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The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical and Computer Engineering

Study Programme	: Bachelor of Science Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	: **EEX3262 Introduction to Object Oriented Programming**
Academic Year	: 2023/24
Date	: 01st March 2025
Time	: 0930 – 1230 hrs

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **two** parts (Part A and Part B)
3. **Part A** has twenty (20) **MCQ** type and **Part B** has three (03) essay type questions in five (05) pages.
4. Use the sheet provided (page 6) at the end of this exam paper to answer the MCQ questions (Part A) and **attach** it to the end of the answer booklet.
5. Use answer booklet to answer to the Part B.
6. This is a Closed Book Test (CBT).
7. Do not use a red colour pen to write the answers.
8. Start each new question on a new page.
9. Answer **all** the questions.

Part A: (20 marks)

Use the answer sheet provided in the end to select the correct answer from A), B), C), D)

1. What is an object in Object-Oriented Programming?

   A) A reference to a class
   B) A function that defines behaviour
   C) An instance of a class
   D) A variable that stores multiple values

2. Which of the following best describes encapsulation in OOP?
   A) Making all class members public for easy access
   B) Bundling data and methods that operate on that data together while restricting direct access
   C) Using global variables to share data between different classes
   D) Allowing all parts of a program to modify object attributes freely

3. What is the main purpose of inheritance in OOP?
   A) To create completely independent child classes
   B) To allow one class to acquire properties and behaviour of another class
   C) To restrict access to private attributes
   D) To define multiple classes with the same name

4. What does polymorphism allow in OOP?
   A) Overriding the private attributes of a class
   B) Creating multiple copies of an object at runtime
   C) Defining multiple functions with the same name but different implementations
   D) Using only one method for all data types

5. What is the key goal of abstraction in OOP?
   A) To make all class members accessible from anywhere in the program
   B) To allow dynamic method binding at runtime
   C) To hide implementation details and expose only relevant functionality
   D) To create complex code structures for better performance

6. What does code refactoring primarily aim to do?
   A) Add new features by modifying existing methods
   B) Improve code readability and structure without changing its external behaviour
   C) Replace object-oriented principles with procedural programming
   D) Optimize memory usage by removing redundant classes

7. Which of the following is the best way to handle exceptions in an OOP-based program?
   A) Ignoring exceptions to allow the program to continue running
   B) Using try, catch, and finally blocks to manage errors effectively
   C) Restarting the program every time an error occurs
   D) Writing separate code blocks to handle every possible exception manually

8. What is the consequence of not handling an exception in an OOP-based program?
   A) The program continues execution with a warning message
   B) The program enters an infinite loop until the issue is resolved
   C) The program terminates unexpectedly and may generate an error message
   D) The error is automatically fixed by the compiler

9. Which of the following is NOT a good debugging technique in OOP?
   A) Using print statements to check variable values
   B) Using a debugger tool to step through code execution
   C) Running the program without testing or reviewing the code
   D) Checking error logs and stack traces for detailed error analysis

10. Which of the following statements about constructors is incorrect?
   A) A constructor is a special method that is automatically called when an object is created.
   B) A constructor must always have the same name as the class.
   C) A class can have only one constructor, and it cannot be overloaded.
   D) Constructors are used to initialize objects with default or specific values.

11. Which of the following statements about abstraction is incorrect?
   A) Abstraction hides unnecessary details and shows only essential features.
   B) Abstraction can be achieved using abstract classes and interfaces.
   C) Abstraction increases code complexity by exposing all implementation details.
   D) Abstraction helps in reducing code dependencies.

12. Which of the following statements about object-oriented programming is incorrect?
   A) OOP allows code reuse through inheritance and polymorphism.
   B) OOP focuses on structuring code into objects rather than procedures.
   C) OOP eliminates the need for procedural programming techniques.
   D) OOP supports encapsulation to protect data integrity.

13. Which of the following statements about refactoring is incorrect?
   A) Refactoring improves code structure without changing its behaviour.
   B) Refactoring is used to remove duplicate code and improve maintainability.
   C) Refactoring should be done only when performance issues arise.
   D) Refactoring helps make code easier to understand and modify.

14. Which of the following statements about exception handling is incorrect?
   A) Exceptions help in handling runtime errors efficiently.
   B) The finally block in exception handling is always executed, regardless of errors.
   C) Unhandled exceptions cause the program to continue running without any issues.
   D) Custom exceptions can be created to handle specific error cases.

