53 (IT 303) DGEL

2014

DIGITAL ELECTRONICS

Paper : IT 303

Full Marks : 100

Pass Marks : 30

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* Convert the following : 1×5=5

(i) $(1F2A)_{16} = (\text{———})_2$

(ii) $(11{\cdot}001)_2 = (\text{———})_{16}$

(iii) $(155)_{10} = (\text{———})_8$

(iv) $(0{\cdot}32)_{10} = (\text{———})_2$

(v) $(110{\cdot}00101)_2 = (\text{———})_8$

(b) Perform binary arithmetic operation on the following : 2×4=8

(i) 110×111

(ii) $1100 \div 10$

(iii) $10110 - 101$

(iv) $11110 + 10111$

(c) Subtract 11011–01110 using 2's complement method. 3

(d) Draw the logic diagram of $y = a'b + b'cd + ef$ using basic gates only. 4

2. (a) Simplify the following using boolean algebra. 2+3+3=8

(i) $xyz + x'y + xyz'$

(ii) $A'C' + ABC + AC' + AB'$

(iii) $ABCD + A'BD + ABC'D + A'D$

(b) Using k-map simplify the below functions. $6\times2=12$

(i) $F=\sum m(0,1,2,4,5,9,10,11,13)$

(ii) $F=\sum m(2,3,4,9,10,14)$ with don't care conditions $d(1,11,15)$

3. (a) Use only NAND Gate to implement the below boolean function 5

$$F=ab'+ac+bd'$$

(b) Design a 4 : 1 multiplexer. 7

(c) Write down the truth table of a seven segment decoder. 5

(d) Draw the block diagram of a 4 bit ripple carry adder. 3

4. (a) Explain the operation of a basic S-R latch. 5

(b) Discuss the difference between a positive and a negative edge-triggered flip flop. 4

(c) Design a Full Subtractor. 7

(d) (i) An asynchronous counters are known as ————.

(ii) A circuit with many inputs but only one output is named as ————.

(iii) A 4 bit binary counter has a maximum modules of ————.

(iv) $A+A'B=$ ————. 1×4=4

5. (a) Explain the truth table of a J-K flipflop. 5

(b) Describe the operation of Master-slave D-flipflop. 5

(c) Describe the operation of a 2 bit asynchronous binary counter and develop counter timing diagram. 10

6. (a) Develop and analyze timing diagram for serial in serial out shift registers. 10

(b) Describe a PLA and compare with PAL. 6+4=10

7. *(a)* Describe a 2 bit magnitude comparator. 5

(b) Differentiate between multiplexer & Demultiplexer. 3

(c) What are the main differences between synchronous and asynchronous logic ? 3

(d) What is excitation table ? 2

(e) Write down the state synthesis table for SR to JK flip flop conversion. 5

(f) Write down how excitation table is different from truth table. 2
