A4-R4: COMPUTER SYSTEM ARCHITECTURE

अवधि: 03 घंटे	अधिकतम अंक: 100
DURATION: 03 Hours	MAXIMUM MARKS: 100

ओएमआर शीट सं.: OMR Sheet No.:					

रोल नं.: Roll No.:						

उत्तर-पुस्तिका सं.: Answer Sheet No.:						

परीक्षार्थी का नाम: परीक्षार्थी के हस्ताक्षर:

Name of Candidate: ________________________________; Signature of candidate: _______________

परीक्षार्थियों के लिए निर्देश:	Instructions for Candidate:
कृपया प्रश्न-पुस्तिका, ओएमआर शीट एवं उत्तर-पुस्तिका में दिये गए निर्देशों को ध्यान पूर्वक पढ़ें।	Carefully read the instructions given on Question Paper, OMR Sheet and Answer Sheet.
प्रश्न-पुस्तिका की भाषा अंग्रेजी है। परीक्षार्थी केवल अंग्रेजी भाषा में ही उत्तर दे सकता है।	Question Paper is in English language. Candidate can answer in English language only.
इस मॉड्यूल/पेपर के **दो भाग** है। **भाग एक** में चार प्रश्न और **भाग दो** में पाँच प्रश्न है।	There are **TWO PARTS** in this Module/Paper. **PART ONE** contains **FOUR** questions and **PART TWO** contains **FIVE** questions.
भाग एक "वैकल्पिक" प्रकार का है जिसके कुल अंक 40 है तथा **भाग दो**, "व्यक्तिपरक" प्रकार है और इसके कुल अंक 60 है।	**PART ONE** is Objective type and carries 40 Marks. **PART TWO** is subjective type and carries 60 Marks.
भाग एक के उत्तर, इस प्रश्न-पत्र के साथ दी गई **ओएमआर उत्तर-पुस्तिका** पर, उसमें दिये गए अनुदेशों के अनुसार ही दिये जाने है। **भाग दो** की उत्तर-पुस्तिका में **भाग एक** के उत्तर **नहीं** दिये जाने चाहिए।	**PART ONE** is to be answered in the **OMR ANSWER SHEET** only, supplied with the question paper, as per the instructions contained therein. **PART ONE** is **NOT** to be answered in the answer book for **PART TWO**.
भाग एक के लिए अधिकतम समय सीमा **एक घण्टा** निर्धारित की गई है। **भाग दो** की उत्तर-पुस्तिका, **भाग एक** की उत्तर-पुस्तिका जमा कराने के पश्चात दी जाएगी। तथापि, निर्धारित एक घंटे से पहले **भाग एक** पूरा करने वाले परीक्षार्थी **भाग एक** की उत्तर-पुस्तिका निरीक्षक को सौंपने के तुरंत बाद, **भाग दो** की उत्तर-पुस्तिका ले सकते हैं।	Maximum time allotted for **PART ONE** is **ONE HOUR.** Answer book for **PART TWO** will be supplied at the table when the answer sheet for **PART ONE** is returned. However, candidates who complete **PART ONE** earlier than one hour, can collect the answer book for **PART TWO** immediately after handing over the answer sheet for **PART ONE.**
परीक्षार्थी, उपस्थिति-पत्रिका पर हस्ताक्षर किए बिना एवं अपनी उत्तर-पुस्तिका, निरीक्षक को सौंपे बिना, परीक्षा हाल नहीं छोड़ सकता हैं। ऐसा नही करने पर, परीक्षार्थी को इस मॉड्यूल/पेपर में अयोग्य घोषित कर दिया जाएगा।	**Candidate cannot leave the examination hall/room without signing on the attendance sheet and handing over his Answer sheet to the invigilator. Failing in doing so, will amount to disqualification of Candidate in this Module/Paper.**
प्रश्न-पुस्तिका को खोलने के निर्देश मिलने के पश्चात एवं उत्तर देने से पहले उम्मीदवार यह जाँच कर यह सुनिश्चित कर ले कि प्रश्न-पुस्तिका प्रत्येक दृष्टि से संपूर्ण है।	After receiving the instruction to open the booklet and before answering the questions, the candidate should ensure that the Question booklet is complete in all respect.

जब तक आपसे कहा न जाए तब तक प्रश्न-पुस्तिका न खोलें।

DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

PART ONE
(Answer all the questions)

1. **Each question below gives a multiple choice of answers. Choose the most appropriate one and enter in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)**

1.1 Von Neumann architecture of computer is mainly characterized by ______
A) Separate storage and signal path ways for their instructions and data
B) Stored- program concept emphasizing storing of data as well as the instructions to manipulate that data, in the same way
C) Swiftly execution of program
D) None of the above

1.2 The number of MINITERMS is a truth table of n variables
A) n^2 B) 2^n
C) 2*n C) N!

1.3 In memory hierarchy, which one of the followings is the fastest memory?
A) Magnetic Disk B) RAM
C) Cache D) ROM

1.4 Which of the following is not associated with DMA?
A) Bus Request B) Burst Transfer
C) Programmed I/O D) Cycle Stealing

1.5 Locality of reference refers to
A) Scope of local variables in functions
B) The area in the memory where the address of instruction is stored
C) The fact that reference to memory at any given interval of time, during the program execution tends to confine with few localized areas in the memory
D) None of the above

