

B.E. (Computer Engineering) Fourth Semester (C.B.S.)
Numerical Computational Techniques Paper - IV

P. Pages : 2

Time : Three Hours



TKN/KS/16/7394

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No.2.
 3. Solve Question 3 OR Questions No.4.
 4. Solve Question 5 OR Questions No.6.
 5. Solve Question 7 OR Questions No.8.
 6. Solve Question 9 OR Questions No.10.
 7. Solve Question 11 OR Questions No.12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Illustrate your answers whenever necessary with the help of neat sketches.
 11. Use of non programmable calculator is permitted.

1. a) Write an algorithm for Newton's Raphson method to find root of equation. **6**
- b) Find the root of the equation $x e^x = \cos x$ using the regula-falsi method correct to four decimal places. **7**

OR

2. a) By using the bisection method, find an approximate root of the equation $\sin x = \frac{1}{x}$ that lies between $x = 1$ and $x = 1.5$ (measured in radians) carry out computations upto 7th stages. **7**
- b) Find positive root of $x^3 - 2x - 5 = 0$ by using direct substitution method. **6**
3. a) Apply Gauss – Jordan method to solve the equations $x + y + z = 9$; $2x - 3y + 4z = 13$; $3x + 4y + 5z = 40$. **7**
- b) Apply Gauss elimination method to solve the equations $x + 4y - z = -5$; $x + y - 6z = -12$; $3x - y - z = 4$. **7**

OR

4. a) From the following table, estimate the number of students who obtained marks between 40 and 45. **7**

Marks	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
No. of students	31	42	51	35	31

- b) Apply Lagrange's formula inversely to obtain a root of the equation $f(x) = 0$, given that $f(30) = -30$, $f(34) = -13$, $f(38) = 3$ and $f(42) = 18$. **7**
5. a) Find $y'(0)$ and $y''(0)$ from the following table. **8**

x	0	1	2	3	4	5
y	4	8	12	7	6	2

- b) Write an algorithm for Trapezoidal rule. **5**

OR

6. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using 13
- i) Trapezoidal rule ii) Simpson's $\frac{1}{3}$ rd rule
- iii) Simpson's $\frac{3}{8}$ th rule
- and compare result with its actual value.

7. a) Find the mean, median and mode for the following. 6

Mid value	15	20	25	30	35	40	45	50	55
Frequency	2	22	19	14	3	4	6	1	1

- b) Calculate the first four moments of the following distribution about the mean: 7

x	0	1	2	3	4	5	6	7	8
f	1	8	28	56	70	56	28	8	1

OR

8. a) Six dice are thrown 729 times. How many times do you expect atleast 3 dice to show 5 or 6 6

- b) A random variable x has following probability distribution: 7

x	0	1	2	3	4	5	6	7	8
f(x)	a	3a	5a	7a	9a	11a	13a	15a	17a

- i) Determine value of a ii) $P(x < 3)$ iii) $P(0 < x < 5)$.

9. a) Find the rank correlation for the following data. 7

x	56	42	72	36	63	47	55	49	38	42	68	60
y	147	125	160	118	149	128	150	145	115	140	152	155

- b) Write an algorithm for calculation of coefficient of correlation. 7

OR

10. a) In a partially destroyed laboratory record, only the lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y = 107$ respectively. Calculate \bar{x} , \bar{y} and the coefficient of correlation between x and y. 7

- b) Write an algorithm for non-linear regression model. 7

11. Fit a normal distribution to the following data of weights of 100 students of Delhi university and test the goodness of fit. 13

Weights (kg)	60 – 62	63 – 65	66 – 68	69 – 71	72 – 74
Frequency	5	18	42	27	8

OR

12. a) What do you mean by tests of significance? What are different tests of significance available to analyze the data? Explain methodology to apply these tests of significance. 7

- b) Analyze given data using T-test: 6

x	4	5	8	8	6
y	3	5	6	6	3
