CBCS SCHEME

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18CS32

Third Semester B.E. Degree Examination, Dec.2024/Jan.2025
Data Structures and Applications

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Illustrate the difference between linear and non – linear data structure with an example. **(04 Marks)**

b. Write the functions to compare and concatenate strings. What are the equivalent library functions? **(08 Marks)**

c. Illustrate with a diagram 2 – d array of 3 – rows and 4 – columns in row major order. Write a function to print row and column index of a given number N. **(08 Marks)**

OR

2 a. Write the type definition for an element as triplets in a sparse matrix. What is the advantage? **(04 Marks)**

b. With a diagram, illustrate representation of the polynomial $A(x) = a_0 + a_1x^1 + a_2x^2 + \ldots + a_nx^n$. Write a program to construct the polynomial. **(08 Marks)**

c. Implement C - program to match all occurrence of pattern 'P' in text 'T'. **(08 Marks)**

Module-2

3 a. Write a recursive function to compute gcd of two numbers. **(04 Marks)**

b. Write a program to implement the stack operations using dynamic array. **(08 Marks)**

c. Convert a * x ^ 2 + b * x + C into post fix expression using stack. **(08 Marks)**

OR

4 a. Write a recursive function for Ackermann function A(m, n).

$$A(m,n) = \begin{cases} n+1 & \text{if } m = 0 \\ A(m-1,\ 1) & \text{if } m \neq 0 \text{ but } n = 0 \\ A(m-1, A(m, n-1)) & \text{if } m \neq 0 \ \& \ n \neq 0 \end{cases}$$ **(04 Marks)**

b. Write a program to implement queue operations for the circular queue. **(08 Marks)**

c. Evaluate postfix expression ab + cd + * 2 / , when a = b = c and c = d = 4 using stack. **(08 Marks)**

Module-3

5 a. Describe the dynamic memory allocation and free functions. **(04 Marks)**

b. Write a program to create linked list for the polynomial $1 + 2x + 3x^2 + \ldots. + nx^{n-1}$. **(08 Marks)**

c. Write a program to implement stack operations using linked list. **(08 Marks)**

OR