SABARAGAMUWA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES AND TECHNOLOGY
B.Sc. HONS DEGREE IN COMPUTER SCIENCE & TECHNOLOGY

YEAR III SEMESTER I EXAMINATION, FEBRUARY/MARCH, 2024

PST 31130 COMPUTER LABORATORY 3-I

Time allowed: **TWO (02) Hour(s)**

INSTRUCTIONS TO CANDIDATES:

This paper consists of **04** questions. Answer **All** questions.
Create a folder in the "Desktop" using your Index number e.g. 18APP0000
Save all answers in that folder.

The marks given in brackets are indicative of the weight given to each part of the question.

Write your Index No clearly in all places where appropriate.
Write clearly in English and use blue or black ink.
Non-programmable calculators are **NOT ALLOWED** in this examination.
No clarifications will be provided on the given questions.
No part of this question paper shall be removed from the Examination Hall without permission from the examination supervisor.
Cross out all scratch paper and hand in at the time of collection.

1. a. Write a program in Python that facilitates users to enter radius (r) and height (h) of a cylinder. Calculates surface area of cylinder using following formula. **Surface area = 2 * Pi * r * (r + h)** [10 Marks]

   b. Write a Python program that takes an integer as input and extracts each digit from the integer in reverse order. Then, print the extracted digits. [10 Marks]

   Example:
   Input: 12345
   Digits extracted in reverse order: [5, 4, 3, 2, 1]

2. Develop a Python program that computes the maturity amount of a bank deposit using user-provided inputs. The program offers a user-friendly menu interface allowing users to select between calculating maturity amounts for both **Term Deposit and Recurring Deposit.** The program iteratively prompts users for input until they option to exit. [20 Marks]

   The user is given the following options:

   (i) Term Deposit
   (ii) Recurring Deposit

   For **option (i)** accept principal(P), rare of interest(r) and time period in years(n). Calculate and output the maturity amount(A) receivable using the formula,

   $$A = P\left[1 + \frac{r}{100}\right]^n$$

   For **option (ii)** accept Monthly Installment (P), rate of interest(r) and time period in months (n). Calculate and output the maturity amount(A) receivable using the formula,

   $$A = P \times n + P \times \frac{n(n+1)}{2} \times \frac{r}{100} \times \frac{1}{12}$$

3. a. Write a Python program that prompts the user to input 10 integer values and stores them in an **array.** The program should then determine and display the counts of odd, even, and negative numbers among these inputs. [15 marks]

   b. While exercising, you can use a heart-rate monitor to see that your heart rate stays within a safe range suggested by your trainers and doctors. According to the American Heart Association (AHA), the formula for calculating your maximum heart rate in beats per minute is **220 minus your age in years**. [20 Marks]

Your target heart rate is a range that's 50– 85% of your maximum heart rate.

Age	**Target Heart Rate 50-85%** beats per minute (bpm)
20 years	100-170 bpm
30 years	95-162 bpm
35 years	93-157 bpm
40 years	90-153 bpm
45 years	88-149 bpm
50 years	85-145 bpm
55 years	83-140 bpm
60 years	80-136 bpm
65 years	78-132 bpm
70 years	75-128 bpm

Write a program in Python to prompt for and take the input of a person's name (first and last), date of birth (year, month, and day), and the today date (year, month, and day). Calculates and prints the person's age in (years), maximum heart rate and target heart rate range according to the above table.

4. You have a dataset containing information about students, including their names, ages, grades, and favorite subjects. Here are the lists representing the data: [25 Marks]

['Alice' , 'Bob ' , 'Charlie' , 'David' , 'Eva', 'Rickey', 'Michel']

[20,22,21,23,20,24,21]

[85,90,78,92,88,76,81]

['Math', 'English', 'Physics' , 'Chemistry' ,'Biology', 'IT', 'Media']

a. Using the provided lists, create a pandas **DataFrame** named **df** that combines the data into columns with appropriate names.

b. Calculate and display the average marks of all the students in the DataFrame.

c. Create a new column named Pass Status in the DataFrame. This column should indicate whether a student passed or failed based on a passing grade of **80**. Display the updated DataFrame with the new column.

d. Find the student who scored the highest marks and display their name and favorite subject.