FYIT/SEM I/DLA

**Time: 2½ hrs.** **Marks:75**

**Note:**

1. All questions are compulsory with internal choice.
2. Draw neat diagrams wherever necessary.
3. Figures to the right indicate full marks.

**Q.1** **Answer the following (any three)** **(15)**

**(a)** Convert :

i. $(125)_{10}$ to ( ? )$_2$

ii. $(127)_8$ to ( ? )$_2$

**(b)** Solve using 1's complement.

i) 12 - 10 ii) 12 -13

**(c)** Multiply :

i) (1101) x (101)
ii) (1110) x (110)

**(d)** Convert in to BCD :

i) $(256)_{10}$
ii) $(512)_{10}$

**(e)** Perform :

i) (1101011) + (101010)
ii) (1101011) - (101011)

**(f)** Explain Basic gates with symbol and truth table.

**Q.2** **Answer the following (any three)** **(15)**

**(a)** Explain Demorgan's laws.

**(b)** Describe NOR and XOR gate with Symbol, Truth table, Boolean expression and Waveform.

**(c)** Draw the circuit diagram for following Boolean expression.

*i.* $\bar{A}B + \bar{A}\bar{B}$

*ii.* $\bar{A} + BC + \overline{(BC)}$

**(d)** Explain with the help of circuit diagram how NAND gate is used to create NOT, AND and OR gate?

**(e)** Simplify the following Boolean expression using Boolean algebra laws.
$\overline{AB}(\bar{A} + B)(\bar{B} + B)$

**(f)** Simplify using K-map : $y=\sum m(1,2,9,10,11,14,15)$

**Q.3** **Answer the following (any three)** **(15)**

**(a)** Explain Half adder in detail.

**(b)** Explain 4:1 multiplexer.

**(c)** Simplify using multiplexer : $y=\sum m(1,2,4,6)$

**(d)** Explain 2 bit Comparator.

**(e)** Design 8:1 multiplexer using 4:1 multiplexer.

**(f)** Explain Full adder in detail.

...ht indicate full marks.

**Q.4** **Answer the following (any three)**

**(a)** Explain R-S flip flop with circuit diagram and truth table. **(15)**

**(b)** Explain D flip flop in detail.

**(c)** Solve using K map : $y=\sum m(0,2,5,6,7,8,10,13,15)$.

**(d)** Draw Half adder using multiplexer.

**(e)** Draw Half subtractor using multiplexer.

**(f)** Draw 1:16 Demultiplexer using 1:4 Demultiplexer.

**Q.5** **Answer the following (any three)** **(15)**

**(a)** Explain 3 bit Asynchronous up counter.

**(b)** Design MOD 10 counter.

**(c)** Explain ALU (IC 74181) in detail.

**(d)** Design MOD 12 counter.

**(e)** Explain significance of preset and clear input with respect to D Flip flop.

**(f)** Explain serial in serial out shift register.

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