| Seat No. | |
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# S.E. (CSE) (Semester-III) Examination, November - 2018
# APPLIED MATHEMATICS
## Sub. Code : 63524

**Day and Date : Tuesday, 20 - 11 - 2018** **Total Marks : 50**

**Time : 09.30 a.m. to 11.30 a.m.**

**Instructions:**
1) **Answer any two questions from each section.**
2) **Use of calculator is allowed.**

## SECTION - I

*Q1)* Attempt any two **[12]**

a) Using following data find equation of regression to estimate Y when X is known

| Age of Husband (X) | 45 | 66 | 75 | 98 | 83 | 84 | 50 |
|---|---|---|---|---|---|---|---|
| Age of Wife (Y) | 40 | 65 | 71 | 95 | 75 | 80 | 48 |

b) Find value of following integral using Simpson's 3/8$^{th}$ rule

$$\int_0^{1.2} e^x x^5 dx$$

c) Determine root of the equation correct up to four decimal places using Secant Method $\tan x - 2e^{-2x} = 0$

*Q2)* Attempt any two **[12]**

a) If an engineerscan resolve customer complains 80% of times. What is the probability that on a particular day out of 10 complains received

i) Engineer will resolve all complains.

ii) Engineer will be unable to resolve at least one complains.

b) Number of accidents in an industry in a day follows Poisson probability distribution. If variance of number of accidents is one, find probability that on certain day there will at the most one accident or there will be two accidents.

c) If wage of workers is normally distributed with mean 5500 and variance 625 then what percent of workers will have wage

i) more than 5470?

ii) less than 5530?

Area under normal curve from 0 to 1.2 is 0.3849.

*P.T.O.*

*Q3)* a) Fit Binomial probability distribution to the following data of number of defective components in 200 samples each of size 6. Hence find theoretical frequencies. **[6]**

| Number of defective components | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Number of samples | 35 | 52 | 48 | 35 | 15 | 9 | 6 |

b) Fit second degree parabola using method of least squares to the following data **[7]**

| x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| y | 3 | 4 | 6 | 6 | 9 | 10 | 10 | 12 | 12 |

## SECTION - II

*Q4)* Following table represent expected cost required (in min.) to five different groups for completing four different tasks. Determine assignment schedule in order to minimize the cost of completion of tasks. **[12]**

| | | Group | | | |
|---|---|---|---|---|---|
| | | A | B | C | D |
| Task | I | 350 | 280 | 260 | 310 |
| | II | 340 | 350 | 240 | 320 |
| | III | 290 | 380 | 350 | 330 |
| | IV | 270 | 270 | 330 | 320 |

*Q5)* a) Define scalar cardinality and fuzzy cardinality. **[3]**

b) Let $A(x)=\frac{0.3}{1}+\frac{0.9}{2}+\frac{0.7}{3}$ and $B(x)=\frac{0.4}{0}+\frac{0.5}{1}$. Also if $f : X \times X \rightarrow X$ is difined for all $x_1, x_2 \in X$ such that $f(x_1,x_2)=x_1 \times x_2$ then using extension principle find $f(A,B)$. **[5]**

c) Find $(\overline{A \cap B})$ using the fuzzy set defined by **[5]**

$$A(x)=\frac{x}{x^2+1},\quad x \in \{0,1,2,3,4\} \text{ and } B(x)=\frac{1}{x+1},\quad x \in \{0,1,2,3,4\}$$

*Q6)* Attempt any two [12]

a) Find α-cut and strong α-cut for α = 0.1, 0.3. for the fuzzy set defined by

$$C(x)=\frac{1}{x^2+1}, \quad x\in\{1,2,3,4\}$$

b) If $A(x)=\frac{0.2}{x_1}+\frac{0.5}{x_2}+\frac{0.7}{x_3}+\frac{0.3}{x_4}$ and $B(x)=\frac{0.3}{x_1}+\frac{0.4}{x_2}+\frac{0.6}{x_3}+\frac{0.3}{x_4}$

Find scalar cardinality of $A\cup B$ *and* $\overline{A\cup B}$

c) Find fuzzy number A + B using following fuzzy numbers

$$A(x)=0 \;\; x\le -2, x>4;\; A(x)=\frac{x+2}{3} \;\; -2\le x\le 1;\; A(x)=\frac{4-x}{3} \;\; 1<x\le 4$$

and

$$B(x)=0 \;\; x\le 4, x>10;\; B(x)=\frac{x-4}{3} \;\; 4<x\le 7;\; B(x)=\frac{10-x}{3} \;\; 7<x\le 10$$

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