POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS (PGDCA–NEW)

Term-End Examination
December, 2023

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 Question No. **2** to Question No. **5**.*

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1. (a) Perform the following operations using signed 2's complement notation of 8-bits, (including the sign bit). You must indicate overflow or no-overflow and the reasons thereof :   6

   (i) Add + 69 and + 59

   (ii) Subtract 90 from – 38

   (iii) Add – 76 and + 86

(b) Simplify the following function using Karnaugh's map : 5

$$F (A, B, C, D) = \Sigma (2, 3, 6, 7, 9, 10,$$
$$11, 12, 15)$$

Draw the logic diagram of the simplified function using AND, OR and NOT gates.

(c) What is the need of Cache memory ? Explain the associative mapping scheme of Cache memory with the help of an example. 5

(d) Explain with the help of a flowchart how Interrupt-driven Input/Output technique is used to perform input function. 5

(e) Explain the following addressing modes with the help of *one* example each : 6

   (i) Register indirect addressing

   (ii) Base register addressing

   (iii) Direct addressing

(f) What is instruction pipelining ? Explain with the help of a diagram. 4

(g) What are the segment registers in 8086 microprocessor ? Explain their uses with the help of an example. 4

(h) Write a program in 8080 assembly language that finds the largest of two byte numbers stored in the memory. The program then subtracts smaller number from the larger number. The result is left in AX register. 5

2. (a) Explain the Von-Neumann architecture. How is it different than the Harward architecture ? 5

(b) Explain different components of a floating point number. How are they different than the fixed point numbers ? 5

(c) Draw the S-R latch using NOR gates and explain its functioning. Also make the characteristic table of S-R flip-flop. 5

(d) Draw the truth table and block diagram for synchronous counter. Explain its functioning. 5

3. (a) Explain the term access time in the context of a hard disk. Also differentiate between CLV and CAV in the context of secondary storage technologies. 5

(b) Explain the set-associative cache mapping scheme. 6

(c) What is DMA ? Explain the structure of DMA module with the help of a block diagram. 5

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(d) Explain the following terms in the context of Input/Output technologies : 4

   (i) Colour depth

   (ii) Non-impact printers

4. (a) Explain the steps of subroutine call and return instructions with the help of an example. Assume suitable register set. 4

(b) What is a micro-operation ? Explain register-transfer, arithmetic and logic micro-operations with the help of an example. 7

(c) Explain the features of RISC processors. 4

(d) Explain the operations of micro-programmed control unit with the help of a block diagram. 5

5. (a) Explain the following in the context of 8086 microprocessor : 15

   (i) Bus interface unit

   (ii) Tools for assembly language programming

   (iii) Interrupt processing in 8086 micro-processor

(b) Write a program in 8086 assembly language that converts an ASCII digit stored in a memory location into its equivalent binary. 5