KUMARAGURU
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B.E/B.TECH DEGREE EXAMINATIONS: APRIL/ MAY 2024

(Regulation 2018)

Second Semester

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

U18AII2204: Object - Oriented Programming and Data Structures

COURSE OUTCOMES

CO1: Understand the object-oriented programming concepts and GUI.

CO2: Apply Overloading and concept of handling exceptions.

CO3: Demonstrate the concepts of data structures using Python.

CO4: Develop the graph, sorting, and search techniques of data structures.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	Explain the concept of data encapsulation in OOP.	CO1	[K_2]
2.	What is polymorphism? Provide an example.	CO1	[K_1]
3.	Describe multiple inheritance in Python.	CO1	[K_2]
4.	What is the purpose of operator overloading?	CO2	[K_1]
5.	How are exceptions handled in Python?	CO2	[K_1]
6.	Define an Abstract Data Type (ADT).	CO3	[K_1]
7.	Compare a singly linked list and a doubly linked list.	CO3	[K_2]
8.	What are the applications of stacks?	CO3	[K_1]
9.	Explain the difference between linear and binary search.	CO4	[K_2]
10.	Describe the heap data structure.	CO4	[K_2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11. Scenario: You are developing a simple library management system using Python. The system should allow users to borrow and return books. Each book has a title, author, and unique ID. The library can store up to 1000 books.

   a) Design a Python class for the Book and Library. Include appropriate methods and attributes.   7   CO1   [K4]

   b) Explain how you would handle exceptions when a user tries to borrow a book that is not available.   7   CO2   [K2]

   c) What is the advantage of using classes in this scenario?   2   CO1   [K1]

12. Scenario: A social media application needs to manage a network of user. Each user has a profile with a unique ID, name, and a list of friends (connections).The application should be able to add and remove friends, and suggest friends of friends.

   a) Design a Python class for the User and methods to add/remove friends.   7   CO1   [K4]

   b) How would you implement a function to suggest friends of friends?   7   CO3   [K1]

   c) What data structure would be efficient for managing user connections? Justify your choice.   2   CO4   [K3]

13. a) Explain the concept of inheritance and provide an example with code.   7   CO1   [K2]

   b) Discuss how method overriding is implemented in Python with an example.   7   CO2   [K1]

   c) Why is inheritance important in object-oriented programming?   2   CO1   [K1]

14. a) Write a Python program to implement a linked list.   7   CO3   [K1]

   b) Explain the applications of queues with relevant examples.   7   CO2   [K4]

   c) Compare stack and queue data structures.   2   CO2   [K2]

15. a) Describe the binary search tree (BST) and its operations.   7   CO3   [K1]

   b) Design a Python function to perform in-order traversal of a BST.   7   CO2   [K4]

   c) What are the advantages of using BSTs?   2   CO3   [K2]

16. a) Explain the different graph traversal techniques.   7   CO4   [K2]

   b) How would you implement a graph using adjacency lists in Python? Provide code.   7   CO4   [K1]

   c) What is the significance of graph traversal algorithms?   2   CO4   [K1]

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