USN 01JST18EC055 Code: EC560

JSS MAHAVIDYAPEETHA
JSS SCIENCE AND TECHNOLOGY UNIVERSITY
SRI JAYACHAMARAJENDRA COLLEGE OF ENGINEERING
JSS Technical Institutions Campus, Mysuru – 570 006, Karnataka

JANUARY/FEBRUARY 2021 SEMESTER END EXAMINATIONS

PROGRAMME: B.E.	**DATE: 01.02.2021**
BRANCH: E&C	**DAY: Monday**
SEMESTER: V	**TIME: 9.30 A.M. to 12.30 P.M.**
SECTION: 'A' & 'B'	**DURATION: 3 hrs.**
PAPER SETTER: Mrs. Pavithra D.R.	**MAX. MARKS: 100**

DATA STRUCTURES AND ALGORITHMS

NOTE:

1. **PART-A is compulsory.**
2. **Answer PART-B according to internal choice.**

PART – A

Q. No.	CO	CD	QUESTION	MARKS
1.a)	CO1	L2	Differentiate between object oriented programming and procedure oriented programming.	05
b)	CO1	L2	Illustrate the 2 methods of defining member functions using C++ programs.	05
2.a)	CO2	L2	Define ADT. Write ADT for lists.	05
b)	CO2	L2	What is Skip list? Name the data structure similar to skip list and illustrate how time complexity can be improved compare to linked list for inserting and deleting the elements.	05
3.	CO2	L3	Write C++ program to implement stack operations using switch case statement.	10
4.	CO3	L2	Illustrate the array-based and pointer / linked based representation of binary tree with relevant diagrams.	10
5.a)	CO4	L2	Define the following terms with reference to graph data structure. ① Directed Graph ② Undirected graph ③ minimum spanning tree ④ Cycle ⑤ Forest.	05
b)	CO4	L3	Create adjacency matrix and adjacency list for the graph shown in Figure 5.	05

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PART – B

Q. No.	CO	CD	QUESTION	MARKS
6.	CO1	L3	What are base and derive classes create a base class called AREA having. • Two data members of type int • Member function getdata() to initialize base class data members. • Virtual member function disparea() to compute and display the area of the geometrical object. • Derive two specific classes called TRIANGLE and RECTANGLE from the base class. Using these 3 classes design a program that will accept dimension of a triangle / rectangle interactively and display the area.	10
			OR	
7.	CO1	L3	What is Polymorphism? Mention the types of Polymorphism. Create a class called SAMPLE having • Two data members of type int • Member function getdata() to initialize base class data members • Friend member function to overload unary increment operator and to display the value of data members. Write main function to create object of SAMPLE and overload unary increment operator and to display the results.	10
8.	CO2	L3	Identify the data structure and write C function to implement the following on the list: i) List can be traversed in both directions. Insert a node at the beginning of the list. ii) List can be traversed in only one direction. Delete at the end of the list.	10
			OR	
9.	CO2	L3	Given the two linked lists with 5 nodes, write a C function to merge two linked lists such that, each node of second list comes into first list at alternate positions.	10

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10.	CO2	L3	What are Postfix and Prefix expressions? why they are used? Convert the following expressions from, i) Postfix to Infix ABD^+EF-/G+ ii) Infix to Postfix A+(B*C-(D/E-F)*G)*H iii) Infix to Prefix (A+B)/C*D-E	10
			OR	
11.a)	CO2	L3	What are Hashing & hash clash? Illustrate how hash clash can be resolved using hashing with chaining technique.	05
b)	CO2	L3	Compute double hashing to insert the given key values {18,41,22,44,89,32,31} in a hash table of size 13. Given $h_1(K)=K\%13$ $h_2(K)=7-(K\%7)$	05

12.a)	CO3	L3	Write C recursive traversal algorithms for preorder and postorder traversal methods and also construct the tree for the traversal given. Pre-order: F A E K C D H G B In-order: E A C K F H D B G	05
B)	CO3	L3	Construct the AVL tree for the elements 55, 66, 77, 15, 11, 33, 22	05
			OR	
13.	CO3	L3	Construct the expression tree for the expression (a+b*c)-((d*e+f)/g) and traverse the same tree to get prefix and postfix expressions. Identify the binary trees given in Figure 13.a, 13.b, & 13.c and explain each of them.	10

