

2007

**APPLIED MATHEMATICS WITH OCEANOLOGY
AND COMPUTER PROGRAMMING**

PAPER-VI

Full Marks : 50

Time : 2 hours

Answer all questions

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers whenever necessary

1. Answer any *two* questions : 5 x 2
- (a) Draw a block diagram of a 4-bit Ripple-Carry adder and implement it using four full adders . Also draw a block diagram of 16-bit adder using four 4-bit adders.
- (b) What is the role of decoders ? Explain 3-to-8-decoder with block diagram.

(c) Write short notes (any *two*

- (i) PRAM
- (ii) Cache memory
- (iv) Register
- (iv) Multiplexer.

2. Answer any *three* questions:

5×3

(a) Write an algorithm to sort a set of random data using merge sort technique. What is the time complexity of your algorithm?

(b) Write an algorithm to evaluate a postfix expression.

(c) Write an algorithm to find the **shortest distance** between two specified vertices **on a graph, using Dijkstra algorithm.**

(d) Define binary tree. Construct a binary tree to store the following **infix expression** :

$$A * (B + C) * ((D + E) * (F - G) + H)$$

From the binary tree find the postfix form of this expression . (Post-order traversal may be used).

(e) Write an algorithm to create a linked list containing **n numbers and find maximum among them.**

3. Answer any *one* question :

10

- (a) What services are provided by the **internet** ? **Explain** the following **terms in connection** with data flow. **Simplex**, half-duplex and full- **duplex**.
- (b) What are LAN and WAN ? **What are their goals?** **Explain network** protocols ?

4. Answer any *three* questions :

5 x 3

- (a) **Explain memory management technique without swapping or paging.**
- (b) **What are the rules for naming a file ? Which types of files are used in an operating system ?**
- (c) **Explain round robin scheduling. Most round robin scheduling use a fixed size quantum. Give an argument in favour of a small quantum.**
- (d) **A mini computer uses the buddy system for memory management. Initially, it has one block of 256K at address 0. After successive requests for 5 K, 25 K, 35K and 20K come in, how many blocks are left and what are their sizes and addresses ?**
- (e) **What do you mean by multiprogramming? How memory is organized in a multiprogramming system ?**