15. Which of the following statements about debugging is incorrect?
   A) Debugging is the process of identifying and fixing errors in a program.
   B) Using breakpoints in an IDE helps in debugging efficiently.
   C) Debugging tools allow developers to inspect variable values at runtime.
   D) Debugging ensures that a program is completely error-free.

16. Which of the following statements about object-oriented programming are correct?
   X) Objects are instances of classes that encapsulate data and behaviour.
   Y) A class can only inherit from one parent class in all OOP languages.
   Z) Polymorphism allows the same method name to have different implementations.

   A) Only X and Y
   B) Only X and Z
   C) Only Y and Z
   D) All X, Y, and Z

17. Which of the following statements about constructors are correct?
X) A constructor is automatically called when an object is instantiated.
Y) A constructor can return a value like a normal function.
Z) A constructor can be overloaded by defining multiple constructors with different parameters.

A) Only X and Y
B) Only X and Z
C) Only Y and Z
D) All X, Y, and Z

18. Which of the following statements about encapsulation are correct?
X) Encapsulation restricts direct access to object attributes and methods.
Y) Private attributes can be accessed directly from outside the class.
Z) Encapsulation helps protect data integrity and maintain modularity.

A) Only X and Y
B) Only X and Z
C) Only Y and Z
D) All X, Y, and Z

19. Which of the following statements about inheritance are correct?
X) Inheritance allows a class to acquire properties and behaviour from another class.
Y) A subclass cannot override methods of a superclass.
Z) Inheritance promotes code reuse and reduces redundancy.

A) Only X and Y
B) Only Y and Z
C) Only X and Z
D) All X, Y, and Z

20. Which of the following statements about exception handling are correct?
X) The try-catch mechanism helps in handling runtime errors gracefully.
Y) Unhandled exceptions may cause a program to crash.
Z) The final block is executed only if an exception occurs.

A) Only X and Y
B) Only Y and Z
C) Only X and Z
D) All X, Y, and Z

Part B: (80 marks)

Q1)

You are designing a program for a simple circuit component management system for an electronic laboratory. The system manages different types of electronic components like resistors, capacitors, and transistors. Each component has a unique ID, a value (e.g., resistance in ohms, capacitance in farads), and a status (available or used). The system also has projects that use these components. Each project has a name, a unique ID, and a list of components used in it. Use the Java programming language to write program components for the following questions.

a) Create the **Component** class with attributes: value, componentID, status with its constructor to initialize these attributes when an object of Component is created.

(05 marks)

b) What OOP features were used to implement the above part (a)?

(03 marks)

c) Make the attributes of the **Component** class private and implement public methods getValue(), setStatus() to access or modify them.

(05 marks)

d) What OOP features were used to implement the above part (c)?

(02 arks)

e) Create three subclasses: **Resistor**, **Capacitor** and **Transistor** and add additional attributes like tolerance for resistors, voltageRating for capacitors, and gain for transistors. Implement constructors for these subclasses to initialize their specific attributes.

(05 marks)

f) What OOP features were used to implement the above part (e)?

(02 arks)

g) In the Component class, create a method called useComponent() that changes the status of the component to "used".

(07 marks)

h) What OOP features were used to implement the above part (g)?

(02 arks)

i) Create a class called **Project** with attributes name, projectID, and components used in the project. Each project can use a maximum of ten components. Add a method called useComponent that allows a project to use a component.
Tip: You can use an array to store multiple components.

(07 marks)

j) What OOP features were used to implement the above part (i)?

(02 marks)

Q2.

I. Define the following terms.

a) Refactoring
b) Just in Time Compiler (JIT)
c) Java Interpreter
d) Super Class
e) Destructor

(10 marks)

II. Explain the term 'Access Modifiers' and identify the available access modifiers in OOP.

(10 marks)

Q3.

I. Compare the Structural Programming with Object Oriented Programming using a table.

(08 marks)

II. Is Java a platform-independent language? Justify your answer.

(06 marks)

III. Write a Java program to display following pattern of numbers using "for loops".

1
1 3
1 3 5
1 3 5 7

(06 marks)

(End)

Use this sheet to provide answers to the MCQ questions of Part A and attach to the answer script (booklet).

Index Number: .....

Queston Number	Answer			
1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D
16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D