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**B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2023**

Second Semester

**IT22202 – OOPS USING C++ AND PYTHON***(Information Technology)***(Regulation 2022)****TIME: 3 HOURS****MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Examine the features and basics of OOPS.	4
CO 2	Apply the various features of object oriented programming to construct applications in C++.	4
CO 3	Develop the software using advanced features of Object oriented programming to solve real time problems.	5
CO 4	Develop the programs to implement the basics of python.	5
CO 5	Choose the data structures and design patterns to construct applications using python.	5

**PART- A (20 x 2 = 40 Marks)**

(Answer all Questions)

	CO	RBT LEVEL
1. What is the purpose of a constructor in C++? How does it relate to classes and objects?	1	2
2. Can you have a class without any member functions in C++? Why or why not?	1	2
3. How does nesting classes relate to encapsulation and information hiding in C++?	1	3
4. How does a nested class differ from a friend class in C++?	1	2
5. How do you use dynamic memory allocation in C++ to create and manipulate arrays?	2	2
6. What is the difference between the new operator and the malloc() function in C++?	2	2
7. Differentiate function overloading and function overriding in C++	2	2
8. How does dynamic binding work in C++? How does it relate to virtual functions?	2	3
9. What is the difference between class templates and function templates in C++?	3	2
10. What are some common pitfalls to avoid when working with templates in C++, such as ambiguity errors and template recursion?	3	2
11. How do you use the containers in the STL, such as vectors, lists, and maps? What are their key features and advantages?	3	3
12. How can you use exception handling to write more robust and error-resistant code in C++?	3	2

13. How do you create an instance of a class (i.e., an object) in Python? What is the syntax for creating an object?	4	2
14. What is inheritance in object-oriented programming? How does it work in Python classes?	4	2
15. What is the difference between a class method and an instance method in Python?	4	2
16. How can you check if an object has a particular attribute in Python?	4	2
17. Can you modify a tuple in Python? Why or why not?	5	3
18. Write a Python program to find the maximum and minimum elements in a set.	5	3
19. How do you iterate over the keys of a dictionary?	5	2
20. Name some commonly used design patterns in Python.	5	2

**PART- B (5 x 10 = 50 Marks)**

	Marks	CO	RBT LEVEL
21. (a) Write a class called Date that represents a date with day, month, and year. Define member functions inside the class to set and get the date, and a member function outside of the class to check whether the year is a leap year.	(10)	1	3
<b>(OR)</b>			
(b) Construct a class called Time that represents a time in hours, minutes, and seconds. Include a friend function called addTime that accepts two Time objects and returns a new Time object that represents the sum of the two times.	(10)	1	3
22. (a) Write a class called Fraction that represents a fraction with a numerator and denominator. Overload the + operator to add two fractions together and return a new fraction representing the sum.	(10)	2	3
<b>(OR)</b>			
(b) Write a base class called Fruit with properties like name, color, and taste. Create a second base class called Nutrient with properties like calories, vitamins, and minerals. Create a derived class called Fruit Salad that inherits from both the Fruit and Nutrient classes and adds properties like ingredients, serving size, and recipe.	(10)	2	3

**23. (a)** Develop a program that uses the map container in the STL to store a dictionary of English words and their meanings. The program should allow the user to add, remove, and search for words and their meanings in the map, and display the dictionary in alphabetical order using the map's built-in sorting capabilities

**(10) 3 3**

**(OR)**

**(b) (i)** Write a program that simulates a bank account and allows the user to make deposits and withdrawals. Use exception handling to catch any errors related to insufficient funds or invalid account numbers.

**(5) 3 3**

**(ii)** Write a C++ Program to find Square function of each data-type using single template.

**(5) 3 3**

**24. (a)** Consider you are building a social media platform in Python. You have a User class and a Post class. The User class has a get followers() method that retrieves all the followers for a user. The Post class has a send notification() method that sends a notification to all the followers of a user when a new post is created. How can you call the get followers() method from within the send notification() method so that the notification is sent to all the followers?

**(10) 4 4**

**(OR)**

**(b)** Define a class Employee with data members as empno, name, and designation. Derive a class Qualification from Employee that has data members UG, PG, and Experience. Create another class Salary which is derived from both these classes to display the details of the employee and compute their increments based on their experience and educational qualification.

**(10) 4 4**

**25. (a)** Create a List with the following elements.  
[1, Apple,2, Banana,3, Cat,4, Dog]

**(10) 5 3**

- a) Convert the list into Dictionary
- b) Update something into dictionary
- c) Add something into dictionary
- d) Remove all the entries from the dictionary
- e) Delete the entire dictionary

**(OR)**

**(b)** Write a python program to create a tuple of integers, characters and string. Perform the operations slice, concatenate, nested tuples, count the elements, index() and deletion of the elements.

**(10) 5 3**

**PART- C (1 x 10 = 10 Marks)**  
(Q.No.26 is compulsory)

	Marks	CO	RBT LEVEL
<b>26.</b> Create an abstract class called Shape that has a pure virtual function called calculate Area(). Create derived classes called Circle and Rectangle that implement their own versions of the calculate Area() function.	<b>(10)</b>	<b>2</b>	<b>5</b>

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