PARUL UNIVERSITY
FACULTY OF APPLIED SCIENCE
M.Sc., Winter 2018-19 Examination

Semester: 3	**Date: 01/11/2018**
Subject Code: 11206206	**Time: 10.30 am to 1.00 pm**
Subject Name: Fuzzy and Evolutionary Computing	**Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1. **Essay type/ Brief note (4x2) (Each of 04 marks)**   **(08)**
A)

   (a)Examples of Fuzzy Logic.
   (b) Explain classic sets and fuzzy subset.

Q.1. **Answer the following questions (Any two)**
B)

   (a) Short note/ Brief note (2x2)/ Schematically label the figures (2x2) (Each of 02 marks)   **(04)**
      1. Draw and explain Support.
      2. Draw and explain core and alpha cut on Fuzzy systems.
   (b) Different membership functions in Fuzzy systems.   **(04)**
   (c) Discuss three common operations in Fuzzy systems.   **(04)**

Q.2. **Answer the following questions.**
A)   (a) Short note/ Brief note (2x2)/ Fill in the blanks. (Each of 02 marks)   **(04)**
      1. What is an Evolutionary Computation?
      2. Discuss Role of   Genetic Algorithm for Evolutionary Computation.

   (b) Write the general scheme of an Evolutionary Algorithm in pseudo-code.   **(04)**

Q.2. **Answer the following questions (Any two)**
B) (a) Short note/ Multiple choice questions.   (Each of 01 marks)   **(03)**
     1.   Fuzzy graph---------------------------

  2. Draw the fuzzy graph.

$$\begin{array}{c} \\ a_1 \\ a_2 \\ a_3 \end{array} \begin{array}{ccc} b_1 & b_2 & b_3 \\ \left[\begin{array}{ccc} 0.5 & 1.0 & 0.0 \\ 0.0 & 0.0 & 0.5 \\ 1.0 & 1.0 & 0.0 \end{array} \right] \end{array}$$

  3. Advantage of fuzzy graph-----------------

  (b)   **(03)**

Let $X = \{x_1, x_2, , x_3\}$

is $R = \begin{bmatrix} 0.7 & 0.9 & 0.4 \\ 0.1 & 0.3 & 0.5 \\ 0.2 & 0.1 & 0 \end{bmatrix}$ a transitive relation?

  (c)   **(03)**

Prove that $R = \begin{vmatrix} 1 & 0.1 & 0.7 \\ 0.1 & 1 & 0.7 \\ 0.7 & 0.7 & 1 \end{vmatrix}$ is antisimilarity relation?

Q.3. Essay type/ Brief note (4x2) (Each of 04 marks) (08)
A)

(a) predict score using max-min composition.

Speed of bowling = {fast bowling, medium bowling, spin bowling} and

Y= condition on pitches= {good wicket, fair wicket, sporting wicket, green wicket, crumblin wicket, rough wicket}

Let R denotes the relationship between speed of bowling and condition on pitch and Q denotes the relationship between conditions on pitches and runs on the board.

$$R = \begin{array}{c} \\ fast \\ medium \\ spin \end{array} \begin{array}{cccccc} gd.w & f.w & s.w & gr.w & c.w & r.w \\ 0.6 & 0.5 & 0.4 & 0.1 & 0.9 & 0.5 \\ 0.8 & 0.6 & 0.9 & 0.2 & 0.1 & 0.6 \\ 0.7 & 0.8 & 0.6 & 0.7 & 0.1 & 0.2 \end{array}$$

and

$$Q = \begin{array}{c} gd.w \\ f.w \\ s.w \\ gr.w \\ c.w \\ r.w \end{array} \begin{array}{ccc} low.r & ave.r & hig.r \\ 0.4 & 0.8 & 0.7 \\ 0.3 & 0.8 & 0.8 \\ 0.2 & 0.7 & 0.8 \\ 0.8 & 0.6 & 0.4 \\ 0.7 & 0.5 & 0.4 \\ 0.9 & 0.4 & 0.2 \end{array}$$

(b) Refer above question solve max-product composition.

Q.3. Answer the following questions (Any two)
B) (a) Short note/ Brief note (2x2)/ Schematically label the figures (2x2) (Each of 02 marks) (04)
   1. Define cross-over and mutation.
   2. Define Fitness Function.
(b) What is the Need of Hybridization of Genetic Algorithm with Fuzzy Logic? (04)
(c) Write Real-World Applications of Genetic Algorithms. (04)

Q.4. Answer the following questions.
A)

(a) Short note/ Brief note (2x2)/ Fill in the blanks. (Each of 02 marks) (04)
   1. What is a uniform-cross over?
   2. What effect does each of these have on the evolution process ?Cross over or mutation?
(b) Given the following parents, P_1 and P_2, and the template T (04)

P_1	A	B	C	D	E	F	G	H	I	J
P_2	E	F	J	H	B	C	I	A	D	G
T	1	0	1	1	0	0	0	1	0	1

Show how the following crossover operators work i) uniform crossover ii) order-based crossover

Q.4. Answer the following questions (Any two)
B)

(a) Short note/ Multiple choice questions. (Each of 01 marks) (03)
   1. Assume the initial population was x={17, 21, 4 and 28}. Using one-point crossover, what is the probability of finding the optimal solution?
   2. . Assume the initial population was x={17, 21, 4 and 28}. Using multi-point crossover, what is the probability of finding the optimal solution?
   3.one-point vs multi-point cross over-------------------------------------
(b) Outline the similarities and differences between Genetic Algorithms and Evolutionary Strategies. (03)
(c) What are the Variation of parameters and techniques in genetic algorithm? (03)