Sanjay Ghodawat University, Kolhapur

2018-19

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Year and Program: 2018-19   **School of Technology**   **Department of CSE**
S.Y. B. Tech.

Course Code: CST 201   **Course Title: Mathematics for Modern Computing**   **Semester – III**

Day and Date Tuesday 04/06/2019   **End Semester Examination (ESE)**   **Time:** 3 Hrs. 2.30 to 5.30 pm.   **Max Marks: 100**

Instructions:
1) All questions are compulsory.
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks.
4) Non-programmable calculator is allowed.
4) Use of Z- table is allowed.

		Marks	Bloom's Level	CO

Q.1

a) Find a positive root of $x \cos x = 0$ by Bisection method correct up to four decimal place, which lies between 0 and 1. (carry out 6 iterations) — 07 — L_3 — CO1

OR

a) Find a positive root of $xe^x = 2$ by method of false position, which lies in the interval (0, 2) correct to four decimal places. — 07 — L_3 — CO1

b) Find first and second order derivatives at $x = 1.1$ — 08 — L_3 — CO2

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

OR

b) Determine $f'(3)$ and $f'(4)$ from the following table — 08 — L_3 — CO2

x	1	2	4	8	10
$f(x)$	0	1	5	21	27

Q.2

a) Find $\int_0^6 \dfrac{e^x}{1+x} dx$ approximately using Simpson's three-eighth rule. — 07 — L_2 — CO3

OR

a) Using the following table of values, find approximate arc length of the graph $y = \dfrac{1}{x}$ between the points (1, 1) and $\left(1, \dfrac{1}{5}\right)$ by Simpson's rule — 07 — L_4 — CO3

x	1	2	3	4	5
$\sqrt{\dfrac{1+x^4}{x^4}}$	1.414	1.031	1.007	1.002	1.001

b) Fit a Binomial distribution to the following data — 08 — L_3 — CO4

x	0	1	2	3	4
f	12	66	109	59	10

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b)	In a certain factory producing cycle tyres, there is a small chance of 1 in 500 tyres to be defective. The tyres are supplied in lot of 10. Using Poisson distribution calculate the approximate number of lots containing no defective, one defective and two defective tyres respectively in a consignment of 10000 lots.	08	L_3	CO4

Q.3 Solve any Two

a) Use Newton Rapson method to find the positive root of the following equations correct up to three decimal places.   08 L_2 CO1

i) $2\sin(x) = x$ (with $x_0 = 2$)   ii) $x\cos(x) - \sin(x) = 0$ (with $x_0 = 3$)

b) Find first and second order derivatives at $x = 0.50$ 08 L_3 CO2

x	0.35	0.40	0.45	0.50	0.55	0.60	0.65
y	1.521	1.506	1.488	1.467	1.444	1.418	1.389

c) Evaluate $\int_0^1 \dfrac{1}{1+x^2}dx$ by using Weddle's rule by taking $h = \dfrac{1}{6}$ 08 L_4 CO3

d) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.   08 L_3 CO4

Q.4 Solve any Three

a) Verify the rule $|A| + |B| = |A \cap B| + |A \cup B|$ for the fuzzy sets A and B   06 L_1 CO5

$$A = \frac{0.65}{1} + \frac{0.45}{2} + \frac{0.88}{3} + \frac{0.94}{4} + \frac{0.98}{5}$$

$$B = \frac{0.7}{1} + \frac{0.35}{2} + \frac{0.9}{3} + \frac{0.92}{4} + \frac{1}{5}$$

b) Find the degree of subsethood (i) $S(A, B)$ (ii) $S(B, A)$, for the fuzzy sets   06 L_2 CO5

$$A(x) = 1 - \frac{x}{10}; \quad B(x) = \frac{x}{x+2}; \quad \text{where} \quad x \in \{0, 1, 2, ..., 10\}$$

c) Let the fuzzy sets defined by the membership function   06 L_1 CO5

$$C = \frac{0.1}{1} + \frac{0.6}{2} + \frac{0.8}{3} + \frac{0.9}{4} + \frac{0.7}{5} + \frac{0.7}{6}; D = \frac{0.9}{1} + \frac{0.7}{2} + \frac{0.5}{3} + \frac{0.2}{4} + \frac{0.1}{5} + \frac{0}{6}$$