14.	CO4	L3	Find out the minimum spanning tree for the graph shown in figure.14 using Krushkal's algorithm and explain each step.	10
			OR	
15.	CO4	L3	Find out the Breadth First Spanning tree for the graph shown in Figure.15 and explain each steps involved.	10

Diagram

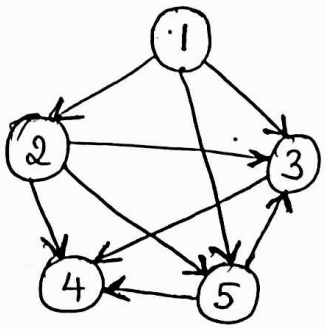

Figure 5

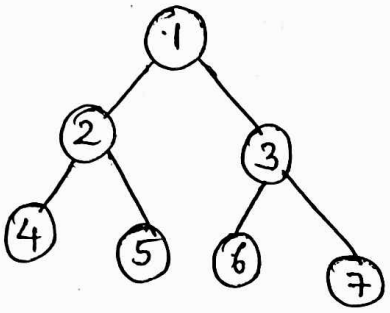

Figure 13.a

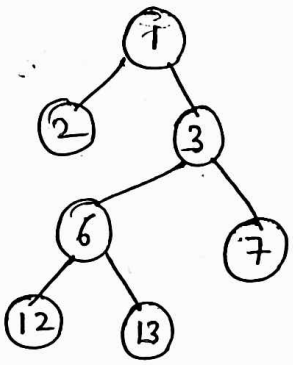

Figure 13.b

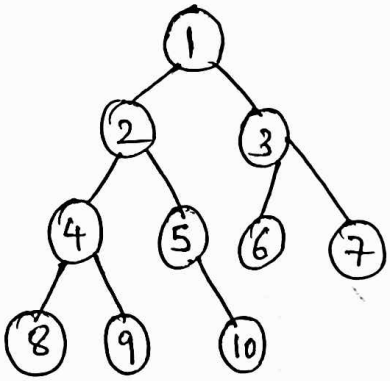

Figure 13.C

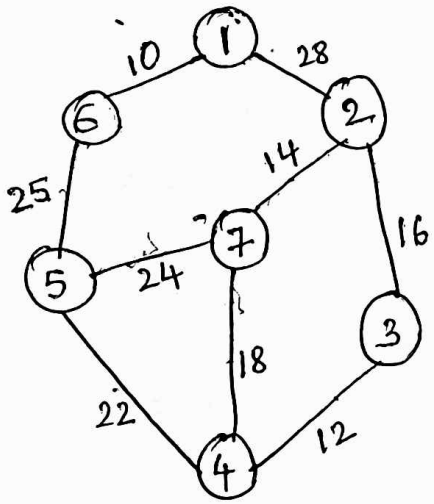

Figure 14

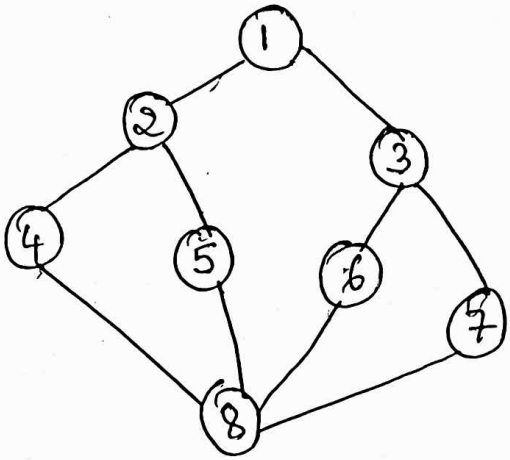

Figure 15

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Course Outcomes

At the end of the course, the student should be able to	
CO–1	Understand programming skills through Object Oriented Programming and evaluate algorithms in terms of time, space complexity and asymptotic analysis.
CO–2	Identify and apply appropriate data structures and algorithms, understand the ADT and use it for a specific problem.
CO–3	Implement and evaluate the data structures for sorting searching and traversals for skill enhancement in problem solving.
CO–4	Develop applications using data structures and algorithms.
CO–5	Develop and demonstrate innovative programming solutions / refine available solutions by improving the existing code and select algorithm design approaches in a problem specific manner.

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