# ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

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ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION WINTER SEMESTER, 2022-2023

DURATION: 3 HOURS FULL MARKS: 150

## CSE 4361: Computer Science and Technology I

**Programmable calculators are not allowed. Do not write anything on the question paper.**

Answer **all 6 (six)** questions. Figures in the right margin indicate full marks of questions whereas corresponding CO and PO are written within parentheses.

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1. a) Perform the following conversions: 4 × 2 (CO1) (PO1)
   i. $(426)_8 = (?)_{16}$
   ii. $(678)_{10} = (?)_2$
   iii. $(1056)_{16} = (?)_{10}$
   iv. $(10011011.0111)_2 = (?)_{10}$

   b) Explain the following terms: 3 × 3 (CO1) (PO1)
   i. Router
   ii. Switch
   iii. Hub

   c) Imagine you are the owner of a financial consulting firm and your business relies on providing personalized financial plans for your clients. You have decided to incorporate a new feature into your financial planning software that utilizes the Fibonacci series. 10 (CO2) (PO1)

   Write a C program to determine all the numbers of the Fibonacci series upto a number $n$, where $n$ is input from the user and must be greater than 0.

2. a) Perform the following operations: 3 × 3 (CO1) (PO1)
   i. $(0011010)_2 + (001100)_2$
   ii. $(0011010)_2 - (001100)_2$
   iii. $(0011010)_2 \times (001100)_2$

   b) There are many different CPU scheduling algorithms. There are five processes $P_1$, $P_2$, $P_3$, $P_4$ and $P_5$ having CPU time 6, 8, 7, 3 and 5. Show the CPU execution of these processes using 3 CPU scheduling algorithms. Also, calculate the waiting time for each process. 10 (CO1) (PO1)

   c) Describe briefly the LAN, MAN, and WAN transmission technologies. 6 (CO1) (PO1)

3. a) Explain the importance of networking. What are the categories of Guided Media. Discuss the features of the categories with appropriate figure(s). 8 (CO1) (PO1)

   b) "The bandwidth or the throughput is affected by the distance between the connected computers" - explain the statement. 8 (CO1) (PO1)

   c) Define Instruction Cycle. List the steps of executing an instruction cycle. 8 (CO1) (PO1)

4. a) List the features of the following LAN topologies: 9 (CO1) (PO1)
   i. Bus
   ii. Star
   iii. Ring

   b) Define multiplexing. Briefly describe the function of each layer of the OSI model. 10 (CO1) (PO1)

   c) Define process. Show the states of a process using a figure. 6 (CO1) (PO1)

5. a) Write the outputs of the following programs in Code Snippet 1 and 2. 12 (CO2) (PO3)

```
1 for i in range(1, 11):
2     print(f"i={i}")
```

**Code Snippet 1:** A Python Program for Question 5.a).

```
1 p = 800
2 q = 0
3 r = 500
4 if p >= 700:
5     q = 600
6 print(q, r)
```

**Code Snippet 2:** A Python Program for Question 5.a).

   b) What is Memory Management in OS? There are different memory allocation schemes to allocate memory to the processes that reside in memory at the same time. Explain the memory allocation schemes with appropriate figures. 13 (CO1) (PO1)

6. a) Write the Boolean expression and truth table for the diagram in Figure 1 and 2. 12 (CO1) (PO1)

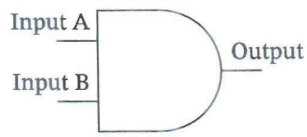


**Figure 1:** Logic Diagram for Question 6.a)

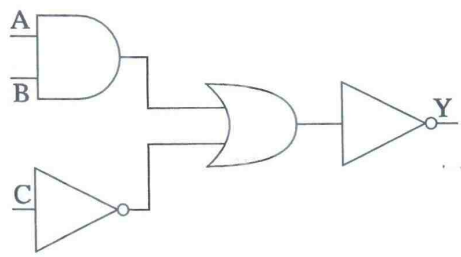


**Figure 2:** Logic Diagram for Question 6.a)

   b) Define gate. Draw the logic diagrams of the following Boolean expressions: 12 (CO1) (PO1)
   i. $AB + BC(B + C)$
   ii. $(AB) \oplus (AB) \oplus (AB)$
   Here, $\oplus$ denotes the XOR operation and $+$ denotes the OR operation.