

(i) Printed Pages : 3

Roll No.

(ii) Questions : 8

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B.A./B.Sc. (General) 6th Semester
(2040)

MATHEMATICS

Paper-III : Numerical Analysis

Time Allowed : Three Hours

[Maximum Marks : 30]

Note: Attempt 50% of Total Questions of Question Paper. Time: 2 Hours
All will carry equal marks. Fraction will be lower digit.

- (2) Use of scientific non-programmable calculator is allowed.

SECTION—A

1. (a) Find a real root of the equation $x^3 - 2x - 5 = 0$ by using bisection method upto three decimal places. 3

- (b) Develop a recurrence formula for finding the value of \sqrt{n} , using Newton-Raphson's method and hence compute $\sqrt{32}$. 3

2. Let $y = \sin x^\circ$ and

$x : 30^\circ \quad 35^\circ \quad 40^\circ \quad 45^\circ \quad 50^\circ \quad 55^\circ$

$y : 0.5 \quad 0.5736 \quad 0.6428 \quad 0.7071 \quad 0.7660 \quad 0.8192$

Find $\sin 54^\circ$ and estimate the error. 6

3. (a) Use following data to find x for which y is minimum :

$$x : \quad 0.60 \quad 0.65 \quad 0.70 \quad 0.75$$

$$y : \quad 0.6221 \quad 0.6155 \quad 0.6138 \quad 0.6170$$

Also find minimum value of y. 3

- (b) Use Bessel's formula to find $f'(0.04)$, given :

$$x : \quad 0.01 \quad 0.02 \quad 0.03 \quad 0.04 \quad 0.05 \quad 0.06$$

$$y : \quad 0.1023 \quad 0.1047 \quad 0.1071 \quad 0.1096 \quad 0.1122 \quad 0.1148$$

3

4. (a) Show that :

$$e^x \left(u_0 + x\Delta u_0 + \frac{x^2}{2!} \Delta^2 u_0 + \dots \right) = u_0 + u_1 x + u_2 \frac{x^2}{2!} + \dots$$

3

- (b) Find the value of $\int_1^2 \frac{dx}{x}$ by Simpson's 1/3 rule. 3

SECTION—B

5. (a) Solve the system of equations $x + 2y + z = 8$, $2x + 3y + 4z = 20$, $4x + 3y + 2z = 16$ by using Gauss-Jordan method. 3

- (b) Using Cholesky decomposition method, solve the equations :

$$x + y + z = 3; \quad x + 2y + 3z = 6; \quad x + 3y + 6z = 10$$

3

6. Solve the system of linear equations by Gauss-Seidel method :

$$5x + 2y + z = 12; \quad x + 4y + 2z = 15; \quad x + 2y + 5z = 20$$

6

7. Using Jacobi's method, find all the eigen values and the eigen

vectors of the matrix
$$\begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix}$$
. 6

8. (a) Using Euler's method, find solution in the interval $[0, 1]$ given that :

$$\frac{dy}{dx} = x + y \text{ and } y = 1 \text{ at } x = 0. \quad 3$$

- (b) Use Runge-Kutta's method to find an approximate value of y when $x = 0.2$, given that :

$$\frac{dy}{dx} = x + y, \quad y(0) = 1. \quad 3$$