ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION **WINTER SEMESTER, 2020-2021**

DURATION: 1 Hour 30 Minutes **FULL MARKS: 75**

CSE 4105: Computing for Engineers

Answer all **three (3)** questions.
Figures in the right margin indicate marks along with COs and POs.

N.B. The name of the pdf must be in the following format <Student ID Course Code MID>
If it becomes evident that you have copied any answer from any other source without prior instruction, evaluators can reject that answer altogether at the time of evaluation.

1. a) **Scenario**: "James drives a Tesla, a smart car with built-in computer system, which operates using an AI based Operating System. The operating system can go from one place to another autonomously using information such as camera footage, radar mapping and GPS."
What are the four main components of a computer system? Identify the components in the scenario given above. (5) (CO1)

b) (5+5=10)

i. What are the two main types of Primary Memory? Explain the differences between in terms of form, function and speed. (CO3)

ii. Arrange the following memory devices in terms of their speed and latency (slower to faster)

- RAM, Registers, Hard-disk drive (Traditional Disk), Cache Memory, Solid-state drive (Flash Disk)

c) (10)

A program is loaded in RAM (address 0 to 3). What happens when the computer executes the programs – explain briefly with the concept of instruction cycles, mention the register values PC, IR and Acc at different steps. (CO2)

Address	Value
0	Load 4
1	Add 5
2	Store 4
3	Halt
4	9
5	6

P.T.O.

2. a)

i. **Scenario**: "Mr. X is a teacher at a local high school and he is assigned the task of tabulating the students' results. He wrote a simple program on his computer which takes in as input a list of numbers representing individual Grades of all the subjects for a particular student. The program outputs the average of all the numbers representing the GPA of that particular student." Write a simple **Pseudocode** for the program mentioned in the scenario. (4+4=8) (CO1)

ii. Why is structured programming a better paradigm compared to unstructured programming?

b)

i. What are the uses and benefits of Octal and Hexadecimal number systems? (2+2+4=8) (CO2)

ii. Why is 2's complement advantageous over 1's complement for representing signed binary numbers in a computer system?

iii. Write the **2's complement** for each of the following **5-bit binary numbers**.

1) $\mathbf{00101_2}$

2) $\mathbf{11111_2}$

c) (4+5=9) (CO2)

i. Perform the following conversions –

1) Convert $\mathbf{63.20_{10}}$ into **Hexadecimal**

2) Convert $\mathbf{101011.0101010_2}$ into **Octal**

ii. Construct a **logic circuit** from the following Boolean expression and draw a graphical representation of it.

- $C(A + BD) + \overline{EF}$

3. a) What are the differences between a compiler and an interpreter? (5) (CO1)

b) (5+5 =10) (CO3)

i. Explain the concept of Process in terms of process management by an operating system. What states a process can be in?

ii. In a computer system, there are currently 4 processes P1, P2, P3, P4 with the following execution time requirements.

Process	Time Needed
P1	5
P2	4
P3	7
P4	2

Draw a diagram of a Queue that represents the **CPU Scheduling** of the processes mentioned above according to **Shortest Job First** Scheduling.

P.T.O.

c) (5+5 =10)
(CO4)

i. Explain the concept of **File** and **Directory Structure**. What is the commonly used directory structure for file management?

ii. How does the **Paging scheme** overcome the problem of **fragmentation** caused by the traditional multiple partition memory allocation strategy?

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