

Faculty of Engineering and Technology			
Ramaiah University of Applied Sciences			
Department	Computer Science and Engineering	Programme	B. Tech. in CSE- Summer
Semester/Batch	7/2018		
Course Code	19CSE422A	Course Title	Computational Intelligence
Course Leader	Dr. Vaishali R. Kulkarni and Dr. Monika Ravishankar		

Assignment-2			
Reg.No.		Name of Student	

Sections	Marking Scheme		Marks		
			Max Marks	First Examiner Marks	Moderator
Part A	Part A				
	A1	Review of deterministic and metaheuristic algorithms	05		
	A2	Case studies	03		
	A3	Conclusion	02		
		Part-A Max Marks	10		
Part B					
	B.1	Design candidate solutions and fitness and algorithm	07		
	B.2	Discuss the graph model	03		
	B.3	Software Simulation with sample input and output	05		
		B.1 Max Marks	15		
Total Assignment Marks			25		

Course Marks Tabulation				
Component-1 (B) Assignment	First Examiner	Remarks	Moderator	Remarks
A				
B				
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  $\pm 3$  marks, then the marks allotted by the first examiner is considered to be final. If the variation is more than  $\pm 3$  marks, then both the examiners should resolve the issue in consultation with the Chairman BoE.

### Assignment

#### **Instructions to students:**

1. The assignment consists of **2** questions: Part A and Part B.
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 **10**.
5. The printed assignment must be submitted to the course leader.
6. **Submission Date: 2<sup>nd</sup> Dec 2021**
7. **Submission after the due date is not permitted.**
8. **IMPORTANT:** It is essential that all the sources used in preparation of the assignment must be suitably referenced in the text.
9. 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**

**(10 Marks)**

Multidimensional optimization is an important aspect of an engineer's life. The success of engineering and management processes depends on the extent of optimization achieved. There are analytical deterministic tools which can handle the problem of multidimensional optimization. These include integer programming, linear programming, dynamic programming and other methods. Unfortunately, these suffer from the curse of dimensionality. Alternatively, researchers have developed a wide range of bio-inspired, computationally intelligent algorithms to tackle this problem. These include metaheuristic algorithms such as Genetic Algorithm (GA), Particle Swarm Optimization algorithm (PSO), ant colony optimization (ACO) etc. These algorithms have gained popularity due to their resource-efficiency and their ability to get near-optimal solutions in acceptable time frames. Therefore, there is a neck-to-neck competition between various intelligent optimization algorithms.

In this part of the assignment, the student has to debate on the topic **“Computationally intelligent optimization algorithms are not as dependable as deterministic algorithms because they produce different results in every trial run.”**

**The report should emphasize on the following:**

1. A critical review of deterministic and computationally intelligent metaheuristic optimization algorithms
2. Case studies using deterministic and metaheuristic algorithms
3. Conclusion

**Part B**

**(15 Marks)**

Ant Colony Optimization (ACO) provides solution to the problem of finding the shortest path between two nodes on a graph  $G = (V, E)$ .  $V$  is the set of nodes (vertices) and  $E$  is a matrix representing the connections (edges) between nodes. In this regard, the student must implement a traveling salesman problem to minimize the total distance. The approach should be linked with path representation, which is the most natural way to represent a legal tour. The computational results must be reported with some traditional path representation methods.

**Your report should include:**

1. Design solution candidates and fitness to meet the requirements of the problem
3. Use any graph model to illustrate the results
4. Implement the algorithm in Matlab, Python or any other language/environment