

Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech (BME)/SEM-4/EC-405/2011**

**2011**

**DIGITAL ELECTRONIC CIRCUITS**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) The hexadecimal equivalent of the binary number  
11101101111010 is

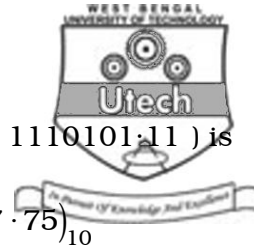
- a) EDEB                                      b) 35572  
c) FB7A                                      d) 3B7A.

- ii) If  $(212)_x = (23)_{10}$  where  $x$  is base ( +ve integer ) then the  
value of  $x$  is

- a) 2    b) 3  
c) 4    d) 5.

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iii) The decimal equivalent of the binary ( 1110101.11 ) is

- a)  $(17.75)_{10}$                       b)  $(117.75)_{10}$   
c)  $(217.25)_{10}$                       d)  $(47.81)_{10}$ .

iv) The minimum number of NAND gates required to implement the Boolean function  $A + AB' + AB' C$  is

- a) zero                                  b) 1  
c) 4                                        d) 7.

v) The flip-flop, which is free from race around problem is

- a) R-S flip-flop                      b) Master-Slave flip-flop  
c) J-K flip-flop                        d) none of these.


vi) Which family has the better noise margin ?

- a) ECL                                    b) MOS  
c) DTL                                    d) TTL.

vii) D flip flop can be used as a

- a) Divider circuit                      b) Delay circuit  
c) Differentiator                        d) None of these.



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xi) The SOP form of logical expression is most suitable for designing logic circuits using only

- a) XOR gates
- b) NOR gates
- c) NAND gates
- d) OR gates.

xii) A flip-flop is a/an

- a) monostable circuit
- b) bistable circuit
- c) astable circuit.

xiii) An example of reflected code is

- a) BCD
- b) ASCII
- c) GRAY
- d) Hamming.

xiv) The number of flip-flops required for a mod-16 ring counter are

- a) 4
- b) 8
- c) 12
- d) 16.



**GROUP – B**  
**( Short Answer Type Questions )**

Answer any *three* of the following.

3 × 5 = 15

2. What is fan out ? what is the basic difference of a latch and edge triggered flip-flop ? Design a 9-bit even parity generator circuit.  
1 + 1 + 3
3. Design BCD-Excess 3 code converter using basic logic gates with proper truth table.
4. What is Race Around condition ? Explain the working of Master-Slave Flip-Flop.  
1 + 4
5. Draw the neat diagram of a 4 bit Bi-directional Shift register using mode control (  $M$  ). When  $M$  is logic zero then left shift and right shift for  $M$  is logic one.
6. Using Quine-McCluskey method, minimise the following Boolean function  $F = \sum m (0, 1, 5, 7, 8, 11, 13)$ .



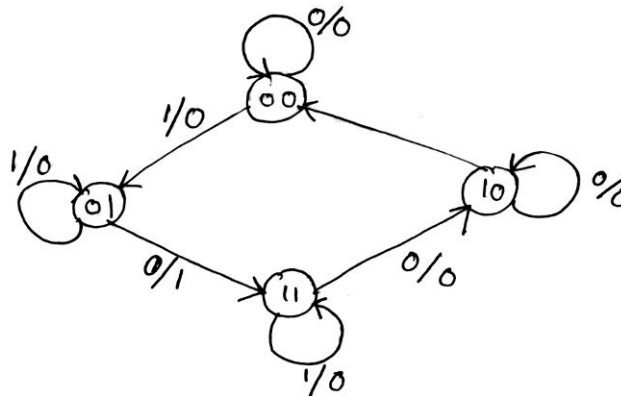
**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.

3 × 15 = 45

7. a) Draw the timing diagram of MOD-10 counter where the MOD-10 counter is designed by cascading MOD-2 followed by MOD-5 counter units.
- b) Design a sequential circuit that implements the following state diagram. Use all D-flip-flops.

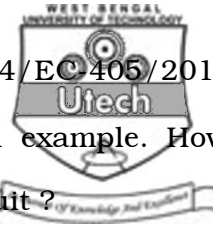


8. a) What are the basic differences between SARM and DRAM ?
- b) What is PLD ? Name different types of PLDs.
- c) Realise the following three functions using a PAL :

$$F_1(A, B, C, D) = \sum(1, 3, 8, 5) + d(4, 9)$$

$$F_2(A, B, C, D) = \sum(1, 3, 9) + d(5, 7, 13)$$

$$F_3(A, B, C, D) = \sum(2, 7, 8) + d(0, 5, 13).$$



9. a) Define combinational logic circuit with example. How does it differ from a sequential logic circuit ?
- b) What is a full adder ? Design a full adder logic using two half adders and find the expressions for the sum and carry out. Also draw the logic circuit for a half subtractor.
10. a) Design a comparator using decoder with an active low outputs to compare two 2-bit binary numbers. Other logic gates can be used in addition to the decoder. The outputs should show the greater than, less than and equal to output.
- b) Gray code is a "Reflected Code". Explain. Draw the circuit to convert a 4-Bit Gray code to its binary.
11. Write short notes on any *three* of the following :
- a) Sequential circuit
- b) CMOS TTL interfacing
- c) Demultiplexer
- d) Asynchronous state machine.