

**MCA/PGDCA 1<sup>st</sup> Semester Examination, 2013**  
**Paper : II (Digital Logic)**

Time : 3 Hrs

Full Marks : 80

1. Answer any five from the following questions in brief

$$2 \times 5 = 10$$

- (a) How do you differentiate a decimal number from that of an Octal number?
- (b) Write the full form of ASCII. How many bits are used here?
- (c) Define a don't care condition. Is it helpful in simplifying a function? How?
- (d) Clearly state the duality principle.
- (e) List the three basic logic operations and draw the gate symbols for them.
- (f) What is the fundamental function of comparator?
- (g) How do you differentiate a synchronous counter from an asynchronous one?

2. Give answer any three from the following questions

4×3 = 12

- (a) What do you understand by primary memory and secondary memory? Give examples and write about their role.
- (b) List the different types of flip flops. State the advantages of J-K flip flop over R-S flip-flop.
- (c) What is a parallel adder? How does it differ from a serial adder?
- (d) Mention the three basic logic operations. How can they be implemented by using NAND gate?
- (e) Clearly define the terms "Maxterm" and "Minterms" with the help of a truth table for three variables.

3. Write answer any three from the following questions

6×3=18

- (a) Perform the following operations.
  - (i) Add  $(01101011)_2$  and  $(10110110)_2$  and also add the same numbers in hexadecimal notations.
  - (ii) Subtract the following after converting them into binary.  
 $(210)_{10} - (128)_{10}$ .

(b) Express the function  $F = x + \bar{y}z$  in

(i) Canonical SOP and

(ii) Canonical POS form.

- (c) What are the XOR and XNOR gates? write their truth tables. Also draw their logic diagrams using basic gates.
- (d) Define a multiplexer. Discuss the operation of a 4x1 multiplexer with the help of necessary diagram and functional table.
- (e) Differentiate between combination and sequential circuits. When is a flip-flop referred to as latch?

4. Write any four answers of the following questions

10×4 = 40

(a) Using K-Map method simplify the following boolean function in (i) SOP and (ii) POS form.

$F(A, C, D, E) = ACE + \bar{A}C\bar{D}\bar{E} + \bar{A}\bar{C}DE$ , with don't care condition  $d = D\bar{E} + \bar{A}\bar{D}E + A\bar{D}\bar{E}$ .

(b) What is a Magnitude comparator? Explain the functions of a 2-bit comparator with suitable logic diagram and truth table. 2+8=10

(c) What is a Master-Slave flip flop? Why is it more

useful over J-K flip-flop? Draw the logic diagram of a Master slave D flip-flop using NAND gates and discuss its functions.  $2+1+7=10$

(d) (i) What is a decoder? How can a decoder function as a demultiplexer? Show with the block diagram of a  $2 \times 4$  decoder.  $2+3=5$

(ii) Write short note on Ripple counter 5

(e) Define a shift register? What are its possible types? (In relation to I/O). Differentiate between unidirectional and bidirectional shift registers. List the capabilities of a most general shift register.  $1+1+2+6=10$

(f) Write briefly any two from the following topics.

$5 \times 2 = 10$

(i) Types of ROM

(ii) Types of RAM

(iii) Basic memory structure.

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