

**POST GRADUATE DIPLOMA IN COMPUTER
APPLICATIONS (PGDCA-NEW)**

Term-End Examination

June, 2022

MCS-202 : COMPUTER ORGANISATION

Time : 3 hours

Maximum Marks : 100

(Weightage : 70%)

Note : *Question number 1 is **compulsory** and carries 40 marks. Attempt any **three** questions from questions number 2 to 5.*

1. (a) Convert the following : 6
- (i) Decimal number 249·125 to binary, octal and hexadecimal
 - (ii) Hexadecimal $(FA12)_h$ into octal, binary and decimal
- (b) Use K-map to find the optimal function for the function

$$F(A, B, C, D) = \sum (0, 4, 8, 11, 12, 13).$$

Also draw the logic diagram of resultant function using AND, OR, NOT Gates. 5

(c) Draw and explain the logic diagram of a RAM cell. 5

(d) A main memory has the size of 2 MB. The word size of the main memory is 16 bits and 1 block of main memory word/cache memory is of 64 bits. The size of the cache memory is 64 KB. Determine the following : $1+1+3=5$

- (i) Size of the address of main memory.
- (ii) The number of cache lines.
- (iii) Assuming that a main memory to cache direct address mapping is used, explain how main memory address will be mapped to cache memory address.

(e) Consider the following state of registers and main memory (All values are in Hexadecimal) : 4

Address	Main Memory
4F11	LDA
4F12	4F14
4F13	2567
4F14	6782
4F15	
4F16	4F00
4F17	4F14

AC

IR

PC

XR

BR

Assuming that the load instruction is stored in address 4F11 and 4F12, where the location 4F12 contains the address field of the load instruction. Calculate the value of operand, that would be loaded to AC, if load instruction uses the following addressing modes :

- (i) Memory Direct Addressing
 - (ii) Index Addressing
 - (iii) Base Addressing
 - (iv) Immediate Addressing
- (f) Explain the sequence of micro-operations that would be required to fetch an instruction stored in a memory location to IP register. You may assume that the machine uses MAR \rightarrow register to stored memory address, R1 \rightarrow register which stores data received from memory or data to be transferred to memory; AC \rightarrow register which is used to perform computation, IP \rightarrow register that stores the instruction, which is fetched and PC \rightarrow register which stores the instruction to be fetched. Make suitable assumptions. 5
- (g) For the following values of various registers in an 8086 microprocessor, compute the physical memory address : 4
- (i) CS : IP \equiv 0FABh : 01FAh
 - (ii) SS : SP \equiv 1F0Ah : 0267h

- (h) Write a program in 8086 assembly language that interchanges the value stored in two memory locations having the name FIRST and SECOND. Explain the logic of the program. 6
2. (a) Simplify the following Boolean functions : 4
- (i) $((A + B')')' + A \cdot B'$
- (ii) $(A + B)' + (A \cdot B)' + (A' \cdot B)'$
- (b) Explain the process of error detection and correction using parity bit. 5
- (c) Explain the floating point number representation with the help of an example. 5
- (d) Explain the working of a basic SR latch. Draw the characteristics table of SR flip-flop. Also make the excitation table of SR flip-flop. 6
3. (a) Explain the internal structure of a hard disk drive with the help of a diagram. 5
- (b) Explain the concept of memory hierarchy with the help of an example. 5
- (c) What is an Interrupt ? How can it be used for Input/Output ? Explain interrupt driven I/O with the help of an example. 5
- (d) Briefly explain any two types of printer technologies. 5

4. (a) Explain the following program control instructions with the help of an example : $2+2+1=5$
- (i) Branch
 - (ii) CALL
 - (iii) Return
- (b) What is the need of an interrupt cycle during the instruction execution ? Explain the micro-operations of an interrupt cycle. Make suitable assumptions. 5
- (c) Explain the working of Wilkes control unit with the help of a diagram. 5
- (d) Explain the use of large register file with the help of an example. 5
5. (a) Explain any three shift instructions in 8086 microprocessor. 6
- (b) Differentiate between .com and .exe programs in the context of 8086 microprocessor. 4
- (c) Write a program using 8086 assembly language that adds four byte values stored in an array of size 4 in the memory. The result of addition is stored in the fifth and sixth location. 6
- (d) Explain the characteristics of the following : 4
- (i) Array processing
 - (ii) Multiprocessor system