



17333

15116

3 Hours / 100 Marks

Seat No.

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- Instructions :** (1) *All questions are compulsory.*
(2) *Illustrate your answers with neat sketches wherever necessary.*
(3) *Figures to the right indicate full marks.*
(4) *Assume suitable data, if necessary.*
(5) *Use of Non-programmable Electronic Pocket Calculator is permissible.*

Marks

1. A) Attempt any six :

12

- Define positive and negative logic digital system.
- Define :
 - Fan In
 - Fan Out.
- Draw the symbol and truth table of AND and OR gate.
- Give the name of universal gate. Why they called as universal gate ?
- Perform the following conversion
 - $(25.45)_D = (?)_B$
 - $(11011010)_B = (?)_H$.
- List any four Boolean laws.
- Give the function of IC 74147 & IC 74181.
- List any two advantages of R-2R ladder DAC.

B) Attempt any two :

8

- Compare TTL and CMOS (any four points)
- Draw truth table of 3 inputs EX-OR gate. Draw its symbol. Also give its output expression.
- Perform $(9)_{10} - (4)_{10}$ using 1's and 2's complement method.

2. Attempt any four :

16

- Define De-Morgan's theorem and prove it.
- Implement the following logical expression using gates
 - $Y = AB + \bar{A} \cdot \bar{B} + \bar{A} \cdot B$
 - $Y = \bar{A} \bar{B} C + AC$.

P.T.O.



- c) Add $(83)_{10}$ and $(34)_{10}$ in BCD.
- d) Design Half adder circuit using K-Map technique.
- e) Draw 16:1 MUX using 4:1 MUX
- f) Draw the block diagram and truth table of Octal to Binary encoder IC 74148.

3. Attempt any four :

16

- a) Implement the Boolean expression using NOR gate only

$$Y = A + \bar{B}C + AC$$

- b) Convert the Boolean expression into standard SOP form

$$Y = A\bar{B}C + B\bar{D}$$

- c) In the following circuit as shown in fig. No. 1. What will be the output 'X' ?

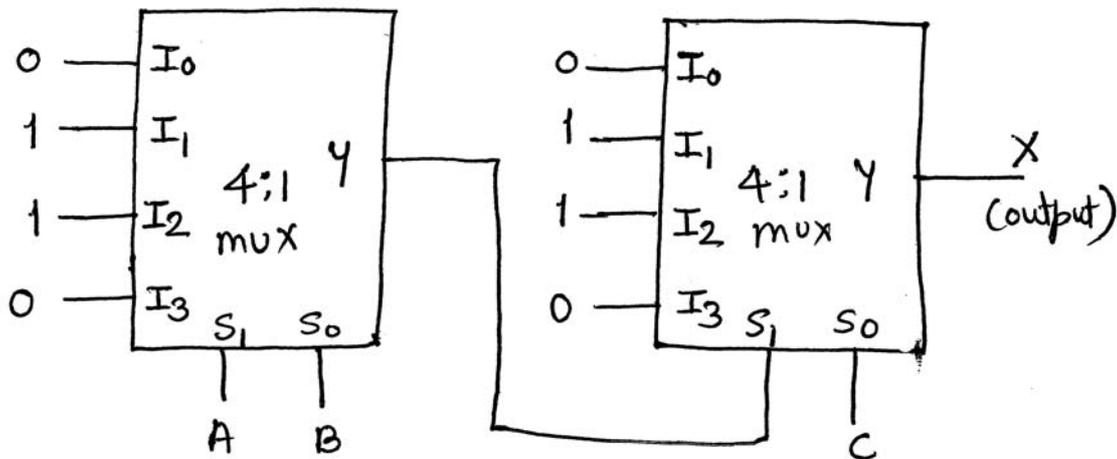


Fig. No. 1

- d) Minimize the following expression using K-Map

$$Y = \sum m (1, 5, 6, 7, 11, 12, 13, 15).$$

- e) Give any four differences between combinational and sequential logical circuit.
- f) How many flip-flops are required to build a shift register to store following number
 - i) Decimal 28
 - ii) Binary 6 bits
 - iii) Octal 17
 - iv) Hexadecimal A.



- 4. Attempt any four :** **16**
- a) Design a 3 bit asynchronous counter. Draw its truth table.
 - b) Explain any four specification of DAC.
 - c) Draw clock signal. Explain various triggering methods.
 - d) Draw and explain D flip-flop using SR flip-flop. Also draw truth table.
 - e) Draw a neat labeled diagram of static RAM Cell and explain it.
 - f) Draw the circuit diagram of successive approximation ADC and explain it.
- 5. Attempt any four :** **16**
- a) Perform $(22)_{10} - (54)_{10}$ in BCD using 10's complement method.
 - b) List different types of flip-flop. Draw the diagram of master Slave JK flip-flop.
 - c) Simplify $Y = \overline{(\overline{AB} + \overline{A} + AB)}$.
 - d) Draw the diagram of serial in parallel out (SIPO) shift register. Also draw timing diagram.
 - e) Draw the block diagram of ALV 74181 and explain each block.
 - f) Draw the pin diagram of universal shift register IC 7495. List any two applications of shift register.
- 6. Attempt any two :** **(16)**
- a) i) Draw block diagram and truth table of 1 : 4 demultiplexer. **2**
ii) Design half subtractor using NAND gate only. **6**
 - b) i) Draw symbol and truth table of JK flip flop. **2**
ii) Define modulus of counter. **2**
iii) Design a MOD-5 ripple counter. **4**
 - c) i) List two advantages and two disadvantages of ADC. **4**
ii) Draw circuit diagram of weighted register DAC & explain its function. **4**
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