

University of Central Punjab, Faculty of IT  
Final Term Examination- Spring 23  
Artificial Intelligence-Lab

Program: BSCS

Course Code: CSAL3241

Time Allowed: 90minutes

Total Marks: 80

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Instructions:

- Time to attempt the exam is 80 minutes. Last 10 minutes are for submission.
  - Understanding of a question is part of exam. Don't ask invigilator for any explanation.
  - Plagiarism will be penalized.
  - Name your solution as "<your roll number>\_mid\_<section>", zip and submit.
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**Task 01: (Genetic Algorithm)**

**(40)**

Find the minimum value of function

$$f(x) = -x^2 + 200x \quad [5]$$

- 1- Create Random population [5]
  - a. Represent problem using *chromosomes* built from 8 *genes* (8 bits)
  - b. Initial random population of size  $N = 8$
- 2- Implement Roulette Wheel [5]
- 3- Select pair of 1<sup>st</sup> and 3<sup>rd</sup>, and 2<sup>nd</sup> and 4<sup>th</sup> chromosome for mating (according to the criteria required). [5]
- 4- Implement 1-point crossover based on random value. [5]
- 5- Apply mutation by changing middle 2-bits in a chromosome [5]

Fitness criteria is 90% of -13999. Run at max three iteration if fitness criteria does not meet and display the chromosome with minimum value. [10]

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**Task 02: (KNN)**

**(40)**

About Dataset: This is a set of data created from imaginary data of water quality. What's inside is more than just rows and columns. Each column represents an ingredient amount in water.

Class attribute (Y) = {1 – Drinkable, 0 – Not Drinkable}

You are provided with a code to read and basic preprocessing of data.

You must implement the following:

- 1- You must remove the mentioned columns/features: X1, X11, X12, X20 [5]
- 2- Perform Train Test Split considering the classes must be equal [5]
- 3- Implement Distance i.e. Train implemented or built-in KNN model using training data. [5]
- 4- Perform Prediction using testing data at k =5 and k = 21. [10]
- 5- Calculate Accuracy. [5]
- 6- Now predict the following point with the model with better accuracy (k=5 OR k = 21) that is stored in a separate list named as p: [10]  
  
p= [0.1, 2.2, 0.03, 1.4, 0.05, 0.6, 0.07, 1.08, 1.9, 0.11, 8.012, 0.13, 0.014, 6.15, 0.016, 4.17, 0.018, 0.019]