1.6 ________ decodes operation code of instruction.
A) Multiplexer B) Decoder
C) Encoder D) Demultiplexer

1.7 _______ is a binary coded hexadeciaml equivalent of $(01100110)_2$.
A) 66 B) 77
C) 44 D) 99

1.8 CPU processes instruction which resides in _______.
A) Program Counter B) Instruction Register
C) Address Register D) Index Register

1.9 _______ memory gives illusion of large memory.
A) Associate B) Set-Associate
C) Segmented D) Virtual

1.10 In _______ mode, the operands are specified implicitly in the definition of the instruction.
A) Implied B) Implicit
C) Direct D) Indexing

2. **Each statement below is either TRUE or FALSE. Choose the most appropriate one and enter your choice in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)**

2.1 A combination circuit that performs the arithmetic addition of two bits is called half-adder.

2.2 An overflow condition can be detected by observing carry into sign bit position and carry out of sign bit position.

2.3 A logical shift left operation divides signed binary number by 2.

2.4 Booth's algorithm is used to add two negative numbers.

2.5 Shift instruction can be categorized under data manipulation instruction.

2.6 Pseudo instructions are assembler directive.

2.7 In memory hierarchy, cost of saving of one bit of information is minimum in cache memory.

2.8 A register is a group of flip-flops with each flip-flop capable of storing one bit of information.

2.9 A register capable of shifting its binary information in one or more direction is called demultiplexer.

2.10 $(74.24)_{10}$ is equivalent to $(1111011.11011)_2$.

ROUGH WORK SPACE:

3. **Match words and phrases in column X with the closest related meaning/ word(s)/phrase(s) in column Y. Enter your selection in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)**

X		Y	
3.1	A digital circuit which forms arithmetic sum of two bits & a previous carry	**A.**	Cache
3.2	Memory unit access by content	**B.**	Post-Fix
3.3	Second part of an instruction code containing operand	**C.**	Vectored Interrupt
3.4	Converting expression to evaluate arithmetic expression in stock operations	**D.**	2 stable states
3.5	In interrupt Initiated I/O, branch address is arranged to a fixed local in memory	**E.**	Immediate instruction
3.6	Flip-Flop loss	**F.**	No. of tasks completed per unit time
3.7	Throughput is defined as	**G.**	FULL Address
3.8	Shift Register	**H.**	Page replacement
3.9	LRU	**I.**	Associative memory
3.10	One I/P signal to the gate & one O/P signal from the gate	**J.**	NOT Gate
		K.	Direct instruction
		L.	Infixed
		M.	Can shift its stored data by one bit postern at each clock period

4. **Each statement below has a blank space to fit one of the word(s) or phrase(s) in the list below. Choose the most appropriate option, enter your choice in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)**

A.	-127	**B.**	linker	**C.**	AND
D.	Flip-flops	**E.**	Multiprogramming	**F.**	Compiler
G.	Program Counter	**H.**	Bootstrap	**I.**	-128
J.	DMA	**K.**	ADDER	**L.**	Mantissa
M.	Multiplexer				

4.1 A ________ is a program which is started first when computer is powered ON.

4.2 A high level language is converted into machine level language by ________.

4.3 Floating point representation contains ________ and exponent.

4.4 The storage element employed in a clocked sequential circuit are called ________.

4.5 ________ is a combinational circuit that receives binary information from one of the 2^n input lines and directs it to a single output line.

4.6 In ________, several programs reside in main memory.

4.7 ________ stores the address of next instruction to be executed.

4.8 ________ transfers data from I/O devices to main memory without involvement of CPU.

4.9 In half adder, CARRY can be obtained by using ________ gate.

4.10 The smallest negative number that can be represented in 8-bit two's complement form is ________.

ROUGH WORK SPACE:

PART TWO
(Answer any FOUR questions)

5.
a) Draw and explain logic circuit diagram of Encoder and Decoder.
b) What are the differences between circular shift and arithmetic shift?
c) What is instruction pipeline? What are the problems associated with Instruction pipeline?

(5+5+5)

6.
a) During execution of instruction, the way the operands are chosen depends on addressing mode of instruction. Which are the modes of addressing? Specify effective address of operand for each addressing mode.
b) Write a short Note on DMA.

(7+8)

7.
a) Perform following arithmetic operation using 2's complement integers.
   i) 35+ (-10)
   ii) 20 - (-4)
b) Write an assembly language program to multiply two positive numbers. (Numbers are 13_{10}, 10_{10}).
c) Which are the registers used in basic computer organization? Write function of each register.

(4+5+6)

8.
a) How are Instruction Register (IR) & Control Unit (CU) connected to decode instruction?
b) Draw and explain flow chart for Booth Multiplication Algorithm.

(7+8)

9.
a) What is disadvantage of strobe method? Explain in brief source-initiated data transfer procedure using handshaking along with its block diagram and timing diagram?
b) Why do computers use addressing mode techniques? Explain Immediate, indexed, Relative & Base register addressing modes.
c) Hoes does microprocessor handles I/O interrupts. Draw Flow chart.

(5+5+5)

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ROUGH WORK SPACE:

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