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Reg. No. : .....

Name : .....

Third Semester B.Tech. Degree Examination, September 2014
(2008 Scheme)
(Special Supplementary)
08.306 : DIGITAL ELECTRONICS (T)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions.

1. Describe the binary codes and convert the following :
   a) $11.125)_{D}$ to 8421 code
   b) "DEC3" to ASCII
   c) $1011010.11)_{Excess3}$ to Decimal
   d) $1011101)_{Greg}$ to Binary

2. Simplify the given function using Boolean algebra and specify the Theorms and postulates used in each step of simplification.

   $Y = \overline{\overline{A\overline{B}} + ABC + A(B + A\overline{B})}$

3. Simplify the given function using K-Map and realize it using NOR only.

   $Y = \Pi M(0, 1, 2, 3, 4, 7)$.

4. Describe the applications and working of multi-vibrators using logic gates.

5. Define the following terms associated with Flip Flops.
   a) skew b) setup time c) delay d) metastability

6. Define at least four important characteristics of TTL logic family and compare the values with other logic families.

7. Describe the main parts of a general VHDL program and write the VHDL program for a full adder.

P.T.O.

8. State and prove duality theorem with examples.

9. Make a detailed classification of the memories associated with digital systems.

10. Describe the types of finite state machines and compare the features of synchronous and asynchronous mode of operation. **(10×4=40 Marks)**

PART – B

Answer **any two** questions from **each** Module. **Each** question carries **ten** marks.

Module – 1

11. Explain the rules for BCD addition and design a single digit BCD adder. Explain the operation with examples.

12. Find the minimal sum of product for the Boolean expression

$Y = \sum m(1, 3, 4, 5, 9, 10, 11) + \sum d\,(6 + 8)$ using Quine-McCluskey method.

13. a) Design and realize a two bit digital comparator for the output =, < and >.

    b) Design and realize a 4 bit binary to Grey converter.

Module – 2

14. Design a synchronous MOD-6 counter using JK Flip Flop and explain the operation with state and timing diagram.

15. a) Discuss the application of shift registers and explain the operation of a 4 bit bi-directional shift register with control signals.

    b) Explain the working of a TTL NAND gate with circuit diagram, truth table and voltage/current levels.

16. a) Realize a 3 bit up/down counter in asynchronous mode and explain the working with state and timing diagram.

    b) Explain the working of a master-slave JK Flip Flop with schematic diagram, truth table and characteristic equation.

Module – 3

17. Describe the different types of hazards. Design and realize a circuit for the following switching function with static hazard and another one with static hazard free. Also compare the working with examples.

    $F = \sum m\,(0, 2, 4, 5, 8, 10, 14)$.

18. Design a Moore type synchronous sequential circuit to detect a non overlapping sequence of "101" using T Flip Flop. Each time the sequence is found, the output (z) should be asserted. Assume the required variables and specify.

19. Derive the state table and state diagram of the given sequential circuit and identify the function of the circuit.