3. Express $y = 2x^3 - 3x^2 + 3x - 10$ in factorial notation.

4. Prove that $\nabla^2 y_8 = y_8 - 2y_7 + y_6$.

5. Prove that $y = -\frac{1}{3}x^{-2}$ is the solution of $\frac{dy}{dx} = 6y^2x$.

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III/BCA/302

2017

(3rd Semester)

BACHELOR OF COMPUTER APPLICATION

Paper No. : BCA–302

[Mathematics—III (Numerical Analysis)]

Full Marks : 75

Time : 3 hours

(PART : B—DESCRIPTIVE)

(*Marks* : 50)

The figures in the margin indicate full marks for the questions

Answer **five** questions, selecting **one** from each Unit

UNIT—I

1. *(a)* Using Regula-Falsi method, find the real root of the equation $x^3 - 4x - 9 = 0$ correct to 3 decimal places. 5

(b) Use iteration method to find a root of the equation $x^3 + x^2 - 100 = 0$ to 4 decimal places . 5

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2. *(a)* Solve the following by Gauss elimination method : 5

$$2x+y+z=10$$
$$3x+2y+3z=18$$
$$x+4y+9z=16$$

(b) Apply Gauss-Seidel method to solve the following equations : 5

$$20x+y-2z=17$$
$$3x+20y-z=-18$$
$$2x-3y+20z=25$$

UNIT—II

3. *(a)* Evaluate : 2+2=4

(i) $\Delta^2\left(\frac{1}{x^2+5x+6}\right)$

(ii) $\Delta(e^{3x}\log 2x)$

(b) Express $u=x^4-12x^3+24x^2-30x+9$ in factorial notation. Hence show that $\Delta^5 u=0$. 3

(c) Obtain the function whose first difference is $2x^3+3x^2-5x+4$. 3

4. *(a)* Sum the following series : 5

$$1^3 + 2^3 + 3^3 + \cdots + n^3$$

(b) Prove that $\delta = \Delta(1+\Delta)^{-\frac{1}{2}} = \nabla(1-\nabla)^{-\frac{1}{2}}$. 3

(c) Show that $\Delta^3 y_2 = \nabla^3 y_5$. 2

UNIT—III

5. *(a)* From the following table, find y when $x = 2{\cdot}4$ by Newton's interpolation formula : 5

x	1·7	1·8	1·9	2·0	2·1	2·2	2·3
y	5·474	6·050	6·686	7·389	8·166	9·025	9·914

(b) Using Gauss forward formula, find y when $x = 3{\cdot}75$ from the following table : 5

x	2·5	3·0	3·5	4·0	4·5	5·0
y	24·145	22·043	20·225	18·644	17·267	16·047

6. *(a)* The following table gives the values of x and y. Find the value of x when $y = 12$ using Lagrange's inverse interpolation method : 5

x	1·2	2·1	2·8	4·1	4·9	6·2
y	4·2	6·8	9·8	13·4	15·5	19·6

SECTION—II

(*Marks* : 10)

III. Answer the following questions briefly : 2×5=10

1. Differentiate 'order' and 'degree' of a differential equation with example.

2. Write down the general formula for Newton's forward interpolation.