

313303

12526

3 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
- (2) Answer each next main Question on a new page.
- (3) Illustrate your answer with neat sketches wherever necessary.
- (4) Figures to the right indicate full marks.
- (5) Assume suitable data, if necessary.
- (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Attempt any FIVE of the following: **10****
- a) Write features of “Binary” and “Octal” numbers in terms of following points.
- i) Base / Radix
 - ii) Symbol / characters used
 - iii) One example.
- b) Draw the following logic gates using “NAND” gate :–
- i) AND Gate
 - ii) NOR Gate.
- c) Draw labelled diagram of Half adder circuit write its i/p signals and output expression.
- d) Write truth table for ‘D’ flipflop and draw its logic diagram using gates.

P.T.O.

- e) State functions of Encoder and Decoder write one application of each.
- f) Draw 16:1 multiplexer tree using 8:1 multiplexer with proper labels.
- g) State De. Morgan's Theorems and write logical expressions for both.

2. Attempt any THREE of the following:

12

- a) Convert given number system with proper steps
Hexadecimal to Binary and further to Octal No. :-
 - i) $(4Fg)_{16} = (?)_2 = (?)_8$
 - ii) $(A72E)_{16} = (?)_2 = (?)_8$
- b) Implement following logic gates using "ONLY-NOR" realization.
Write expression at different stages :-
 - i) OR gate
 - ii) NAND gate.
- c) Simplify given function using K-Map, write truth table, apply grouping rules of K-Map and write final expression
 $f(a, b, c, d) = \Sigma\{0, 3, 5, 9, 13, 15\}$
- d) Describe working of Serial-in Parallel-out (SIPO) shift register with its timing diagram. (Use input, data as "1011" for timing diagram; using suitable flipflop.

3. Attempt any THREE of the following:

12

- a) State concepts of following with proper diagram and give two examples of each :-
 - i) Buffer
 - ii) Tristate.
- b) Differentiate multiplexer and Demultiplexer using any four points given below :-
 - i) Principle of working
 - ii) Input lines
 - iii) Output lines
 - iv) Basic symbol to represent.

- c) Draw logic circuit of J-K flipflop. Write its truth table, Excitation table and one application of J-K flipflop.
- d) Explain “Weighted Register” Digital to Analog (DAC) converter using diagram and state its working principle.

4. Attempt any THREE of the following:

12

- a) Simplify given expression, using boolean laws and draw logic circuit for final expression :-
- i) $F = \overline{A}\overline{B}\overline{C}\overline{D} + A\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}CD + ABCD + \overline{A}\overline{B}C\overline{D} + A\overline{B}C\overline{D} + \overline{A}BC\overline{D} + \overline{A}BCD$
- (Also write boolean algebra rule used in step).
- b) Compare following types of memories with respect to working principle, speed, technology used, application :-
- i) DRAM and SRAM memory
- ii) Non-Volatile and Volatile memory.
- c) Design Half subtractor using Truth table K-Map. Write its expressions for Borrow and Difference. Draw logic circuit.
- d) Perform BCD addition on following decimal nos. :-
- i) $(3485)_{10} + (1357)_{10} = (\quad)_{BCD}$
- ii) $(485)_{10} + (326)_{10} = (\quad)_{BCD}$
- e) Compare following memories with respect to given points. (Any four)
- Working principal
 - Type of storage technology
 - Internal or External
 - Cost
 - Application
- i) PROM
- ii) EPROM
- iii) EEPROM.

5. Attempt any TWO of the following:**12**

- a) For the given truth table (Table No. 1), write expression using POS. Draw circuit for final expression.

Inputs			Output
X	Y	Z	F
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

- b) Design MOD-7 counter, use K-MAP and any flipflop, write truth table. Draw the timing diagram.
- c) What is race-around condition in J-K flip-flop? How it can be overcome and explain the method to overcome race around in J-K?

6. Attempt any TWO of the following:**12**

- a) Minimize following functions and realize it using minimum no. of logic gates. (Use K-MAP) :-
- $F = \Sigma m (0, 3, 5, 8, 9, 11, 13, 14)$
 - $F = \pi m(2, 7, 10, 11, 12, 15)$
- b) Design 3-bit Ripple counter using J-K flipflop with its truth table and draw logic circuit.
- c) Explain R-2R ladder D to A converter with proper diagram. Write two advantages and disadvantages of each.