TUNKU ABDUL RAHMAN UNIVERSITY OF MANAGEMENT AND TECHNOLOGY

FACULTY OF COMPUTING AND INFORMATION TECHNOLOGY

ACADEMIC YEAR 2024/2025

MAY/JUNE EXAMINATION

BACS1013 PROBLEM SOLVING AND PROGRAMMING

THURSDAY, 22 MAY 2025 TIME: 9.00 AM – 11.00 AM (2 HOURS)

BACHELOR OF INFORMATION SYSTEMS (HONOURS) IN ENTERPRISE INFORMATION SYSTEMS

BACHELOR OF INFORMATION TECHNOLOGY (HONOURS) IN INFORMATION SECURITY
BACHELOR OF INFORMATION TECHNOLOGY (HONOURS) IN SOFTWARE SYSTEMS DEVELOPMENT

BACHELOR IN DATA SCIENCE (HONOURS)

BACHELOR OF SOFTWARE ENGINEERING (HONOURS)

Instructions to Candidates:

Answer **ALL** questions. All questions carry equal marks.

BACS1013 PROBLEM SOLVING AND PROGRAMMING

Question 1

a) Give a reason why a software is created. List an example each for System Software and Application Software. (3 marks)

b) One of the characteristics of computer languages is platform dependence or platform independence. Which one is more preferred? Give a reason for your answer. (3 marks)

c) What is the use of comments in a program? Provide **TWO (2)** types of comments and demonstrate an example of each type to show how they can be used. (5 marks)

d) Convert the mathematical equation below into a C++ statement:

$$a = \frac{-b\sqrt{cd^3-1}}{4e}$$

(3 marks)

e) Given the following variable declarations:

```
int x = 10, y = 4;
double u = 2.8, v = 3.5;
```

Evaluate the following C++ statements. Note that each of the statements are independent from each other.

(i) `cout << u + x % y - v;` (1 mark)

(ii) `cout << v + (double) x / y;` (1 mark)

(iii) `cout << floor(u + 0.4) + ceil(v);` (1 mark)

(iv) `cout << ++x + u / y--;` (1 mark)

(v) `cout << !(x * u >= y * v);` (1 mark)

(vi)
```
string str = "I work hard the exam";
cout << str.insert(12, " to pass ");
```
(1 mark)

f) Given the following table showing the parking rates for various vehicle types.

Vehicle Code	Vehicle Type	Parking Rate (Per Hour)
C	Car	1.50
S	SUV	2.20
T	Truck	2.80
Otherwise	Error	0

Draw a flowchart for an *if_else* structure to check the vehicle code, then display the corresponding vehicle type and store the its parking rate in a variable. (5 marks)

[Total: 25 marks]

Question 2

a) With reference to Question 1 f), write a C++ program to perform the following tasks:

- Prompt the user to enter a vehicle code and number of hours parked.
- Use a *switch* statement to determine the parking rate based on the vehicle code entered.
- Calculate the parking fees using the formula: parking rate * number of hours parked.
- Display the parking summary below using string manipulators to format the output accordingly:

Example:-

```
Parking Summary
----------------------
Vehicle Type:          SUV
Hours Parked:          3
Parking Rate / Hour:   2.20
Parking Fees:          RM***6.60
```

Note: You are required to declare the necessary constants and variables (22 marks)

b) Examine the random function that will generate a random number between -3 to 25. (2 marks)

c) Suggest the most suitable solution designing tool to use when a user is asking for an overall idea what overall tasks your program will perform. (1 mark)

[Total: 25 marks]

Question 3

a) (i) Create an ENUM called **SamsungGalaxy** where the literals are the following models of Samsung Galaxy series smart phone produced in the year 2025:

S25_Ultra, S25_Plus, S25, S25_Edge (2 marks)

(ii) Declare a variable called **flagship** and initialise it with **S25_Ultra**. (2 marks)

b) Perform the following tasks using C++ statements:

(i) Declare a double-type array named **donation** to record each members' donation in a charity event and a variable **total** for the total collection of the donation. Assume there are 50 members in total who will participate in the event. (3 marks)

(ii) Use a *for* loop to process the collection of donations by prompting the user to enter the donation amount for all the 50 members. After all donation amounts have been entered, display the total collection. Follow the sample input screen below:

```
Donation Collection

Donor 1:
Donation amount (RM): 100

Donor 2:
Donation amount (RM): 200
:
:
Donor 50:
Donation amount (RM): 180

Total collection (RM):65830
```

(10 marks)

(iii) Declare a file stream variable named **collectFile** and use it to open a text file **collection.txt** for output. You are required to output the total collection into the file with the format shown below.

```
"Total collection of the charity event is RM65830"
```

(6 marks)

(iv) Give a reason why a *for* loop is more suitable than other loop structures for the scenario in Question 3 b) (ii). (2 marks)

[Total: 25 marks]

Question 4

a) Perform the following tasks using C++ statements:

(i) Write a function `ProcessDays` which receives the *number of days* as an input parameter (i.e. pass by value) and outputs the equivalent *weeks* and *days* via output parameters (i.e. pass by address). (5 marks)

(ii) Write the main function which will prompt the user to enter the number of days and then call the ProcessDays function to find the equivalent weeks and days. Finally display the output as follows:

```
23 days = 3 weeks 2 days
```

Hints: Use '/' to find the weeks and use '%' to find the days. (7 marks)

b) Write C++ statements for the following tasks:

(i) Define a structure `Car` which contains the following information
- brand of type string (e.g. Honda)
- model of type string (e.g. City)
- power of type double (e.g. 1.5)
- price of type double (e.g. 88552.75)
- yearMade of type integer (e.g. 2024) (3 marks)

(ii) Declare a structure variable called `car` of type `Car` and initialised with the sample values given in part Question 4 b) (i) above. (2 marks)

(iii) Change the `price` of `car` to 92550. (2 marks)

(iv) Declare another structure variable called `myAllCar` which can store up to 10 cars' information. (2 marks)

(v) Replace the power of the **5th** car in the `myAllCar` array to 2.2. (2 marks)

(vi) Change the **7th** alphabet of the brand of the **3rd** element in the `myAllCar` array to 'v'. (2 marks)

[Total: 25 marks]