(v) Draw the logic diagram from the simplified expression and compare the total number of gates with the diagram of part II.

18/12/17 (M)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 6502 **HC**

Unique Paper Code : 32341102

Name of the Paper : Computer System Architecture

Name of the Course : **B.Sc. (H) Computer Science**

Semester : I

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. **1** is compulsory.
3. Attempt any **4** questions from Question **2** to Question **7**.
4. Parts of a question must be answered together.

1. (a) Convert the following numbers with the indicated bases to decimal : (3×2=6)

   (i) $(7340)_8$

   (ii) $(230)_6$

   (iii) $(123)_4$

(b) Give two instructions required to set E=1 in basic computer. (2)

(c) Differentiate between isolated and memory mapped I/O. (4)

(d) Convert the following from infix to Reverse Polish Notation (RPN) : (2×2=4)

(i) (A + B) * [C * (D + E) + F]

(ii) (A * B) + [A * (B * D) + (C * E)]

(e) Draw a block diagram of 4-to-1 line Multiplexer. (4)

OR

(For Visually handicapped Students only)

Explain 4-to-1 line Multiplexer.

(f) Explain D and T flip-flops with the help of its characteristics table. (4)

(g) Define Pipelining with an example. (2+1=3)

(h) Write micro-operations for following memory reference instructions : (2×2=4)

6. (a) Define the following using block diagrams : (4)

(i) Direct Instruction

(ii) Indirect Instruction

(b) What is associative memory? Explain with the help of a block diagram. Give the application of Associative memory. (6)

7. Given the Boolean function (5×2=10)

$$F = xy'z + x'y'z + xyz$$

(i) List the truth table of the function.

(ii) Draw the logic diagram using the original Boolean expression.

(iii) Simplify the algebraic expression using Boolean algebra.

(iv) List the truth table of the function from the simplified expression and show that it is the same as the truth table in part I.

(i) STA: store AC

(ii) BUN: Branch unconditionally.

(i) Construct a 3×8 decoder using 2×4 decoders. (4)

OR

(For Visually handicapped Students only)

Explain the construction of 3×8 decoder using 2×4 decoders.

2. (a) Give the truth table of full adder. Derive the Boolean function of a full adder using Karnaugh Map. Draw its circuit diagram. (6)

(b) Explain Direct Memory Access (DMA) I/O techniques with the help of block diagram. (4)

3. (a) Show the step-by-step multiplication process using Booth's Algorithm for multiplicand = 10111 and multiplier = 10001. (5)

(b) Draw a space time diagram for a four segment pipeline showing the time it takes to process nine tasks. (5)

OR

(For Visually handicapped Students only)

Explain Arithmetic Pipeline and Instruction Pipeline with example.

4. (a) Draw a 16-bit common bus diagram of basic computer. Explain its functioning. (6)

(b) The following control inputs are active in the common bus system of a basic computer. For each case, specify the register transfer that will be executed during the next clock transition. (4)

	S_2	S_1	S_0	LD of register	Memory	Adder
I.	1	1	1	IR	Read	-
II.	1	1	0	PC	-	-
III.	1	0	0	DR	Write	-
IV.	0	0	0	AC	-	Add

5. (a) Define fetch, decode and execute phases of the instruction cycle in a basic computer. State the sequence of micro-operations using register transfer statements. (6)

(b) Formulate a mapping procedure that provides eight consecutive microinstructions for each. The operation code has six bits and the control memory has 2048 words. (4)