

MAY 2014

P/ID 16151/PITSA

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. What is a constructor method? How is it different from other methods? What type of code is included in a constructor method? Give an example.
2. Write a function that takes two parameters and print their sum if they are numbers and print the concatenated string if the parameters are strings.
3. What is a virtual function? How is it different from an abstract function?
4. Illustrate the use of any one ios manipulator with an example.
5. What is an abstract data type? Why is it referred abstract?
6. Write an algorithm to count the number of nodes in a singly linked list.
7. Draw the tree that is represented by the following array.

A	B	C	-	D	E	-	-	-	F
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8. Write short notes on friend functions.

PART B — (7 × 10 = 70 marks)

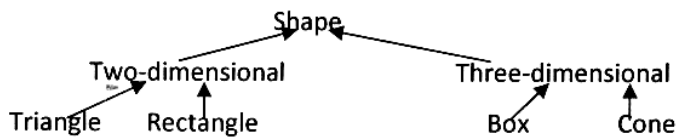
Answer any SEVEN questions.

9. Write a program in C++ to create a Class Matrix whose elements are complex numbers.

Perform following operations:

- (a) Overload * operator to multiply two matrices.
- (b) Overload -- operator to compute complex conjugate of a matrix.
- (c) Overload ~ operator to compute transpose of a matrix.

10. Implement the following class hierarchy in C++



Use appropriate functions for implementation.

11. Create a Class “STUDENT” with the following members - Roll No, Name, Marks, Average, Total, Grade. Overload the operators >>, << to perform input and output of the data members.

Calculate the Grade as per the specification

Grade Specification:

$90 \leq \text{marks/average} \leq 100$ S

$80 \leq \text{marks/average} \leq 89$ A

$70 \leq \text{marks/average} \leq 79$ B

$60 \leq \text{marks/average} \leq 69$ C

$50 \leq \text{marks/average} \leq 59$ D

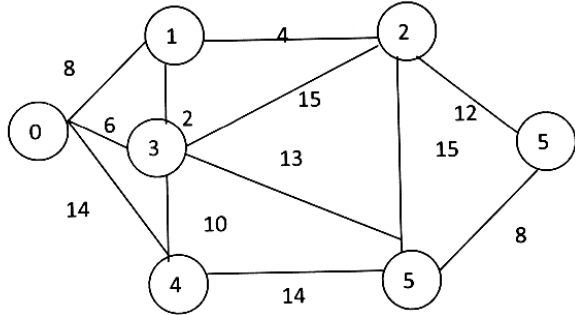
$40 \leq \text{marks/average} \leq 49$ E.

$\text{average} < 40$ F

The Overall Grade is F if the student obtains F in at least one subject.

12. Write algorithms for (i) push and pop operations of a stack and (ii) Insert and delete operations of queue implemented as a linked list.
13. Define O, Ω , notations. What is meant by upper bound, tight upper bound and lower bound? Express the complexity of linear search using these notations. Give suitable examples.
14. What are the different types of traversals in binary trees? Write algorithms for each of them. Draw a complete binary tree with 7 nodes and write the order in which the tree is traversed in each of these methods.

15. What is a minimum spanning tree? Write an algorithm to find the minimum spanning tree of a graph. Trace the algorithm on the following graph and show its minimum spanning tree.



16. Explain the types of inheritance with example.
17. Write short notes on the following:
- (a) Stacks.
 - (b) Threaded binary trees.
