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# 2022

## COMPUTER SCIENCE

( Honours )

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 **any seven** the following questions :
   1×7=7

   (a) What do you mean by the 'Parallel Loading' of a register ?

   (b) What do you mean by binary counter ?

   (c) Why is multiplexer called 'data selector'?

   (d) What do you mean by XNOR gate ?

*Contd.*

(e) Name *two* different ways to represent the real numbers in computer.

(f) What is stored in a program counter (PC) ?

(g) What is instruction set ?

(h) What is effective address (EA) ?

(i) What is micro-operations ?

(j) Name the three types of computer instructions used in a basic computer.

(k) What are RAM and ROM ?

(l) Name *any three* external devices that are used for I/O and memory.

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

$2 \times 4 = 8$

(a) State De Morgan's theorem. Prove *any one* of it with the help of a truth table.

$1 + 1 = 2$

(b) What is the purpose of using complements in digital computer ? Give *one* example.

$1 + 1 = 2$

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

(d) Define interrupt and interrupt handler ?

$1 + 1 = 2$

(e) Name the three basic types of computer instructions used in a basic computer.

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

$1 + 1 = 2$

(g) What is secondary memory ?

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

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

$5 \times 3 = 15$

(a) Draw the logic diagram of 'octal-to-binary encoder' along with a truth table.

(b) What is magnitude comparator ? Write the three basic operations of a magnitude comparator with the help of a simple block diagram.

$2 + 3 = 5$

(c) Describe the basic steps of instruction cycle with the help of a diagram.

(d) Write a short note on assembly language. Briefly describe different fields used in an assembly language instruction. 2+3=5

(e) What do you understand by machine language ? What are the *two* parts that each instruction in machine language consists of ? 3+2=5

(f) Explain *any one* mapping function used in the implementation of the cache memory.

(g) What is interrupt-driven I/O or interrupt-initiated I/O ? Explain it with the help of a simple block diagram by showing the data transfer between CPU and I/O system. 3+2=5

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

4. Answer *any three* of the following questions : 10×3=30

(a) Draw the logic diagram along with a truth table of the following : 5+5=10

(i) T flip-flop

(ii) JK flip-flop

(b) Draw the logic diagram of a 3-bit magnitude comparator.

(c) Draw a block diagram that combines the logic and arithmetic circuits for the design of an ALU. Also make the function table for the arithmetic circuit with brief description of each arithmetic function. 5+5=10

(d) With the help of a block diagram, describe the components of a microprogrammed control unit.

(e) Define stack. Explain the stack organization of a CPU by defining *two* methods of its implementation. Draw a block diagram showing the register stack. 2+5+3=10

(f) Briefly explain *any five* different addressing modes that are used by the computers.

(g) Explain the RAM and ROM chips with the help of *two* separate block diagrams. With the help of a function table, explain how read and write operations are performed in these chips. (2+2)+6=10

(h) What is programmed controlled I/O or programmed I/O system ? Explain with the help of a block diagram showing the data transfer that takes place between I/O devices to CPU through the interface. 5+5=10

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