

B.E. (EE) Part-II 4th Semester Examination, 2010
Numerical Methods and Data Structures
(EE-405)

Time : 3 hours

Full Marks : 70

Use separate answerscript for each half.
Answer SIX questions, taking THREE from each half
Two marks are reserved for neatness in each half.

FIRST HALF

1. a) Find the inverse of the coefficient matrix $[A]$ using Gauss-Jordan method and solve the set of linear algebraic equations $[C] = [C]$, where

$$[A] = \begin{bmatrix} 5 & -1 \\ 2 & 4 \\ 1 & 1 \end{bmatrix} \quad \text{and} \quad [C] = \begin{bmatrix} -5 \\ 8 \end{bmatrix}$$

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- b) Solve the above equations with another $[C]$ vector, $[C]' = [10 \ 12 \ -1]$ [9+2]
2. Find the quadratic factor of $f(x) = x^3 - 1.1x^2 + 23x + 3.3 = 0$ using Bairstow's method up to second iteration. Assume the initial factor is $x^2 + x + 1$. What is the other factor? [9+2]

3. a) Apply Gauss-Seidel method to solve the following equations. Assume $\epsilon < 0.005$ and $x_1^{(0)} = x_2^{(0)} = x_3^{(0)} = 0.0$.

$$\begin{aligned} 5x_1 - x_2 &= 9 \\ -x_1 + 5x_2 - x_3 &= 4 \\ -x_2 + 5x_3 &= \end{aligned}$$

- b) What is the condition for convergence of Gauss-Seidel method? [9+2]
4. a) Derive the general formula for Newton's interpolating polynomial.
 b) Use Lagrange interpolating polynomial of degree 3 to evaluate $f(1.6)$ from the following data points.

x	0.5	1.0	1.5	2.0
m	2.119	2.910	3.945	5.720

16+51

5. Write notes on the following : [4+4+31]
- a) Synthetic division,
 b) Well-conditioned and ill-conditioned systems of equations,
 c) Direct and iterative methods of solution of linear algebraic equations.

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SECOND HALF

6. Fill-up the blanks with appropriate words or sentences : |1 * ii|
- a) User defined data type in C can be created by_____.
 - b) ?: Operator is used to compute_____in C.
 - c) LINUX/UNIX commands are case_____.
 - d) A valid C variable name must start with_____.
 - e) A valid C statement should end with a_____.
 - f) Underflow and Overflow can occur in case of
 - g) Queue is a_____system.
 - h) Recursive call is_____in C.
 - i) "Continue" is a_____in C.
 - j) Names of modes of 'vi*' editor are _____
 - k) In case of an array, the lower bound is _____
7. a) Discuss about searching algorithm, their merits and demerits.
b) Write a C program to find a floating number in an array. [5+6]
8. a) Briefly discuss about 'linked lists'.
b) Develop a C program showing basic operations of '*linked list'. [5+6]
9. a) Discuss about user defined data types in C.
b) Write a C code to multiply two matrices of rational numbers. [3+81]
10. Write short note and C code on following topics (any two): |5Vix21
- a) Sort,
 - b) Iterative methods for solving linear equations,
 - c) Stack.