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**3 (Sem-1/CBCS) CSC HC 2**

**2023**

**COMPUTER SCIENCE**

(Honours Core)

Paper : CSC-HC-1026

**(Computer System Architecture)**

Full Marks : 60

Time : Three hours

***The figures in the margin indicate  
full marks for the questions.***

1. Answer the following questions :  $1 \times 7 = 7$ 
  - (a) What is effective address (EA) ?
  - (b) State the 'duality principle'.
  - (c) What is Boolean algebra ?
  - (d) What do you mean by logic gate ?
  - (e) What is flip-flop ?
  - (f) What is stored in a program counter (PC) ?

Contd.



(g) What is instruction set ?

2. Answer **any four** of the following questions :

2×4=8

(a) In a microprogram control, why are the control variables stored in memory ?

(b) What is hexadecimal number system ?

(c) State and prove De Morgan's theorem with the help of a truth table.

(d) Name *three* different modes of data transfer associated with I/O organization.

(e) What is addressing mode ?

(f) What do you mean by cache-hit and cache-miss ?

3. Answer **any three** of the following questions :

5×3=15

(a) Describe the various ways to represent signed binary numbers (fixed point integers).

(b) Explain I/O channel or I/O processor with the help of a block diagram.

(c) Describe the steps of instruction cycle.

(d) Briefly write on the use of memory stack in computer with its operations. Name three sections that divides a portion of RAM.

(e) What is cache memory ? Explain one mapping function used in the implementation of cache memory.

4. Answer **any three** of the following questions :

10×3=30

(a) Write short notes on the following :

5+5=10

(i) Direct Memory Access (DMA)

(ii) Floating-point Representation

(b) What are the differences between hardwired control and micro-programmed control ? What are the advantages and disadvantages in each method ?



- (c) Draw a block diagram that combines the logic and arithmetic circuits for the design of an ALU. Also make the functional table for the arithmetic circuit with brief description of each arithmetic function.
- (d) Design a MOD-7 ripple counter and explain its operation.
- (e) Draw the logic circuit along with truth table or function table of the following **(any two)**:  $5 \times 2 = 10$
- (i) 8-to-3 line encoder
  - (ii)  $4 \times 1$  multiplexer
  - (iii) Clocked SR flip-flop
- (f) Describe in brief the design of a basic computer by enlisting its required digital hardware components.
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