RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Faculty of Engineering and Technology			
Ramaiah University of Applied Sciences			
Department	Computer Science and Engineering	Programme	B. Tech. in CSE
Semester/Batch	7/2017		
Course Code	CSC401A	Course Title	Computational Intelligence
Course Leader	Dr. Vaishali R. Kulkarni/Prof. Prabhakar/Mr. Sagar U.		

Assignment-01

Reg.No.		Name of Student	

Sections		Marking Scheme	Max Marks	First Examiner Marks	Moderator
Part A	A.1.1	**Pitfalls in traditional AI**	02		
	A.1.2	**Synergism of CI tools**	03		
		Part-A Max Marks	5		
Part B.1	B.1.1	**Key ideas in hill-climbing approach**	04		
	B.1.2	**Key ideas in alternative CI approach**	04		
	B.1.3	**Python Program demonstration**	02		
		B.1 Max Marks	10		
Part B.2	B.2.1	**Discussion on genetic algorithm and benchmark functions**	04		
	B.2.2	**Python program showing the minimized values**	04		
	B.2.3	**Comparison with any other heuristic algorithm**	02		
		B.2 Max Marks	10		
		Total Assignment Marks	25		

Course Marks Tabulation				
Component-1 (B) Assignment	First Examiner	Remarks	Moderator	Remarks
A				
B.1				
B.2				
Marks (out of 25)				

Please note:

1. Documental evidence for all the components/parts of the assessment such as the reports, photographs, laboratory exam / tool tests are required to be attached to the assignment report in a proper order.
2. The First Examiner is required to mark the comments in RED ink and the Second Examiner's comments should be in GREEN ink.
3. The marks for all the questions of the assignment have to be written only in the **Component – CET B: Assignment** table.
4. If the variation between the marks awarded by the first examiner and the second examiner lies within +/- 3 marks, then the marks allotted by the first examiner is considered to be final. If the variation is more than +/- 3 marks, then both the examiners should resolve the issue in consultation with the Chairman BoE.

Assignment 1

Instructions to students:

1. The assignment consists of **3** questions: Part A-**1** Question, Part B-**4** Questions.
2. Maximum marks are **25**.
3. The assignment must be neatly word processed as per the prescribed format.
4. The maximum number of pages should be restricted to 1**0**.
5. Restrict your report for Part-A to 3 pages only.
6. Restrict your report for Part-B to a maximum of 7 pages.
7. The printed assignment must be submitted to the course leader.
8. **Submission Date: 28th Nov 2020**
9. **Submission after the due date is not permitted.**
10. **IMPORTANT**: It is essential that all the sources used in preparation of the assignment must be suitably referenced in the text.
11. Marks will be awarded only to the sections and subsections clearly indicated as per the problem statement/exercise/question

Preamble

The Computational Intelligence course aims to teach the concepts of computational intelligence, intelligent agents, and their applications. The principles of knowledge representation, search strategies, learning, reasoning, and planning are covered in detail. Application of principles of computational intelligence for machine learning, robotics and perception are discussed. Students are required to analyze a given scenario and apply the principles of computational intelligence to design & synthesize intelligent agents.

Part A   **(5 marks)**

Artificial Intelligence (AI) aims at emulating human intelligence so as to enable them to act and think like human beings. Conventional AI mostly involves methods now classified as machine learning, characterized by formalism and statistical analysis. Traditional AI was incompetent to meet the increasing demands of search, optimization and machine learning in information systems and industrial automation. Shortcomings became more pronounced with successive failures of the Japanese project Fifth Generation Computer Systems. The failure of classical AI opened up new avenues for non-conventional models of intelligence in real-world applications. Enormous successes have been achieved through the modelling of biological intelligence, resulting in so-called "intelligent systems". These gave rise to a new discipline called Computational Intelligence (CI). In this context, write a literature survey on the following topic.

The relationship shared by traditional AI and CI.

Your report should include:

    A.1.1 Pitfalls in traditional AI
    A.1.2 Synergism of CI tools

Part B   **(20 Marks)**

B.1   **(10 Marks)**

Hill climbing algorithm is an optimization algorithm used in the field of Artificial Intelligence. It is a heuristic method which optimizes only the neighbouring points. A heuristic method is one of those methods which does not guarantee the best optimal solution. This algorithm belongs to the local search family. Local search algorithms are used on complex optimization problems where it tries to find out a solution that maximizes the criteria among candidate solutions. A candidate solution is considered to be the set of all possible solutions in the entire functional region of a problem.

Discuss the limitations of the hill-climbing approach to n-dimensional optimization. Recommend an alternative CI approach. Justify that how the latter approach overcomes the limitations of the former. Your report should include:

A.1.1 Key ideas in hill-climbing approach
A.1.2 Key ideas in alternative CI approach
A.1.3 Python Program Demonstration of any test case using both approaches

B.2   **(10 Marks)**

Genetic Algorithms (GAs) model genetic evolution, where the characteristics of individuals are expressed using genotypes. The driving operators of a GA are selection (to model survival of the fittest) and recombination through crossover operator (to model reproduction). Global optimization refers to choosing the best values of independent variables in such a way that the value of a dependent variable is minimum (or maximum).

Combinatorial optimization consists of finding an optimal object from a finite set of objects, whereas Deterministic approaches to optimization include linear programming, integer programming, nonlinear programming, dynamic programming, etc. Apply GA for minimization of a Sphere benchmark function. Your report should include:

B.2.1 Discussion on genetic algorithm and benchmark functions

B.2.2 Python program showing the minimized values

B.2.3 Comparison with any other heuristic algorithm