Seat No.	

S.E. (Computer Science and Engg.) (Semester - III) (Revised) Examination, April - 2018
APPLIED MATHEMATICS (Theory)
Sub. Code : 63524

Day and Date : Tuesday, 24 - 4 - 2018 **Total Marks : 50**
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Use of calculator is allowed.**

SECTION-I

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

a) Considering following data find equation of regression to estimate total units produced when number of workers is known

Number of workers (X)	122	140	165	170	183	194	180
Total units produced (Y)	40	65	71	95	104	111	102

b) Find value of following integral using Simpson's 3/8th rule $\int_0^{\pi/4} x^2 \cos x\, dx$.

c) Determine root of the equation correct up to four decimal places using Newton-Raphson Method $\sin x + 2e^x = 0$.

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

a) If a worker has to repair on an average 2 machines out of 25 every day, what is the probability that

i) The worker will free on any day.

ii) Worker will have to repair at the most one machine.

b) Number of customers visiting the bank in one minute follows Poisson probability distribution average 2 customers per minute, find probability that in certain minute number of visitors will be more than 1 or less than 1.

c) Life of certain electronic component follows normal distribution. Average life of component is 550 days and variance is 25 days. What percent of components will work.

i) More than 540 days?

ii) Less than 560?

Area under normal curve from 0 to 2 is 0.4886.

Q3) a) Fit Poisson probability distribution to the following data to find theoretical frequencies. **[6]**

Number of defects in garments	0	1	2	3	4	5	6
Number of samples	35	52	48	25	13	5	2

b) Fit second degree parabola to following data: **[7]**

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

SECTION-II

Q4) 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. **[12]**

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

Q5) a) Define α - cut and strong α - cut. **[3]**

b) Let $A(x) = \frac{0.3}{1} + \frac{0.9}{2} + \frac{0.7}{3}$ and $B(x) = \frac{0.2}{-1} + \frac{0.4}{0} + \frac{0.5}{1}$. Also if $f: X \times X \to X$ is defined for all $x_1, x_2 \in X$ such that $f(x_1, x_2) = x_1 - x_2$ then using extension principle find $f(A, B)$. **[5]**

c) Find $\overline{(A \cup B)}$ using the fuzzy set defined by $A(x) = \frac{x}{x+1}$, $x \in \{0, 1, 2, 3\}$ and $B(x) = \frac{1}{x+1}$, $x \in \{0, 1, 2, 3, 4\}$. **[5]**

Q6) Attempt any two: **[12]**

a) Find α - cut and strong α - cut for $\alpha = 0.2, 0.4$, for the fuzzy set defined by $C(x) = \frac{x}{x+3}$, $x \in \{1, 2, 3, 4\}$.

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 $A \cup B$ and $\overline{A \cup B}$. Also find heights of $A \cup B$ and $\overline{A \cup B}$.

c) Find fuzzy cardinality of $A(x) = \frac{1}{1} + \frac{0.5}{2} + \frac{0.6}{3} + \frac{0.7}{4} + \frac{0.2}{5}$.

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