UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INFORMATION TECHNOLOGY

FINAL EXAMINATION
MARCH 2024 SEMESTER

COURSE CODE	:	IBV20304
COURSE NAME	:	PROGRAMMING 3
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	:	BACHELOR OF GAME DEVELOPMENT TECHNOLOGY WITH HONOURS
DATE	:	26 JANUARY 2026
TIME	:	2:00PM – 4:00PM
DURATION	:	2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please CAREFULLY read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of ONE (1) section; Section A ONLY
4. Answer ALL questions in Section A.
5. Please write your answers on the answer booklet provided.
6. Answer all questions in English language ONLY.

THERE ARE 8 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 100 marks)

INSTRUCTION: Answer only ALL question.
Please use the answer booklet provided.

Question 1

You are developing a simple 2D game called **Fruit Catcher**. The player moves a basket left and right to catch falling fruits like apples, oranges, and bananas. Each fruit has different score values. The player can also view their inventory to check the fruits they have collected.

Based on the game scenario above, answer the following questions by applying Object-Oriented Programming (OOP) concepts and data structures.

a) Name two objects from the game and describe one property and one behavior for each object.

(4 marks)

b) Suggest a suitable class name for this game and write two objects (instances) that can be created from that class.

(4 marks)

c) The function catchFruit() hides complex logic from the player and only shows simple output. Which OOP concept is applied and how?

(2 marks)

d) You have different fruit types with different values. How would you apply inheritance to design this part of the game?

(3 marks)

e) All fruits have a method displayInfo() but show different details (e.g., color, points). What OOP concept allows this and how does it work?

(3 marks)

f) You want to store scores for 5 players. How would you use an array in this case? Show declaration and how to access one score.

(3 marks)

g) You need to store each player's name and their score. Which collection would you use and how?

(3 marks)

h) In a game, the player's health should not be changed directly from outside the class. How can you make sure only safe changes are allowed?

(3 marks)

You are given the following denormalized table used by a college to manage course enrolments:

Denormalized Table : EnrollmentRecords

EnrollID	StudentID	Student Name	StudentPhone	Course Code1	Course Name1	Credit1	Course Code2	Course Name2	Credit2	Course Code3	Course Name3	Credit3	Total Credits	Advisor Name	Advisor Phone
E001	S1001	Aisha Tan	012-3456789	CS101	Programming	3	CS102	Databases	3	MA101	Math 1	4	10	Dr. Lim	03-1234567
E002	S1002	Mark Lee	019-8765432	CS101	Programming	3	MA101	Math 1	4	NULL	NULL	NULL	7	Dr. Goh	03-2345678
E003	S1001	Aisha Tan	012-3456789	CS102	Databases	3	MA102	Statistics	4	NULL	NULL	NULL	7	Dr. Lim	03-1234567
E004	S1003	Nur Iman	017-1111222	CS101	Programming	3	CS103	Web Design	3	MA101	Math 1	4	10	Dr. Goh	03-2345678
E005	S1004	John Woo	018-3333444	CS102	Databases	3	CS103	Web Design	3	NULL	NULL	NULL	6	Dr. Chua	03-8765432
E006	S1005	Emily Chan	013-2222333	CS101	Programming	3	MA101	Math 1	4	MA102	Statistics	4	11	Dr. Lim	03-1234567
E007	S1001	Aisha Tan	012-3456789	CS103	Web Design	3	MA101	Math 1	4	NULL	NULL	NULL	7	Dr. Lim	03-1234567

Question 2

a) Identify the normalization issues in the denormalized table given.

(2 marks)

a) Normalize the above table into First Normal Form (1NF). Provide the new table structure and explain the changes made.

(5 marks)

b) Based on your 1NF table, normalize it into Second Normal Form (2NF). Show all resulting tables and briefly explain how you removed partial dependencies.

(10 marks)

c) Further normalize the 2NF tables into Third Normal Form (3NF). Identify and remove any transitive dependencies. Show the final set of tables and provide a brief explanation.

(8 marks)

Question 3

Scenario: Vehicle Rental System

A vehicle rental company operates multiple branches across the country. To improve their operations, the company plans to develop a database system to manage customers, branches, vehicles, and rental transactions.

Each branch has a unique BranchID. It also has a BranchName, Location, and PhoneNumber. Each branch manages several vehicles, but a vehicle can only be assigned to one branch at a time.

The company offers different vehicles for rent such as cars, vans, and motorcycles. Every vehicle is identified by a VehicleID. Other details recorded for each vehicle include Type (e.g., car, van, bike), Brand, Model, Year, and RentalRatePerDay. The system also stores which branch the vehicle belongs to.

Customers must register before renting a vehicle. For each customer, the company records a unique CustomerID, FullName, PhoneNumber, Email, and DrivingLicenseNumber.

A customer may rent many vehicles over time. Each time a customer rents a vehicle, a rental transaction is created. A rental transaction includes a unique RentalID, RentalDate, ReturnDate, TotalCost, and Status (e.g., Booked, Ongoing, Returned, Cancelled). The rental record links the customer and the vehicle.

One vehicle can only be rented to one customer at a time, but a customer can rent many vehicles (over time, not concurrently). The system must also track the branch from which the vehicle was picked up.

The company wants the database to ensure data consistency and support tracking of each vehicle's status and rental history.

Draw a complete Entity-Relationship (ER) diagram based on the scenario above. Your ER diagram must include:

a) All entities and their relevant attributes

(10 marks)

b) Clearly underlined primary keys

(6 marks)

c) Appropriate relationships between entities

(4 marks)

d) Correct cardinality for each relationship (e.g., 1:1, 1:N, M:N)

(5 marks)

Question 4

Vehicle Service Management System

You are given TWO tables:

Table : Vehicle

Column Name	Data Type
VehicleID	INT (Primary Key)
PlateNumber	VARCHAR(10)
Model	VARCHAR(50)
Year	INT

Table : Services

Column Name	Data Type
ServiceID	INT (Primary Key)
VehicleID	INT (Foreign Key to Vehicles)
ServiceDate	DATE
Description	TEXT
Cost	DECIMAL(8,2)

Write the SQL query based on the statement given below.

a) Create a new table named Customers with the following colums : CustomerID as an integer and primary key, FullName as a string (maximum 100 characters) and PhoneNumber as a string (maximum 15 characters).

(4 marks)

b) Insert a new customer into the Customers table. The customer details are :

CustomerID : 101

FullName : Rizal Rahman

PhoneNumber :0112233445

(3 marks)

c) Update the phone number of the customer with CustomerID 101 to '0198765432'.

(2 marks)

d) Retrieve all records from the Vehicles table. Show PlateNumber, Model and Year.

(3 marks)

e) Display all services that cost more than RM100. Show ServiceID, Description, and Cost.

(3 marks)

f) List all Model and Year of vehicles made after 2020.

(3 marks)

g) Find the average cost of all services. Display the result as AverageCost.

(4 marks)

h) Delete the vehicle with VehicleID = 5.

(3 marks)

END OF EXAMINATION PAPER