Find i) $\bar{C}$ ii) $\bar{D}$ iii) $\bar{C} \cap D$ iv) $C \cap \bar{D}$ v) $\bar{C} \cap C$ vi) $h(\bar{C})$

d) Let the fuzzy sets C and D be defined on the same universal set X by   06 L_2 CO5

$$C(x) = \frac{x}{x+2}; \quad D(x) = \frac{x}{x+5} \quad \text{where} \quad x \in \{0, 1, 2, ..., 10\} = X.$$

Find $|C|, |D|$ and $|C \cap D|$

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Q.5   **Solve any Two**

a)   Verify the following fuzzy sets are fuzzy numbers or not?   09   L₂   CO6

i) $A(x) = \begin{cases} 1 & ; 0 \le x \le 10 \\ 0 & ; \text{otherwise} \end{cases}$ ii) $B(x) = \begin{cases} \min(1, x) & ; x \ge 0 \\ 0 & ; x \le 0 \end{cases}$

b)   Calculate the fuzzy numbers $A + B$ and $A - B$, where   09   L₃   CO6

$$A(x) = \begin{cases} \dfrac{x-1}{2} & ; 1 < x \le 3 \\ \dfrac{5-x}{2} & ; 3 < x \le 5 \\ 0 & ; \text{otherwise} \end{cases} \quad \& \quad B(x) = \begin{cases} \dfrac{x-3}{2} & ; 3 < x \le 7 \\ \dfrac{7-x}{2} & ; 5 < x \le 7 \\ 0 & ; \text{otherwise} \end{cases}$$

c)   Find $A.B$ for the fuzzy sets   09   L₄   CO6

$$A(x) = \begin{cases} \dfrac{x+1}{2} & ; -1 < x \le 1 \\ \dfrac{3-x}{2} & ; 1 < x \le 3 \\ 0 & ; \text{otherwise} \end{cases} \quad \& \quad B(x) = \begin{cases} \dfrac{x-1}{2} & ; 1 < x \le 3 \\ \dfrac{5-x}{2} & ; 3 < x \le 5 \\ 0 & ; \text{otherwise} \end{cases}$$

Q.6   **Solve any Three**

a)   Define   06   L₁   CO5

i) alpha cut   ii) strong alpha cut   iii) core of fuzzy set

b)   Define special fuzzy set and represent the fuzzy set $A(x)$ as union of its   06   L₃   CO5

special fuzzy sets, where $A(x) = \dfrac{0.2}{1} + \dfrac{0.4}{2} + \dfrac{0.6}{3} + \dfrac{0.8}{4} + \dfrac{1}{5}$

c)   Solve the equation $A + X = B$ where   06   L₄   CO6

$$A(x) = \begin{cases} \dfrac{x+2}{2} & ; -2 < x \le 0 \\ \dfrac{2-x}{2} & ; 0 < x \le 2 \\ 0 & ; \text{otherwise} \end{cases} \quad \& \quad B(x) = \begin{cases} \dfrac{x-2}{2} & ; 2 < x \le 4 \\ \dfrac{6-x}{2} & ; 4 < x \le 6 \\ 0 & ; \text{otherwise} \end{cases}$$

d)   Find   i) $[2,5] + [1,3]$ ii) $[2,5] - [1,3]$ iii) $[2,5] * [1,3]$ 06   L₂   CO6

iv) $[2,5] / [1,3]$ v) $[0,3] + [4,6]$ vi) $[0,3] - [4,6]$

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