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13MCA13

First Semester MCA Degree Examination, Dec.2018/Jan.2019
Fundamentals of Computer Organization

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. Perform the following number conversions:
- $(6BCD)_{16} = (?)_8$
 - $(625.4)_8 = (?)_2$
 - $(1111011.00011)_2 = (?)_{16}$
 - $\frac{80_{(10)}}{(?)_{(8)}} = 100_{(2)}$
 - $(23.6)_8 = (?)_{10}$ (10 Marks)
- b. Perform the subtraction $(100)_2 - (110000)_2$ using (i) 1's complement (ii) 2's complement. (06 Marks)
- c. Write the truth table for the following Boolean expression and draw its logic circuit using two input logic gates for $Y = \overline{AC} + ABC$. (04 Marks)
- 2 a. Express the following function:
- $F = A + \overline{BC}$ in Minterm canonical form and write the truth table for the function.
 - $F = \overline{XY} + XZ$ in Maxterm canonical form and write the truth table for the function. (06 Marks)
- b. Implement the function:
- $F(X, Y, Z) = \sum m(0, 6)$ using NAND gates only.
 - $F = XY + \overline{XY} + Z$ using NOR gates only. (06 Marks)
- c. Simplify the Boolean function and obtain the minimal sums and minimal products using K-map method.
 $F(WXYZ) = \pi M(4, 6, 8, 9, 10, 12, 13, 14)$
 $d = \sum(0, 2, 5)$. (08 Marks)
- 3 a. Design a full adder using two half adders and an OR gate with truth table and logical expression. (05 Marks)
- b. Explain 4-bit full adders with look ahead carry generator with neat diagram and explanation. (07 Marks)
- c. What is a multiplexer? Implement the Boolean function using the multiplexer
 $F(A, B, C, D) = \sum m(0, 1, 3, 4, 8, 9, 15)$. (08 Marks)
- 4 a. Explain the operation of clocked RS flip flop with logic diagram, truth table, characteristics table and characteristic equation. (10 Marks)
- b. How synchronous counters are different from Ripple counter? Explain the working of a 4 bit synchronous binary counter with its block diagram and truth table. (10 Marks)
- 5 a. Explain the basic functional units of a computer with a block diagram. (10 Marks)
- b. Define bus structure and explain single bus structure. (04 Marks)
- c. Explain Multiprocessors and Multicomputers. (06 Marks)

- 6 a. What are the addressing modes? Explain the different addressing modes with syntax and addressing function with examples. (12 Marks)
- b. Registers R1 and R2 of a computer contain the decimal values 1200 and 4600. What is the effective address of the memory operand in each of the following instructions:
- i) Load 20(R1), R5
 - ii) Move #3000, R5
 - iii) Store R5, 30 (R1, R2)
 - iv) Add -(R2), R5
 - v) Subtract (R1) + , R5
- (08 Marks)
- 7 a. Describe the use of DMA controllers in a computer systems with diagram. (10 Marks)
- b. What is bus arbitration? What are the approaches to bus arbitration? Explain. (10 Marks)
- 8 Write short notes on:
- a. Cache Memory (05 Marks)
 - b. RISC and CISC (05 Marks)
 - c. ROM (05 Marks)
 - d. Virtual Memory. (05 Marks)
