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PG/IS/MCA/107/24

MCA 1st Semester Examination, 2024

MCA

(Parctical)

PAPER – MCA-107

Full Marks : 100

Time : 3 hours

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Answer any **two** questions on lottery basis :

1. Demonstraterepr__method in a Python program using the instructions below :

   (*a*) Define a class called Point with attributes x, and y as coordinate with default values 0, and 0.

(*b*) Implement therepr_method to print any point directly.

(*c*) Create two objects of Point and a list L of two points.

(*d*) Print these two objects and the list L.

8 + 12 + 7 + 8

2. Write a Python program to :

(*a*) Create a dictionary student with keys : name, age, grades (a list of integers), and is_active (a boolean).

(*b*) Add a new key-value pair major with a value of your choice.

(*c*) Retrieve and print the student's name using the key.

(*d*) Update the grades key to add a new grade.

(*e*) Remove the is_active key from the dictionary.

(*f*) Check if the key major exists in the dictionary. 8 + 5 + 5 + 5 + 5 + 7

3. Illustrate property decorator a Python program using the instructions below :

(*a*) Create a class Rectangle with protected attributes_length and _width.

(*b*) Implement getters and setters for both attributes using property decorator.

(*c*) Add a computed property area that calculates and returns the area of the rectangle (length × width).

(*d*) Ensure the setter methods for length and width validate that the values are positive numbers.

(*e*) Create a rectangle instance, set its length and width and display its area.

5 + 10 + 7 + 6 + 7

4. Demonstrate constructor and destructor in Python using the instructions below :

   (*a*) Create a class Employee with a constructor that takes name and salary as arguments.

   (*b*) Additionally, have a class variable company_name that is shared by all instances.

   (*c*) Create two objects of Employee class.

   (*d*) Print the details of an employee with their company name using display function.

   (*e*) Implement a destructor that prints a message when the Employee objects are destroyed. 10 + 5 + 5 + 5 + 10

5. Write a Python program to :

   (*a*) Create a class called student that has a default constructor.

(*b*) The default constructor should initialize the student's name, age and grade to default values ("Unknown", 0, "Not Assigned").

(*c*) Then, define a method display () that prints these details.

(*d*) Create two objects of Student class.

(*e*) Implement a destructor that prints a message when the Employee objects are destroyed. 10 + 5 + 5 + 5 + 10

6. Write a Python program to :

(*a*) Create a çlass Book with attributes : title, author and price.

(*b*) Implement the str_method to returnauser-friendly string representation(e.g., "Book : [Title] by[Author]").

(*c*) Implement the repr method to return a technical
string(e.g., “Book(title=‘...’ ;author =‘...’, price=...)”).

(*d*) Create an instance of the Book class and print the object using str( ) and repr ().

7 + 10 + 10 + 8

7. Illustrate getter and setter a Python program considering below steps :

(*a*) Create a class product with a privare attribute__price.

(*b*) Implement a getter that formats the price as a string prefixed with a currency symbol (e.g., “$50.00”).

(*c*) Implement a setter that ensures the price is a valid number and updates__price.

(*d*) Create an instance of the product class.

(*e*) Set and retrieve the price, observing the formatted output. 7 + 10 + 10 + 8

8. Demonstrate multi level inheritance in a Python program using below instructions :

   (*a*) Create a base class person with attributes name and age.

   (*b*) Create a derived class student from class person that adds the attribute student_id.

   (*c*) Create a derived class Graduate Student from class student that adds degree.

   (*d*) Define methods to display all details in Graduate Student class.

   (*e*) For testing, create an instance of the Graduate Student class and display all details. 8 + 8 + 8 + 6 + 5

9. Write a Python program to :

   (*a*) Create two base classes Teacher and Researcher, each with a work() method that prints different messages.

(*b*) Create a derived class professor that inherits from both Teacher and Researcher and overrides the work() method.

(*c*) For testing, create an instance of each three classes and call work(). 15 + 10 + 10

10. Write a Python program to :

(*a*) Create a base class shape with attributes color and a method display ().

(*b*) Create a derived class Rectangle with additional attributes length and width, and override display () using super ().

(*c*) Create an instance of Rectangle class and call display (). 10 + 15 + 10

11. Write a Python program to :

(*a*) Create a base class Bank Account with attributes account_number and balance and methods deposit () and withdraw ().

(*b*) Create a derived class Savings Account with an additional attribute interest_rate and a method add_interest ().

(*c*) Create and instance of Savings Account class and call deposit (), add_interest () and withdraw (). 13 + 12 + 10

12. Write a Python program to create a class String Manipulator with a method combine() that behaves differently based on the type of arguments passed. If two strings are passed, it concatenates them. If a string and an integer are passed, it repeats the string the number of times indicated by the integer. 35

13. Write a Python program to create a class multiplier with a method multiply() that can take any number of arguments and multiplies them together. If no agruments are passed, it should return 1. 35

14. Write a Python program to

- Create a class vehicle with a method description() that prints the general description of a vehicle.

- Then, create a subclass car that overrides the description() method to print the description of a car along woth the number of wheels (add extra functionality). 15 + 20

15. Perform addition of two complex numbers using + operator overloading using a program in Python. 35

[PNB : 10 and VIVA : 20]