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CCFUP/3rd Sem/BCA/25(NEP)

2025

3rd Semester Examination (CCFUP : NEP)

BCA

Paper : MI 3-T (Minor)

[Data Structure and Algorithm]

Full Marks : 40

Time : Two Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any *five* questions : $2 \times 5 = 10$

1. Why is asymptotic analysis preferred over exact time measurement of algorithms?
2. Arrange the following functions in increasing order of growth and justify your answer :
 $n, 2^n, n \log n, 1, \log n, n^2$
3. Write down the basic principle of divide and conquer technique.
4. What is sparse matrix? Give one application of it. 1+1
5. Why does a circular queue perform better than a linear queue?

P.T.O.

(2)

- Q. Why does an AVL tree guarantee logarithmic height?
- A. A hash table of size 10 uses the hash function $h(k)=k \pmod{10}$ and resolves collisions using linear probing. Insert the keys 23, 43, 13, and 27 into the hash table.
- Q. What is the difference between BSF and DFS?

Group - B

Answer any *four* questions : $5 \times 4 = 20$

- Q. Write an algorithm to implement the PUSH and POP operations of stack.
- Q. Demonstrate the rotations when the following elements are inserted into an empty AVL search tree : 12, 16, 8, 11, 4, 7
- Q. Convert the following infix $(A+B) \times (C-D) + E \div F$ into corresponding postfix expression using stack method.
- Q. Construct a min heap using the following key values : 26, 12, 32, 18, 16, 7, 22, 24, 14, 9
- Q. Write an algorithm to insert a node in a sorted link list.
- Q. Write and explain the quicksort algorithm.

Group - C

Answer any *one* question : $10 \times 1 = 10$

- Q. Define queue. What are the advantages and disadvantages of representing a queue using link list?

(3)

Implement the INSERT and DELETE operation of queue using link list.

$$1 + 3 + (3 + 3)$$

Q. Write short notes on any *two* : $5 \times 2 = 10$

(i) Chaining

(ii) BFS

(iii) Asymptotic Notations

