

6

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1429

C

Unique Paper Code : 32221303

Name of the Paper : Digital Systems and  
Applications

Name of the Course : B.Sc. (Hons) Physics  
(CBCS)

Semester : III

Duration : 3 Hours

Maximum Marks : 75

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions in all. Q. No. 1 is compulsory. All questions carry equal marks.

Attempt any **five** questions

1. Attempt any five parts (all parts carry equal marks) :  
(5×3=15)

(a) Represent  $(-56)_{10}$  in signed magnitude and 1's complement representation limited to 8-bits.

P.T.O.

- (b) Define deflection sensitivity in Cathode Ray Oscilloscope?
- (c) The accumulator of 8085 microprocessor contains AAH and carry is set. What will accumulator and carry contain after the execution of 'XRA A' instruction?
- (d) Realize OR gate using diodes and resistors.
- (e) Why is D Flip-flop referred to as transparent latch?
- (f) Draw the circuit for 4-bit even parity generator.
- (g) Subtract  $23_{10}$  from  $39_{10}$  using 2's complement method.
2. (a) Draw the labelled block diagram of a Cathode Ray Tube (CRT)? Explain the role of the following: (8)
- (i) Aqua Dag coating
  - (ii) Control Grid
- (b) Minimize the following logic expression using K-map and realize it using NAND gates only  
 $F(A, B, C, D) = \sum m(1, 3, 7, 11, 15) + d(0, 2, 5)$  (7)

3. (a) Draw the circuit diagram of Serial Shift Register and hence describe its working in serial in serial out (SISO) and serial in parallel out (SIPO) modes. (8)
- (b) Distinguish between a 4-bit multiplexer and an encoder using appropriate diagrams. Using block diagrams realise  $8 \times 1$  multiplexer using two  $4 \times 1$  multiplexers and an OR gate and explain its functioning? (7)
4. (a) Write an assembly language program to multiply two 8 bit numbers, one of which is stored in memory location 2050H and other one in memory location 2051H. Store the product in memory locations 2053H and 2054H. (8)
- (b) Explain the working of a 2's complement 4-bit adder - subtractor with an appropriate logic circuit diagram. (7)
5. (a) Describe the phenomena of racing in JK flip-flop. Hence explain how this condition can be avoided with the use of master-slave JK flip-flop. (8)
- (b) Describe the working of a decade counter (MOD-10) with a suitable diagram? (7)

6. (a) Draw the circuit diagram of 555 timer IC in Astable configuration and hence explain its working in terms of the charging and discharging of its timing capacitor by drawing the relevant wave diagrams. (8)
- (b) Write an assembly language programme to divide two hexadecimal numbers. (7)
7. (a) Draw the logic pin out diagram of 8085 microprocessor wherein all the different signals are depicted and classified in different groups. (8)
- (b) What are flags? Describe various flags (in detail) for 8085 microprocessor. (7)