Code No: 113BS

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November - 2015
DIGITAL LOGIC DESIGN
(Computer Science and Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A **(25 Marks)**

1.a) State and Prove De Morgan's Theorems. [2M]
b) Realize an XOR gate using universal gates. [3M]
c) Write about Sum of Products and Product of Sums of Boolean expressions. [2M]
d) Explain Steps of Simplification in Karnaugh maps with example. [3M]
e) Explain the working of Full adder with help of diagram. [2M]
f) Draw the logic diagram of a 3/8 decoder. [3M]
g) Construct Master-Slave J-K Flip-Flop. [2M]
h) Explain about Ripple counter. [3M]
i) Differentiate between SRAMs and DRAMs. [2M]
j) What is the difference between PLA and PAL? [3M]

PART-B **(50 Marks)**

2.a) Explain various number systems and Binary codes used in digital logic design with examples.
b) Draw the logic diagram of the Boolean expression without simplifying (A+B) (C+D) ($\bar{A}$+B+D). [5+5]

OR

3.a) Explain the signed binary number representation and floating point number representation with typical examples and discuss about their advantages.
b) Convert $(AB+C)(B+\bar{C}D)$ expression into sum of products and product of sums form. [5+5]

4.a) Realiaze the following function using basic gates.(Two-level).
$f(x,y,z)=\sum(3,5,6,7)$
b) Simplify the Boolean function F together with don't care condition d, and then express the simplified function in some of minterms: $F(A,B,C,D)=\sum(0,2,5,7,11,15), d=\sum 3,4,6,12,13)$. [5+5]

OR

5.a) Construct Karnaugh maps for three variable, four variable and five variable Boolean functions and discuss their simplification methods.
b) Implement the following Boolean function using NAND gates and NOR gates after simplification using Karnaugh map method: $F(A,B,C)=(0,1,2,3,6,7)$. [5+5]

6.a) Discuss with example how higher order Decoders are realized using low-order Decoders.

b) Draw the logic diagrams of a 4 bit binary to gray and gray to binary code converter and verify its working with suitable examples. [5+5]

OR

7.a) Explain the functions of a De multiplexer and Encoder with necessary diagrams and discuss their applications.

b) Construct logic diagram of a 4bit 2's complement adder for performing subtraction operation and verify its working by taking suitable examples. [5+5]

8.a) Draw the circuit diagram of a 4 bit UP/DOWN binary counter and explain its working with the help of its state diagram and truth table.

b) Design a 4 bit binary Ripple counter using T flip-flops and explain its working with help of state diagrams and truth table. [5+5]

OR

9.a) Design a 4 bit universal shift register and explain its working with the help of its state diagram and timing diagram.

b) Explain the working of synchronous sequential circuits and asynchronous sequential circuits with examples and mention their applications. [5+5]

10.a) Explain various types of memories and their construction and characteristics and discuss the hierarchy of memory organization.

b) Implement the following two Boolean functions with a PLA

$F_1(A, B, C) = \sum (0, 2, 4, 6)$

$F_2(A, B, C) = \sum (0, 1, 6, 7)$. [5+5]

OR

11.a) What is Cache memory? Explain the organization of cache memory with suitable diagrams.

b) What is meant by memory decoding? Discuss the structure of address bus and data bus with suitable diagrams. [5+5]

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