

Q. P. Code : 30238

(2½ Hours)

[Total Marks: 75]

- N. B.: (1) **All** questions are **compulsory**.
 (2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
 (3) Answers to the **same question** must be **written together**.
 (4) Numbers to the **right** indicate **marks**.
 (5) Draw **neat labeled diagrams** wherever **necessary**.
 (6) Use of **Non-programmable** calculators is **isallowed**.

- 1. Attempt any three of the following: 15**
- a. Convert:
- $(23)_{10} = (?)_2$ 2
 - $(34)_{16} = (?)_{10}$ 2
 - $(555)_8 = (?)_2$ 1
- b. Convert :
- $(101100)_2 = (?)_{\text{gray}}$ 2
 - $(456)_{10} = (?)_{\text{bcd}}$ 2
 - $(64)_{10} = ()_{\text{excess 3}}$ 1
- c. Write a short note on different techniques of binary subtractions 5
- d. Solve :
- $(1011011)_2 - (10010)_2 = (?)_2$ 2
 - $(101101)_2 + (11001)_2 = (?)_2$ 3
- e. Solve :
- $(67)_8 + (70)_8 = (?)_8$ 3
 - $(331)_8 = ()_2 = (?)_{16}$ 2
- f. Solve :
- $(ABC)_{16} + (89)_{16} = (?)_{16}$ 3
 - $(FA)_{16} - (45)_{16} = (?)_{16}$ 2
- 2. Attempt any three of the following: 15**
- a. Describe the AND gate and the XOR gate with the symbol, the logical statement, the boolean expression and its logical circuit diagram.
- b. State and proof DeMorgans Law.
- c. Solve the following
- Simplify : $(\overline{A * B}) * (\overline{A + B}) * (\overline{B + B})$
 - Simplify : $(A + C)(AD + AD) + AC + C$
- d. Describe how NAND gate is used to build the NOT, OR and AND gates
- e. Derive the SOP of the following expression using K- Maps and draw the logical diagram
 $F(W,X,Y,Z) = \sum m((0,2,5,8,10,13)$
- f. Derive the POS of the following expression using K- Maps and draw the logical diagram
 $F(A,B,C,D) = \prod M(0.2.3.4,8,12)$
 $F(A,B,C,D) = \prod M(0.2.3.4,8,12)$
- 3. Attempt any three of the following: 15**
- a. What is a combinational circuit? Build a combination circuit of a half adder.
- b. With the help of K-Maps build a 3- bit full adder and describe it working.
- c. Describe the working of 2 bit half subtractor.

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- d. Describe the working of an 4 bit adder subtractor with a tristate inverter
- e. Describe the working of a multiplier
- f. What is a Comparator? Explain .

4. Attempt any three of the following:

15

- a. Draw the logical circuit diagram and describe the working of a 4:1 multiplexer
- b. Draw the logical circuit diagram and describe the working 1: 4 demultiplexer
- c. Differentiate between encoders and decoders
- d. Describe with a truth table the working of Clocked Set – Reset flip flop.
- e. Describe with a truth table the working of JK flip flop.
- f. What is race around condition? How can it be handled?

5. Attempt any three of the following:

15

- a. Write a short note on type of counters .
- b. Draw a logical diagram and describe working of 4 bit binary counter.
- c. Describe the functioning of a presettable counter
- d. Write a short note on shift registers .
- e. Describe with a timing diagram the working of a 4 bit ring counter.
- f. What is the function of a pseudo random binary sequence generator .