COMSATS UNIVERSITY ISLAMABAD (CUI)
Park Road, Tarlai Kalan Islamabad 45550 Pakistan
Department Of Computer Science.
Final Examination. Spring - 2025.

Class: BRG-2A / BS-R (BCS-2R / BCS-5R)
Subject: CSC101-Applications of I&CT
Instructor: Mohsin Ahmed

Total Marks: 50
Time allowed: 3 hrs.
Date: 02 July 2025

*Note: All questions are self-explanatory and require no further explanation during exam time. Make sure to sign the attendance sheet before leaving the examination room. **Do not Return** the question paper along with the answer sheet.*

(CLO – 1: Explain the basic computing models and its related hardware)

Q1: a. You have a budget to add **either 1 GB of L2 cache or 8 GB of RAM.** Which should you choose for a high-speed transaction system and why? Justify your decision with reasoning related to access time and use case. **[2+3=5 Marks]**

b. A CPU has a clock speed of **3.2 GHz.** If a single instruction takes **4 clock cycles** to execute:

1. How many instructions can it theoretically execute per second?
2. What happens if a program has 2 billion instructions—how long would the CPU take to complete it (in seconds)?

(CLO – 2: Work out with different number systems and codes.)

Q2: A digital scoreboard stores players' scores in octal (base-8) format for legacy compatibility. The current scores are: **[3+3+2=8 Marks]**

- *Player 1: 272_8*
- *Player 2: 154_8*

a) Convert both scores to binary and then to hexadecimal.
b) Determine which player is leading, and calculate the difference in decimal.
c) Discuss why hexadecimal representation is more efficient and preferred over octal in modern computing and communication systems.

(CLO – 3: Describe the fundamental concepts of ICT domains.)

Q3: A startup is launching a web-based application and is considering using cloud computing to support its development and operations. The team is evaluating different deployment models to balance control, cost, and scalability. **[2+2=4 Marks]**

3.1. Describe the main characteristics of the Public, Private, and Hybrid cloud deployment models.

3.2. Which deployment model would be most suitable for a startup concerned with low cost and rapid scalability and why?

Q4: A hospital plans to integrate Artificial Intelligence (AI) tools to support its diagnostic procedures and administrative tasks. **[2+1= 3 Marks]**

4.1. Mention one specific use of AI in healthcare and explain how it improves patient care.

4.2. Name one other industry (besides healthcare) where AI applications are creating significant impact, *and briefly describe how.*

(CLO – 4: Solve computing problems using problem-solving process.)

***Q5:** Write pseudocode to design the logic for a smart vending machine that manages item selection, stock levels and dynamic payment handling. The machine should display available items with their codes, prices and stock. A user selects an item but if it's out of stock, they must choose again without restarting. On successful payment the machine dispenses the item, updates the stock and returns change also handle refund. After each transaction the machine should ask if the user wants to continue or exit.* [5 Marks]

Q6: You are a systems engineer assigned to develop a utility tool for an embedded device. This tool accepts an input code from a technician, a positive integer of at least 6 digits. The tool should then validate that the number is at least of 6 digits, and reverse the digits of the number and display the reversed code to confirm entry.
Your task is to draw a Flow Chart for the above-mentioned scenario. **[5 Marks]**

(CLO – 5: Describe the concepts of variables, conditional, repetitive structures, and functions using a programing language.)

Q7: *Write the output of the following code.* **[4 Marks]**

a.
n=5;
for i in range(n):
for j in range(i):
print ('* ', end='')
print('')
for i in range(n,0,-1):
for j in range(i):
print('* ', end='')
print('')
	b.
	for i in range(3, 4):
	for j in range (1, 11):
	if i==j:
	break
	print (i, "*", j, "=", i*j)
	print()

c. x = 'abcd' for i in range(len(x)): print(i)	d. line = "What will have s◌ will" L = line.split('a') for i in L: print(i, end=' ')

Q8. Write a Python program to take a number from the user and allow the user to perform the following tasks based on their choice: **[8 Marks]**

- Check Prime: Write a function that checks whether the given number is a prime number or not.
- Find Square Root: Write a function that calculates and returns the square root of the given number.
- How all these actions can be performed again and again until user want to exit.

Write python program for the above-mentioned scenario.

Q9: You are tasked with developing a Book Management System in Python. The system should allow users to manage a collection of books. To ensure modularity and code reusability, use functions for each task. Write a Python program that fulfills the following requirements: **[8 Marks]**

- The system must have a function named add_book() that takes three parameters: title (string), author (string), and genre (string). It should add the book to the collection.
- The system must have a function named search_books_by_genre(). This function should return a list of books that belong to a specific genre (e.g., "Fiction", "History").
- The system must have a function named remove_book() that takes one parameter: title_keyword (string). It should remove any book(s) from the collection where the title contains the given keyword.
- Write a main() function that acts as the entry point of the program. It should allow the user to:
  - Add a new book.
  - View all books of a particular genre.
  - Delete a book using a keyword from the title.
  - Exit the program.

Best of luck