BENNETT UNIVERSITY
THE TIMES GROUP

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Department/ School: SCSET

MID-TERM EXAMINATION, ODD SEMESTER 2024

COURSE CODE: CSE326 **MAX. DURATION: 1 HRS**

COURSE NAME: Soft Computing

PROGRAM: B.Tech (V Sem) **TOTAL MARKS: 15**

Mapping of Questions to Course and Program Outcomes				
Q.No.	A1	A2	B1	B2
CO	1	1	2	1
BTL	3	3	2	2

GENERAL INSTRUCTIONS: -

1. Do not write anything on the question paper except **name, enrolment number** and **department/school.**
2. Carrying mobile phones, smartwatches and any other non-permissible materials in the examination hall is an act of **UFM.**

COURSE INSTRUCTIONS:

a) **Attempt all questions**

SECTION A

A1) Peter wants to design a fuzzy logic-based control system. For this, he needs to map fuzzy inputs R and fuzzy rules S to an output fuzzy set using fuzzy relation. Given the relations below: Marks-5

$$R = \begin{bmatrix} 0.2 & 0.5 & 0.8 \\ 0.6 & 0.4 & 0.3 \end{bmatrix} \qquad S = \begin{bmatrix} 0.9 & 0.3 \\ 0.7 & 0.5 \\ 0.4 & 0.6 \end{bmatrix}$$

a) Compute the output using Max-Min composition.
b) Compute the output using Zadeh's max-min rule.

A2) Jeniffer uses a decision-making system for customer satisfaction to provide the following fuzzy output for service quality. The numerical values associated with each linguistic term are defined as: Marks-4

Poor = 2, Average = 4, Good = 7 and Excellent = 9

Service Quality ={(Poor,0.3); (Average,0.6); (Good,0.8); (Excellent,0.4)}

a) Apply the centroid method to ~~fuzzify~~ defuzzify the fuzzy set and provide a numerical rating for the service quality.
b) How would defuzzification influence the decision-making process in this scenario?

SECTION B

B1) a) Define Genetic Algorithm (GA). Explain its key components and how it is used to solve optimization problems. ~~Compute the output using Zadeh's max-min rule.~~ Marks-1.5

b) Draw and label the architecture of a Genetic Algorithm, highlighting the main stages involved in the process, such as initialization, selection, crossover, mutation, and evaluation. Marks-1.5

B2) Define defuzzification in the context of fuzzy logic systems. Explain why defuzzification is essential in the fuzzy inference process and different defuzzification methods. Marks-3