বিদ্যাসাগর বিশ্ববিদ্যালয়

VIDYASAGAR UNIVERSITY

B.Sc. Honours Examination 2021

(CBCS)

1st Semester

COMPUTER SCIENCE

PAPER—C2T & C2P

COMPUTER SYSTEM ARCHITECTURE

Full Marks : 60

Time : 3 Hours

The figures in the right-hand margin indicate full marks.

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

THEORY : C2T

Group – A

Answer any *three* questions.   3×12

1. (a) State and prove distribution theorem of booloean algebra.

   (b) Find the complement of the function $F' = \bar{x}y\bar{z} + \overline{xy}z$.

(c) Implement $F = xy + \overline{x}\overline{y} + \overline{y}z$ with only OR and NOT gates.   5+3+4

2. (a) Simplify the boolean function $F(w, x, y, z) = \sum(1, 3, 7, 11, 15)$ with the don't care conditions:

$d(w, x, y, z) = \sum(0, 2, 5)$ using K-map method.

(b) Obtain the simplified expression in sum of products and product of sums of $\overline{x}\overline{z} + \overline{y}\overline{z} + y\overline{z} + xyz$.   6+6

3. (a) What is the difference between combination and sequential circuits?

(b) What is encoder? Design a octal to binary encoder.

(c) Distinguish between encoder and decoder.   4+6+2

4. (a) Draw and explain Booth algorithm for multiplication of signed 2's complement numbers.

(b) Show the step-by-step multiplication process of (+15)×(+13) using Booth algorithm assuming 5 bit register holding signed numbers.   7+5

5. (a) What is addressing mode? What is the necessity of it?

(b) Explain register direct, implied, and indirect addressing modes.

(c) What is I/O driver?   4+6+2

6. (a) Compare RISC and CISC.

(b) Explain a hardware control unit with proper diagram.

(c) Explain Direct memory access.   3+6+3

Group – B

Answer any *two* questions. 2×2

7. What is instruction format ?

8. Draw the circuit diagram of SR flipflop.

9. Distinguish between register and counter.

10. What are fixed and floating point representation ?

PRACTICAL : C2P

Answer any *one* question. 1×15

1. Design 3×8 decoder using two 2×4 decoder. Draw the circuit and truthtable.

2. Design a full subtractor circuit using NAND gates and NOR gates. Draw the circuit and also truthtable. 8+7

3. Design a J-K flip flop usinf D flip flop. Draw the circuit. Also explain the characteristics table.

Answer any *one* question. 1×5

4. Write an assembly language program to find the 1's complement of a 16 bit number.

5. Write a program to perform addition of two numbers (i.e. 159279H and 05A2CH). Store the 24 bits result in register BCD.

6. Design and implement a 4-bit synchronous down counter. Draw the circuit and truth table.

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