JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 2 EXAMINATION (October 2025)

B.Tech. - VIII Semester

COURSE CODE (CREDITS): 21B1WMA831 (3) **MAX. MARKS: 25**

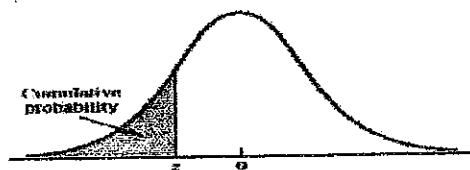COURSE NAME: SOFT COMUPTING & OPTIMIZATION TECHNIQUES

COURSE INSTRUCTORS: RKB* **MAX. TIME: 1 Hr 30 Mins**

Note: *All questions are compulsory. Use of scientific calculator is allowed. The candidate is allowed to make suitable numeric assumptions wherever required for solving problems*

Q.No	Question	CO	Marks
Q1	Let the universe space $X = \{1, 2, 3, ..., 15\}$ and fuzzy set A of X be, $\{(2, 0), (3, 0.1), (4, 0.4), (5, 0.5), (7, 0.2), (8, 0.6), (9, 0), (10, 0), (11, 0)\}$. Find the support and crossover point of A.	CO-2	2
Q2	Explain a neuro-fuzzy system with its merit and demerits. With the help of diagram show a five-rule neuro-fuzzy system.	CO-2	4
Q3	Illustrate the functioning of a fuzzy logic controller with a suitable real-life example.	CO-3	4
Q4	In view of material implication and extended propositional calculus, list out the set of fuzzy if-then rules.	CO-3	4
Q5	Let $A = 2 = $ "Approximately 2 = $\{0.6/1 + \frac{1}{2} + 0.8/3\}$ and $B = 6 = $ "Approximately 6 = $\{0.8/5 + 1/6 + 0.7/7\}$, then find the fuzzy addition and product of A and B.	CO-2	4
Q6	With the help of Block diagram of a fuzzy inference system or fuzzy controller system, discuss the types of fuzzy inference system.	CO-3	4
Q7	Using the graphical illustrations, show the behavioral pattern of trapezoidal membership and Gaussian membership function.	CO-2	3

***

Q5	Solve the LPP by graphical method $$Max\ Z = 5x_1 + 7x_2$$ s/t $x_1 + x_2 \leq 4$, $\ 3x_1 + 8x_2 \leq 24$, $\ 10x_1 + 7x_2 \leq 35$ $$x_1, x_2 \geq 0$$	4
Q6	Use simplex method to solve the LPP $$Max\ Z = 7x_1 + 5x_2$$ s/t $x_1 + 2x_2 \leq 6$, $\ 4x_1 + 3x_2 \leq 12$ $$x_1, x_2 \geq 0$$	5

(Standard) Normal Probability Table:

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
−2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
−1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
−1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
−1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
−1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
−1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
−0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
−0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451