

**Fifth Semester B.Sc. Degree Examination,  
October/November 2019**

(CBCS Scheme)

**Physics**

**Paper V - DIGITAL ANALOG CIRCUITS AND  
SEMICONDUCTOR DEVICES**

Time : 3 Hours]

[Max. Marks : 90

Instructions to Candidates : Answers should be written in English only.

**PART - A**

Answer any FIVE of the following questions. Each question carries 8 marks :

(5 × 8 = 40)

1. (a) Explain OR gate using diodes with truth table and logic circuit.  
(b) Give the truth table for NAND gate. (6 + 2)
2. (a) What are minterms and maxterms?  
(b) Explain half adder with truth table and logic circuit. (2 + 6)
3. (a) With a neat diagram. Explain the construction of CRO.  
(b) Explain how CRO is used to determine the frequency. (6 + 2)
4. (a) What are p-type and n-type semi conductors? Mention the majority charge carriers in p-type and n-type semiconductors.  
(b) Explain the barrier formation in pn junction diode. (4 + 4)
5. (a) What is bipolar junction transistor? Mention its types.  
(b) Explain the characteristics of a transistor in common-emitter mode. (2 + 6)
6. What is load line and operating point? Explain how DC load line is drawn. (8)
7. Explain the classification of embedded system  
(a) based on generation and  
(b) based on complexity and performance. (8)
8. With a neat block diagram, explain pin diagram of 8085 processors. (8)

**Q.P. Code - 42531**

**PART - B**

Answer any **SIX** questions from the following. Each question carries 5 marks :

**(6 × 5 = 30)**

9. Convert the following decimal numbers to their binary equivalents.

(a)  $25_{(10)}$

(b)  $37.625_{(10)}$

10. Simplify the following expression using Boolean algebra and draw logic diagram

$$A[\overline{ABC} + A\overline{BC}]$$

11. Using Karnaugh map simplify the following expression :

$$Y = \overline{A}BC + \overline{A}BC + AC + \overline{A}BC$$

12. In a transistor base current  $I_B$  and collector current  $I_C$  are  $80 \mu A$  and  $1.85 \text{ mA}$  respectively. Calculate  $\alpha$  and  $\beta$  of a transistor. What will be the emitter current?

13. Find the operating point for a voltage divider bias circuit with npn transistor. Given  $R_1 = 4K\Omega$ ,  $R_2 = 1K\Omega$ ,  $R_C = 470\Omega$ ,  $R_E = 220\Omega$  and  $V_{CC} = 15V$ .

14. A transistor used in CE configuration has the following set of h-parameters.

$$h_{ie} = 1k\Omega, h_{fe} = 100, h_{re} = 5 \times 10^{-4} \text{ and } h_{oe} = 2 \times 10^{-5} \text{ If } R_s = 2k\Omega \text{ and } R_L = 5k\Omega$$

Calculate :

(a) input impedance

(b) output impedance

(c) current gain

15. Write a program to add 49H and 56H stored in the memory locations 2501 H and 2502 H respectively.

16. Write a program to exchange the contents of memory locations 2000 H and 4000 H.

PART - C

Answer any **TEN** of the following questions. Each question carries 2 marks.

(10 × 2 = 20)

17. (a) Why is binary system preferred to decimal system in digital circuits?
- (b) AND gate is equivalent to logical multiplication. Why?
- (c) Write 2's complement of  $1011_{(2)}$ .
- (d) Name logic gate whose output is HIGH when its inputs are different.
- (e) What are Lissajous figures?
- (f) What is aquadog? Why is it used in a CRT?
- (g) Is emitter heavily doped in a transistor? Justify.
- (h) Why is CE mode preferred to CB mode in a transistor amplifier?
- (i) Name any two applications of embedded system.
- (j) What is working principle of LED?
- (k) What are stack and sub routine?
- (l) What are reactive and real time systems?

