Weightage : 5 **Artificial Intelligence** **Total Marks: 40**

Date: 17th June 2020

Topic: Genetic Algorithm **Teacher: Dr. Hafeez Ur Rehman**

Time Allowed: 30 minutes, however, extra 30 minutes are given for scanning/uploading.

Note: Upload your answers before 5 pm today.

Question 01:

Consider the 5-Queen problem that you would like to solve using Genetic Algorithm. The idea is to find a configuration in which no queen attacks the other. A random configuration of the problem is shown below:

Q1			Q4	
		Q3		Q5
	Q2			

In the above context answer the following IN YOUR OWN WORDS:

a. Make four chromosomes (NOT BINARY) of the above, justify your representation as well. **[5]**
b. What will be the objective function? How will you turn it into a maximization problem? Write objective function for maximization problem. **[5]**
c. What will be the maximum fitness value that your algorithm will try to achieve? And why? **[5]**
d. Start with a random population of four and list the steps involved using Genetic Algorithm in generating the first generation of states **such that the overall fitness improves**? **[20]**
e. Can you think an **alternative to mutation**? Also justify your choice. **[5]**