

B.Sc. Semester - 5 (CBCS) Examination

Oct/Nov - 2024 (NEW COURSE)

Programming in C and Numerical Analysis -1(Core)

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

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- Que.1(A) Attempt any TWO. (10)
1. Explain types of constants in C. Also, differentiate between a constant and a variable.
 2. Explain type conversion in assignments in C with the help of suitable example.
 3. Explain nested *if else* statement.
- Que.1(B) Attempt any ONE. (04)
1. What do you mean by a header file in C? Explain its purpose with at least 2 examples.
 2. Write a program to display the smallest number amongst the three numbers input by user through keyboard.
- Que.2(A) Attempt any TWO. (10)
1. Draw the flow chart of *for* loop and explain it with an example.
 2. Write a short note on user defined functions in C.
 3. Write a program using *do-while* loop to print all the positive divisors of the given positive number and also count them.
- Que.2(B) Attempt any ONE. (04)
1. Differentiate between *continue* and *break* statements.
 2. Differentiate between *signed* and *unsigned int* and *float* data types.
- Que.3(A) Attempt any TWO. (10)
1. Explain Macros with argument.
 2. Write a short note on arrays in C programming.
 3. Write a short note on preprocessor directives in C.
- Que.3(B) Attempt any ONE. (04)
1. Explain two-dimensional array initialization in C programming.
 2. Write a program to check whether the entered 3×3 square matrix is symmetric or not.
- Que.4(A) Attempt any TWO. (10)
1. Explain Gauss elimination method in detail, on a general system of 3 simultaneous equations in 3 unknowns.
 2. Explain LU decomposition method to solve a general system of 3 simultaneous equations in 3 unknowns.
 3. Using the principle of least square fit a linear equation $y = ax + b$ to a set of n ordered data points $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$ for some $n \in \mathbb{N}$.

Que.4(B) Attempt any ONE. (04)

1. Fit an exponential curve $y = a e^{bx}$ to the following data as per the method of least square.

x	1	2	3	5	7	8
y	5.77	9.51	15.69	42.64	115.90	191.09

2. Write name of iterative methods for solving a system of simultaneous linear equations. Also explain which method is more rapid and why?

Que.5(A) Attempt any TWO. (10)

1. State and derive Gregory Newton's forward interpolation formula.
2. In usual notation, show that $D = \frac{1}{h} \left\{ \Delta - \frac{\Delta^2}{2} + \frac{\Delta^3}{3} - \frac{\Delta^4}{4} + \dots \right\}$.
3. Interpolate the missing values a and b in the following table:

x	-2	-1	0	1	2	3	4	5
y	-68	2	6	-2	a	42	b	1766

Que.5(B) Attempt any ONE. (04)

1. Without creating the difference table, find the value of $\Delta^4 y_0$ and $\nabla^4 y_4$ from the data given below:
 $y_0 = -3, \quad y_1 = -4, \quad y_2 = -3, \quad y_3 = 24, \quad y_4 = 125.$
2. Express the polynomial $p(x) = 2x^5 - 5x^3 + 10x^2 - x - 8$ in factorial notations.
