

**B.Sc. (Honours) Examination, 2018**  
**Semester-III (CBCS)**  
**Physics (Core)**  
**Core Course: CC-7**  
**( Digital Systems and Applications )**

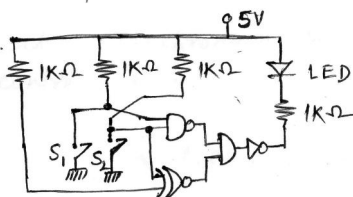
**Time: Three Hours**

**Full Marks: 40**

Questions are of value as indicated in the margin.

Answer *any four* questions

1. a) Find the value of  $25_8 + 56_8 + 45_8$  in HEX through intermediate binary number.  
 b) Add the following signed number given in 2's complement and write its equivalent decimal number  
 $00011010_2$  and  $11101100_2$   
 c) Draw the truth table of four variable function  
 $f = (A + BC)(A + CD)$   
 d) Given  $7_x \times 8_x = 38_x$ , find  $x$  and write the name of the number system.  
 e) Design an EX-OR gate using minimum number of 2-input NAND gates. 2+2+2+2+2
2. a) In the given circuit the LED emits light (i) when both  $S_1$  and  $S_2$  are closed, (ii) when both  $S_1$  and  $S_2$  are open, (iii) when  $S_1$  is closed and  $S_2$  is open and (iv) when  $S_1$  is open and  $S_2$  is closed. Choose the correct option.



- b) Minimize the expression,  $Y = \sum m(0, 2-4, 6-11)$ .
- c) Design a 4-bit ADD/SUB circuit using ADDER IC7483. Show carry output and its sign bit. 3+3+4
3. a) Design a 8:1 MUX using basic logic gates.  
 b) How can you generate the output of a logical expression  $f = \sum m(0, 2-5, 7-9, 13)$  using 16:1 MUX IC?  
 c) Design a Half subtractor using MUX.  
 d) Generate a 1:8 DMUX using multiple 1:4 DMUX IC. 3+2+3+2
4. a) Draw the diagram of a clocked SR Flip-Flop using NAND gates and verify its truth table.  
 b) How can you modify an SR to design JK Flip-Flop?  
 c) What is 'race around' problem and how it can be eliminated? 3+3+4
5. a) Design a 3-bit SISO shift register using Flip-Flops. How can you convert it as a ring counter?  
 b) Design a 3-bit asynchronous Up/Down counter with a mode control line.  
 c) How can you design a MODE counter? 4+4+2
6. a) Show the organization of a  $4 \times 4$  bit ROM using transistor as memory elements.  
 b) What are 'EPROM', 'RAM' and 'DRAM'?  
 c) Write about the Registers and Flags available in 8085 microprocessor.

**P.T.O.**

( 2 )

- d) Write a program in assembly language to add two numbers stored at memory locations 8000 H and 8001 H. Store the result at 8002 H. 2+3+3+2
7. Write notes on (*any two*): 5+5
- a) Binary to Gray Code converter
  - b) 555 Timer
  - c) Synchronous counter
  - d) PISO Shift Register
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