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Reg. No. :



**Question Paper Code : 20358**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018

Third Semester

Computer Science and Engineering

CS 6301 — PROGRAMMING AND DATA STRUCTURES – II

(Common to Information Technology)

(Regulations 2013)

(Also common to PTCS 6301 – Programming and Data Structures II for B.E.  
(Part-Time) Second Semester – Computer Science and Engineering –  
Regulations 2014)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define a class.
2. Outline the role of 'this' pointer.
3. What is a copy constructor?
4. Name the operators that cannot be overloaded in C++.
5. Define an abstract class.
6. What is an exception? Give an example.
7. What is an AVL tree?
8. Outline the properties of a red-black tree?
9. What is an undirected graph? Give an example.
10. How a directed graph can be represented as an adjacency matrix? Give an example.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain data abstraction and data encapsulation with examples. (7)  
 (ii) Write a C++ program to perform computation of  $\sin(x)$  as given below. (6)

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} \dots \dots \dots N \text{ terms.}$$

Or

- (b) Write a C++ program to accept two square matrices, add the same and print the result. Use classes and member functions. (13)
12. (a) (i) What is polymorphism? Discuss compile time and run time polymorphism with examples. (7)  
 (ii) Illustrate dynamic memory allocation in C++ by giving suitable examples. (6)

Or

- (b) Describe inheritance in C++. Discuss various types of inheritance in C++ by writing suitable programs. (13)
13. (a) What is a template? Outline the need for templates in C++. Give examples for different types of templates in C++. (13)

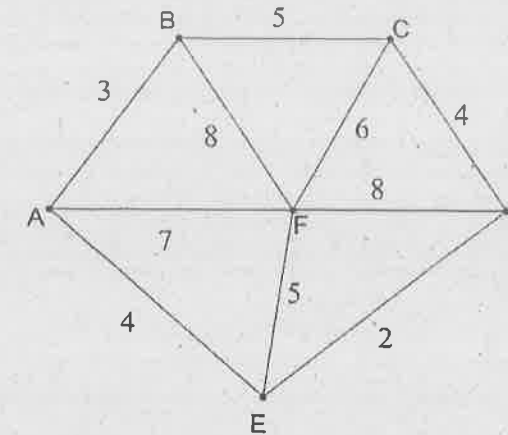
Or

- (b) Write a C++ program to copy the contents of one file to another. (13)
14. (a) Construct a B – tree of order 5 for the following key values: 1, 12, 8, 2, 25, 6, 14, 28, 17, 7, 52, 16, 48, 68, 3, 26, 29, 53, 55 and 45. Illustrate the tree construction process step by step. (13)

Or

- (b) (i) Write algorithms for arbitrary and smart unions for disjoint set ADT. (5)  
 (ii) Discuss the three methods of amortized analysis with an example. (8)

15. (a) What is a minimum spanning tree? A cable company wants to connect five villages to their network as illustrated in the diagram below:



Using Prim's algorithm find the minimum length of cable needed. (13)

Or

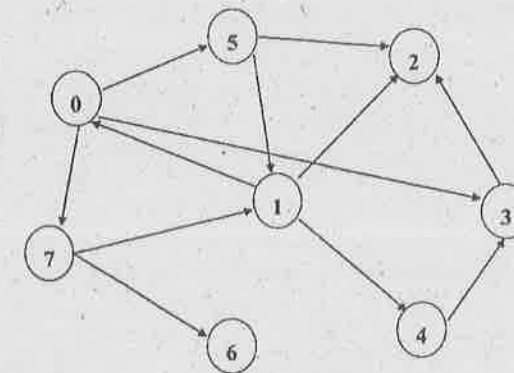
- (b) State the single-source shortest path problem and illustrate Dijkstra's algorithm with an example. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Construct a max heap and min heap by inserting the following elements: 10, 14, 9, 8, 7, 3, 12, 15, 17. Show the heap structure and array representation in each step. (15)

Or

- (b) Outline the breadth first traversal algorithm for a graph and apply the breadth first traversal algorithm to the following directed graph:



Start with node 5 and illustrate the traversal process step by step. (15)