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63 (FY)SEM-3/MIN/BCAMIN2014

2024

COMPUTER APPLICATION

Paper : BCAMIN2014

(Computer Oriented Numerical Methods)

Full Marks : 50

Pass Marks : 20

Time : Two hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct option from the following :

1×5=5

a) _____ are the errors caused by using approximate formulae in computations?

(i) Internet errors

(ii) Truncation errors

(iii) Approximation errors

(iv) Relative errors

- b) Which of the following is an iterative method?
- (i) Gauss Seidel
 - (ii) Gauss Jordan
 - (iii) Gauss Elimination
 - (iv) Factorization
- c) Which of the methods is a direct method for solving simultaneous algebraic equations?
- (i) Relaxation method
 - (ii) Gauss Seidel method
 - (iii) Jacobi's method
 - (iv) Cramer's rule
- d) Using Simpson's 1/3 rule for numerical integration, the consecutive points are joined by a _____
- (i) line
 - (ii) Parabola
 - (iii) polynomial with power 3
 - (iv) polynomial with power 1/3

- e) Which of the following is an assumption of Jacobi's method?
- (i) The coefficient matrix has zeroes on its main diagonal
 - (ii) The coefficient matrix has no zeros on its main diagonal
 - (iii) The rate of convergence is quite slow compared with other methods.
 - (iv) Iteration involved in Jacobi's method converges.

2. Answer the following questions : **(any five)**
2×5=10

- a) What is a floating point number? Give example.
- b) Differentiate between round-off error and truncation error.
- c) Covert the decimal $(37.45)_{10}$ into its binary equivalent.
- d) State the Newton's backward difference formula.
- e) What do you mean by relative error? How is it important in error analysis?

- f) State the Simpson's $\frac{3}{8}$ th rule.
 g) State Runge-Kutta fourth order method.

3. Answer the following questions : **(any five)**
 $5 \times 5 = 25$

- a) Find the root of the equation $x^2 - 4x - 10 = 0$ with initial value 1 and 2 using the Secant method.
 b) Using Lagrange's formula find the value of y when $x = 0.3$. The values of x and y are:

x	0	1	3	4	7
y	1	3	49	129	813

- c) Apply Simpson's $\frac{1}{3}$ rd rule to evaluate $\int_2^{10} \frac{dx}{1+x}$ by dividing the range into four equal parts.
 d) Compare Gauss elimination and Gauss Jordan method.
 e) Find the positive real root of the following equation with the help of Bisection method correct to its four decimal places.

$$x^2 - 7x + 5 = 0$$

- f) Construct the divided difference for the following data.

x	1	2	4	7	10
$f(x)$	5	10	26	65	122

- g) Explain Romberg integration or Gaussian quadrature method for numerical integration.
 h) Explain Milne's predictor and corrector method for solving first order equations.

4. Answer the following question : **(any one)**
 $10 \times 1 = 10$

- (a) Solve the system of equations by Gauss elimination method.

$$x_1 + x_2 + x_3 = 3$$

$$2x_1 + 3x_2 + 7x_3 = 0$$

$$x_1 + 3x_2 - 2x_3 = 17$$

- (b) Solve the following system of linear equations by using Gauss Seidel method :

$$5x + 2y + z = 12$$

$$x + 4y + 2z = 15$$

$$x + 2y + 5z = 20$$