PC-727/MH

BS/2051

NUMERICAL METHODS–IV

(Semester–IV)

Time : Three Hours] [Maximum Marks : 40

Note : Attempt *two* questions each from Section A and B Section C will be compulsory.

SECTION–A

I. Find a smallest positive root of the equation $x^3 - 5x + 1 = 0$ using iteration method.

II. Find the real root of the equation $\cos x - xe^x = 0$ by using Secant method, correct to three decimal places.

III. Using triangularisation method to solve the equation :

$$2x + y + 3z = 13$$
$$x + 5y + z = 14$$
$$3x + y + 4z = 17.$$

IV. Perform four iterations of the Jacobi method to solve the following system of the equations :

$$5x + 2y + z = 12$$
$$x + 4y + 2z = 15$$
$$x + 2y + 5z = 20.$$

(6×2=12)

SECTION–B

V. Given $f(0) = 3, f(1) = 12, f(2) = 81, f(3) = 200, f(4) = 100, f(5) = 8$. Find the value of $\Delta^5 f(0)$.

VI. The following table gives the values of e^x for certain equidistant values of x. Find $e^{0.644}$ using Bessel's formula :

x :	0.61	0.62	0.63	0.64	0.65	0.66	0.67
$y = e^x$	1.840431	1.1858928	1.877610	1.896481	1.915541	1.934792	1.954237

VII. Prepare a divided difference table for the following data :

x :	1	3	6	10	11
$f(x)$:	3	31	223	1011	1343

VIII. Using Newton's backward difference formula, find a polynomial of degree 4 in x which satisfies the following data:

x :	1	2	3	4	5
y :	1	−1	1	−1	1

(6×2=12)

SECTION–C

IX. Attempt all the questions :

(a) State the Newton Raphson formula for finding the root of the equation $f(x) = 0$.

(b) Derive the iterative formula to find $N^{1/k}$.

(c) Write the-difference between the Gauss Seidal and Gauss elimination method.

(d) Derive the order of the convergence of the iteration method.

(e) Show that $\Delta\nabla y_k = \Delta\nabla y_k = \delta^2 y_k$.

(f) State Lagrange's formula for equally spaced data points.

(g) State Stirling and Everett's formula for interpolation.

(h) Define interpolation. (8×2=16)