## 2011

Time: 3 hours

Full Marks: 80

Candidates are required to give their answers in their own words as far as practicable.

The questions are of equal value.

Answer any five questions in which

Q. No. 1 is compulsory.

- 1. Indicate the correct answer:
  - (a) A matrix is not a square matrix if:
    - (i) m > n
    - (ii) n > m
    - (iii) m≠n
    - (iv) None of these

Where m × n is the order of the matrix.

- (b) If A and B are two n × n matrices, then which of the following is not equal to (A + B)<sup>2</sup>?
  - (i)  $(B + A)^2$

VW - 3/4

(Turn over)

(iii) 
$$A^2 + AB + BA + B^2$$

(iv) 
$$A^2 + 2AB + B^2$$

- (c) In skew symmetrix matrix, the diagonal elements are:
  - (i) All zeros
  - (ii) Not all zero's
  - (iii) All negative
  - (iv) None of these
- (d) For which values of 't', does the following linear system of equations have infinitely many solutions?

$$tx + y = 1$$
,  $6x + (t + 1)y = 3$ 

- (i) t = +3
- (ii) t = 2
- (iii) t = 2 and 3
- (iv) None of these
- (e) Find the minimum number of sub-intervals for applying Simpson's <sup>1</sup>/<sub>3</sub>rd rule :
  - (i) 1

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(2)

Contd. ·

| , | (ii)  | 2  |
|---|-------|----|
|   | (iii) | 3  |
|   | (in)  | NI |

- (iv) None of these
- (f) The equation of ellipse is:

$$(i) \frac{x}{a} + \frac{y}{b} = 1$$

(ii) 
$$x^2 + y^2 = a^2$$

(iii) 
$$y^2 = ax$$

- (iv) None of these
- (g) The number of real roots in the equation  $x^3 4x^2 + 17x = 0$  is :

- (i) 1
- (ii) 2

- (iv) None of these
- (h) In the difference table, the independent variable is called as:

- (iii) Constant
- (iv) None of these

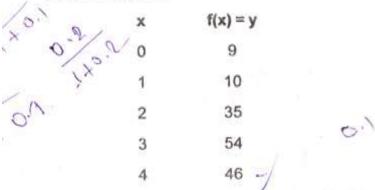
(3)

(Tum over)

Explain the idea to solve a set of linear equations using Gauss Elimination Method. Solve the set of equations by this method:

$$x-3y+z=4$$
  
 $2x-8y+8z=-2$   
 $-6x+3y+15z=9$ 

- Discuss the basic idea behind Jacobi Method. Is it possible to solve the set of linear equations given in Question No. (2) ? If possible, solve it.
- What do you mean by interpolation and extrapolation? Justify when you will prefer each of them. Construct a forward difference table for the following data:



Find f(2.7). Explain how you will find f(4.5).

VW = 3/4 (4) · Contd.

 Discuss the basic idea to solve a set of linear equations using CRAMER's rule. Solve the following set of equations using the same method (if possible):

$$2x-y+3z=-3$$

$$-x-y+3z=-6$$

$$x-2y-z=-2$$

6 What do you mean by eigenroots and eigenvectors of a matrix ? Find the eigenroots and

eigenvectors of 
$$\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$
.

rule.

- Discuss the basic idea behind Simpson's  $\frac{1}{3}$ rd rule. Evaluate  $\int_{0}^{1} \frac{dx}{1+x}$  by using this method corrected upto four decimal places. Also, explain how does this method differ from Simpson's  $\frac{1}{3}$ rd
- 8. Write down the basic steps on Bisection method of find root of a function f(x). Is this method equal to binary search? Justify your answer.

9. Explain least square principle. Fit a least square line to the following data:

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