1. Give the energy band diagram of a Schottky barrier and discuss the junction properties (voltage and electric field across the junction) .

OR

2. Discuss the energy band gap of heterojunction materials and the concept of two dimensional electron gas.

24.1. With a neat diagram explain the internal architecture of 8086 microprocessor.

OR

2. What are the main features of 8051 microcontroller? Give the pin and block diagrams of 8051.

(12 x 3 = 36)