Question Paper Code : 8873

BCA (Semester-III) Examination, 2021

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

[Paper : BCA-301]

Time : Three Hours] **[Maximum Marks : 70**

Note : Answer **any five** questions in all. Each question carries **equal** marks.

1. (a) Round off the numbers 865250 and 37.46235 to four significant figures and compute E_a, E_r, E_p in each case. [7]

   (b) Find by Newton–Raphson method, the real root of the equation $x^3 - 2x - 5 = 0$. [7]

2. (a) Find the real root of the equation $x log_{10} x = 1.2$ by Regula Falsi Method correct to four decimal places. [7]

(b) Apply Gauss–Seidal iteration method to solve the equations. [7]

$20x + y - 2z = 17$

$3x + 20y - z = -18$

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

3. (a) Show that : [7]

(i) $\mu\delta = \frac{1}{2}(\Delta + \nabla)$

(ii) $(1+\Delta)(1 - \nabla) = 1$

(b) Estimate the missing term in the following table. [7]

x	0	1	2	3	4
y	1	3	9	-	81

4. (a) Using Newton's forward formula, find the value of f(1.6) if : [7]

x	1	1.4	1.8	2.2
f(x)	3.49	4.82	5.96	6.5

(b) Apply Bessel's formula to obtain Y_{25}, given $Y_{20} = 2854$, $Y_{24} = 3162$, $Y_{28} = 3544$, $Y_{32} = 3992$. [7]

5. (a) Determine f(x) as a polynomial in x for the following data : [7]

x :	−4	−1	0	2	5
f(x)	1245	33	5	9	1335

(b) Given the values : [7]

x	0	2	3	6
f(x)	-4	2	14	158

Find the value of f(4) using Lagrange's formula.

6. (a) Find the first and second derivatives of the function given below at the point $x = 1.2$ [7]

x	1	2	3	4	5
y	0	1	5	6	8

(b) Evaluate the value of $\int_0^1 \frac{2x}{1+x^2} dx$ using Simpson's $\frac{1}{3}rd$ rule. [7]

7. (a) Using Euler's method, find an approximate value of y corresponding to $x = 2$ given that : [7]

$\frac{dy}{dx} = x + 2y$ and $y = 1$, when $x = 1$

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Boole's rule. [7]

8. (a) Using Taylor's Series method, obtain the solution of $\frac{dy}{dx} = x + y^2$ and $y = 1$, when $x = 0$.

Find the value of y for $x = 0.1$ correct to four places of decimals. [7]

(b) Apply Runge–Kutta method to find an aproximate value of y when $x = 0.1$ given that $\frac{dy}{dx} = x + y$, $y = 1$ where $x = 0$ [7]

9. Fit a second degree parabola to the following : [14]

x	1	2	3	4	5
y	1090	1220	1390	1625	1915

10. (a) The IQ and economic condition of x homes of 1000 students of an engineering college Delhi were noted as given in the table. [7]

Eco.Con. \ I.Q.	High	Low	Total
Rich	100	300	400
Poor	350	250	600
Total	450	550	1,000

Find out whether there is any association between economic condition at home and I.Q. of the students.

Given for 1.d.f. x^2 at the level of significance 0.05 is 3.84.

(b) Compute the students t for the following values in a sample of Eight : –4, –2, –2, 0, 2, 2, 3, 3 taking the mean of universe to zero. [7]

——— x ———