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University Examinations 2024/2025

SECOND YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE BACHELOR OF BUSINESS INFORMATION TECHNOLOGY, BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

CIT 3206: STATISTICAL PROGRAMMING

DATE: JANUARY 2025 **TIME: 2 HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE (30 MARKS)

a. Imagine you're setting up a new Python development environment and want to verify that everything is installed correctly. Write a Python script that prints out the current Python version and confirms that your setup is functioning properly. (5 Marks)

b. You're working on a program that handles various types of data for a project. Write a script that declares variables of different data types such as an integer, a float, a string, and a list—and then prints out each variable along with its data type. (5 Marks)

c. Suppose you're maintaining an employee database for a company. Write a Python program that deletes an employee's record from the database based on their unique employee ID. Ensure that the program confirms the deletion. (5 Marks)

d. You're tasked with creating a simple calculator that performs basic arithmetic operations. Write a Python script that uses variables and arithmetic operators, accepts user input for the numbers and the operation to perform, and then displays the result. (5 Marks)

e. Imagine you have a small dataset representing the relationship between hours studied and exam scores. Write a program that performs linear regression on this dataset to determine the correlation between the variables and displays the regression equation and prediction results. (5 Marks)

f. Write a Python function that takes a string as input and returns the number of vowels in the string. (5 Marks)

QUESTION TWO (20 MARKS)

a. Develop a program that asks the user to enter a specific year and then checks whether that year is a leap year. Make sure to include all the conditions that define a leap year and provide the user with an appropriate message. (7 Marks)

b. You're conducting a statistical analysis and need to explore the relationship between two variables. Create a program that generates random numerical data for these variables and calculates the correlation coefficient to determine how strongly they are related. (7 Marks)

c. Imagine you're setting up an order processing system for an online store. Write a Python program that creates a database table called 'Orders' and inserts sample order data, including order ID, customer name, and total amount, into the table. (6 Marks)

QUESTION THREE (20 MARKS)

a. Write a Python function that takes a list of numbers provided by the user and returns the largest number in the list. Include error handling to manage cases where the list might be empty or contain non-numeric values. (6 Marks)

b. Create a program that prompts the user to enter a number. If the input is not a valid number (e.g., if the user enters text or symbols), the program should raise an exception and inform the user of the invalid input. (7 Marks)

c. You're designing a software system for a local library. Implement a class called Library with methods to add new books to the collection, remove books by title or ID, and display the current list of books available in the library. (7 Marks)

QUESTION FOUR (20 MARKS)

a. Design a base class named Animal with a method called speak(). Then, create two subclasses Dog and Cat that inherit from Animal. Override the speak() method in each subclass to return a sound appropriate for that animal, such as "Woof!" for dogs and "Meow!" for cats. Demonstrate how these classes can be used to create animal objects that speak. (6 Marks)

b. Write a program that uses a loop to calculate and print the sum of all even numbers between 1 and 50. Ensure that your program only adds even numbers and displays the final sum to the user. (6 Marks)

c. Suppose you're updating an employee management application. Implement a class called Employee that includes attributes like name, age, and department. Add methods to update these details and another method to display an employee's full information. Demonstrate how an employee's data can be modified and retrieved using this class. (8 Marks)

QUESTION FIVE (20 MARKS)

a. Imagine you have a text file containing several paragraphs of text, and you need to perform a basic analysis of its content. Write a program that reads the file and counts the number of lines, words, and characters it contains. Display these counts to the user in a clear and organized format. (6 Marks)

b. Develop a Python program that prompts the user to input an integer. The program should then determine whether the entered number is positive, negative, or zero and display an appropriate message for each case. Include error handling to manage invalid inputs. (6 Marks)

c. Create a Python program that simulates a user input form requiring a numerical entry, such as age or quantity. If the user enters invalid data (e.g., letters or special characters instead of numbers), the program should raise and handle a ValueError, inform the user of the mistake, and prompt them to enter the data again until a valid number is provided. (8 Marks)