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B.Sc. Engg. CSE 1st Semester — 08 December 2023 (Afternoon)

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

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 4105: Computing for Engineers

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) Newly admitted students always look for accommodations within the campus. The Halls of Residence of IUT having limited capacity, distributes the seats among the students based on a policy. You are already aware of the policy being employeed. Emails are sent to the students regularly who win a seat in the Halls of Residence. — 5 (CO2) (PO1)

   Write an algorithm to answer the question "whether I will get a seat in the Hall". You may assume any input necessary to consider according to IUT policy.

   b) "Learning Management System (LMS)" is an important educational tool and probably you have already experienced one: google classroom. List the typical features that an LMS must have. Suggest 02 (two) very exciting features for future inclusion? — 5 (CO1) (PO1)

   c) Sometimes overflow occurs in an arithmetic operation that leads to severe software bug. Give an example code/pseudo-code to demonstrate overflow in arithmetic operations. — 5 (CO2) (PO1)

   d) Answer to following short questions: — 5 × 2 (CO1) (PO1)
   i. What are the two primary criteria for using any memory technology as RAM?
   ii. Mention two cavity places where viruses can hide in an executable.
   iii. What are the hashes used in Bitcoin and Linux login systems?
   iv. Which cloud services are commonly referred to as "-aas"?
   v. What is a Server in terms of hardware and software?

2. a) Convert the decimal number 57 to following number systems: — 3 × 3 (CO2) (PO1)
   i. Base 3
   ii. Base 2
   iii. Base 4

   b) Considering a 4-bit system performs the following 2's complement arithmetic, comment on their correctness: — 3 × 3 (CO2) (PO1)
   i. $-6-3$
   ii. $5+3$
   iii. $-4-4$

   c) Answer the followings in brief: — 7 × 1 (CO1) (PO1)
   i. Why do we need binary number system in computers?
   ii. What is the range of values possible in a 2's complement system of 8-bit?
   iii. What is the range of values of unsigned 8-bit variable?
   iv. What is the range of values of a signed 8-bit variable?
   v. How many bits make a KiloByte?
   vi. When you say your network connection bandwidth is 10 Mbps, what do you mean?
   vii. What are ASCII values used for?

3. a) `ls` is a command that prints files and directories present in a particular directory i.e. `/home`. `grep` is a command that prints the lines that matches with the given expression. `^expr` means the character set `expr` should be at the start of the line to have a match. | operator allows the pass output of command on the left to be passed as input of the command at the right (i.e. `command1|command2`)
Write a command with the above two commands (with appropriate options) that will print the lines for directories only present in `/home`. 5 (CO1) (PO1)

b) For a single-core CPU, when OS transfer the control of CPU to any program, how does the OS take the control of the CPU back? 5 (CO1) (PO1)

c) Sometime when your computer is running many computing intensive programs, it happens that you give input to the word program but text is not updated, you experience a delay. Can you explain the situation in terms of OS working mechanism? 5 (CO1) (PO1)

d) Answer the followings in brief: 5 × 2 (CO1) (PO1)
   i. Any empty directory has at least two references (pointers). What are those two references pointing to the empty directory we are talking about?
   ii. What is the meaning of the file permission 0755?
   iii. What are the two file types that can be executed as program?
   iv. How much CPU does msword program takes when it is showing graphics?
   v. What does it mean by the term kernel of an OS?

4. a) What is the task of a linker in compiler toolchain? 5 (CO1) (PO1)

b) Segments in a PE has the four information in the section header: `SizeOfRawData`, `PointerToRawData`, `VirtualSize`, and `VirtualAddress`. How does the loader use these information? 5 (CO1) (PO1)

c) FileAlignment is an Optional Header entry in PE that may help virus to creep into an executable. Explain with the help of language or graphics. 5 (CO1) (PO1)

d) Briefly explain *XSS* and *NULL Pointer Exception* in respect to Cyber security threats. 10 (CO1) (PO1)

5. a) Describe the 5 clauses of USA Patent Law briefly. 10 (CO1) (PO1)

b) Briefly describe Cyber Security Laws in USA. 15 (CO1) (PO1)

6. a) What do you understand by File System? Explain FAT and FAT32 file systems with their pros and cons. 10 (CO1) (PO1)

b) Write short notes on the followings: begin 3 × 5 (CO1) (PO1)
   i. Keyboard
   ii. Hard Disk
   iii. LED Monitor