

B.C.A. IIIrd Semester Examination, 2022  
 COMPUTER BASED NUMERICAL AND  
 STATISTICAL TECHNIQUES

Paper : BCA-301

Time : 3 Hours ]

[ M.M.

Note - Answer any five questions. All questions carry equal marks.

1. (a) If  $U = \frac{4x^2y^3}{z^4}$  and errors in  $x, y, z$  be 0.001, compute the relative maximum error in  $U$  when  $x = y = z = 1$ .

(b) Find by Newton-Raphson method, the real root of the equation  $3x = \cos x + 1$ .

2. Solve the following system by Gauss-Seidel method:

$$10x + 2y + z = 9$$

$$2x + 20y - 2z = -44$$

$$-2x + 3y + 10z = 22$$

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( 1 ) K-1751

Turn Over

3. Find a root of the equation  $x^3 - x - 11 = 0$ , using the Bisection method correct to three decimal places.

4. (a) Evaluate :

(i)  $\Delta^2 \cos 2x$

(ii)  $\Delta \frac{1}{x^2 + 3x + 2}$

(b) Estimate the missing term in the following table :

$x$	0	1	2	3	4
$f(x)$	1	3	9	—	81

5. (a) Apply Bessel's formula to obtain  $Y_{25}$ , given

$Y_{20} = 2854, \quad Y_{24} = 3162, \quad Y_{28} = 3547,$

$Y_{32} = 3992,$

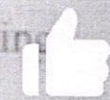
(b) Use Lagrange's interpolation formula to find the value of  $y$  when  $x = 10$  if the following values of  $x$  and  $y$  are given :

$x$	5	6	9	11
$y$	12	13	14	16

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(2)

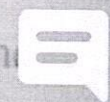
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6. Given that :

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find  $\frac{dy}{dx}$  at  $x = 1.1$  and  $\frac{d^2y}{dx^2}$  at  $x = 1.1$

7. Evaluate  $\int_4^{5.2} \log x \, dx$  by :

(i) Trapezoidal rule

(ii) Simpson's  $\frac{1}{3}$  rule

(iii) Simpson's  $\frac{3}{8}$  rule

8. Apply Runge-Kutta method to find approximate

value of  $y$  for  $x = 0.2$  in steps of 0.1 if  $\frac{dy}{dx} = x + y$ ,

given that  $y = 1$  where  $x = 0$ .

9. Fit a second degree parabola to the following data :

x	10	15	20	25	30	35	40
y	11	13	16	20	27	34	41



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- (a) What are the *four* main compounds of a time series and explain it.
- (b) Use Chi-square test, A survey of 320 families with 5 children is given below :

No. of boys	5	4	5	2	1	0	Total
No. of girls	0	1	2	3	4	5	
No. of families	14	56	110	88	40	12	320

Is this result consistent with hypothesis i.e. the male and female birth are equally possible ?

[Given for 5 degrees of freedom  $\chi^2$  at the level of significance is 11.07].