

Seat No.	
----------	--

**S.Y. B.Tech (Computer Science and Engg.)**  
**(Semester - III) (CBCS) Examination, January - 2023**  
**APPLIED MATHEMATICS**  
**Sub. Code : 73276**

Day and Date : Friday, 20 - 01 - 2023

Total Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

- Instructions :**
- 1) Attempt any three questions from each section.
  - 2) Figures to the right indicate full marks.
  - 3) Use of non programmable calculator is allowed.

**SECTION - I**

**Q1) a)** Find coefficient of correlation from following data. **[6]**

$x:$	1	2	3	4	5	6	7	8	9
$y:$	9	8	10	12	11	13	14	16	15

**b)** Fit a straight line  $y = a + bx$  to following data. **[6]**

$x:$	1	2	3	4	6	8
$y:$	2.4	3	3.4	4	5	6

**Q2) a)** From a box containing 100 transistors 20 of which are defective, 10 are selected at random. Find the probability that **[6]**

- i) All will be defective.
- ii) All will be non defective.
- iii) At least one is defective.

**b)** If the probability that an individual suffer a bad reaction from certain injection is 0.001. Determine the probability that out of 2000 individual **[5]**

- i) Exactly 3,
- ii) More than 2 will suffer a bad reaction.

**P.T.O.**

**Q3) a)** Evaluate  $\int_0^6 \frac{1}{1+x^2} dx$  using Trapezoidal Rule. [5]

b) Evaluate  $\int_0^1 \sqrt{1+x+x^2} dx$  using Simpson's  $\left(\frac{1}{3}\right)^{rd}$  Rule. [6]

**Q4)** Attempt any two.

a) Fit a second degree parabola to the following data. [6]

$x:$	1	2	3	4	5	6	7	8	9
$y:$	2	6	7	8	10	11	11	10	9

b) In a sample of 1000 student the mean and standard deviation of marks obtained by the student in a certain test are 14 and 2.5. Assuming the distribution to be normal find the numbe of students getting marks. [6]

i) Between 12 and 15,

ii) Above 18,

iii) Below 8.

(Given: For a S.N.V.z area between  $z = 0$  and  $z = 0.4$  is 0.1554, that between  $z = 0$  and  $z = 0.8$  is 0.2881, that between  $z = 0$  and  $z = 1.6$  is 0.4452 that between  $z = 0$  and  $z = 2.4$  is 0.4918)

c) Evaluate  $\int_{0.2}^{1.4} (\sin x - \log x + e^x) dx$  using Simpson's  $\left(\frac{3}{8}\right)^{th}$  Rule. [6]

## SECTION - II

**Q5) a)** Define: [6]

i) Fuzzy intersection

ii) Height of fuzzy set

iii) Degree of subset hood  $S(C, D)$  for the fuzzy sets C and D.

b) Find  $\alpha$ -cut and strong  $\alpha$ -cut for  $\alpha = 0.2, 0.4, 0.6, 0.8$  for the fuzzy set

defined by  $B(x) = \frac{0.2}{1} + \frac{0}{2} + \frac{0.65}{3} + \frac{0.7}{4} + \frac{0.35}{5}$ . [6]

- Q6) a)** Define fuzzy number and determine whether the following fuzzy set is a fuzzy number

$$A(x) = \begin{cases} \sin x & 0 \leq x \leq \pi \\ 0 & \text{otherwise} \end{cases} \quad [5]$$

- b)** Calculate the fuzzy number  $A + B, A.B$  [6]

$$\text{where } A(x) = \begin{cases} \frac{3+x}{3} & -3 \leq x \leq 0 \\ \frac{3-x}{3} & 0 \leq x \leq 3 \\ 0 & \text{otherwise} \end{cases}$$

$$B(x) = \begin{cases} \frac{x-3}{3} & -3 \leq x \leq 6 \\ \frac{9-x}{3} & 6 \leq x \leq 9 \\ 0 & \text{otherwise} \end{cases}$$

- Q7)** Following table represent expected time required (in min.) to five different groups for completing four different tasks. Determine assignment schedule in order to minimize the time of completion of tasks. [11]

	Group					
		A	B	C	D	E
Tasks	I	35	24	28	26	31
	II	34	32	35	24	32
	III	29	25	38	35	33
	IV	28	26	27	33	32

Q8) Attempt any two.

- a) If the fuzzy set A and B are defined by the following membership functions:

$$A(x) = \frac{0.1}{1} + \frac{0.6}{2} + \frac{0.8}{3} + \frac{0.9}{4} + \frac{0.7}{5}, \quad B(x) = \frac{0.9}{1} + \frac{0.7}{2} + \frac{0.5}{3} + \frac{0.2}{4} + \frac{0.1}{5}$$

Calculate  $\bar{A}, \bar{B}, \overline{A \cup B}, \overline{A \cap B}$ . [6]

- b) Calculate the fuzzy number  $A + B, A - B$  [6]

$$\text{where } A(x) = \begin{cases} \frac{x+1}{2} & -1 \leq x \leq 1 \\ \frac{3-x}{2} & 1 \leq x \leq 3 \\ 0 & \text{otherwise} \end{cases}$$

$$B(X) = \begin{cases} \frac{x-1}{2} & 1 \leq x \leq 3 \\ \frac{5-x}{2} & 3 \leq x \leq 5 \\ 0 & \text{otherwise} \end{cases}$$

- c) Solve the following assignment problem [6]

		To			
From		I	II	III	IV
	A	8	26	17	11
	B	13	28	4	26
	C	18	29	18	15
	D	19	23	24	10

