Total No. of Questions : 8]

SEAT No. :

PD-4854

[Total No. of Pages : 2

[6404]-385

B.E. (Artificial Intelligence and Data Science)

COMPUTATIONAL INTELLIGENCE

(417530) (2019 Pattern) (Semester - VIII)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidate:

1) ***Answer four questions from the following.***
2) ***Draw neat labeled diagrams wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of non programmable electronic calculator is permitted.***
5) ***Assume Suitable/Standard data if necessary.***

Q1) a) Define Swarm Intelligence and Explain Ant Colony Optimization algorithm. **[8]**

b) Write short note on: **[10]**

i) Evolutionary Computation versus Classical Optimization

ii) Ant Colony Optimization algorithm

OR

Q2) a) Write short note on: **[10]**

i) Tournament selection method

ii) Constraint Handling

b) What are genetic operators and what is their role in evolutionary algorithms? **[8]**

Q3) a) Explain following Terminologies of Genetic Algorithm: **[10]**

a) Search space

b) Genes

c) Allele

d) Trait

e) Genotype and Phenotype

P.T.O.

b) Write short note on : **[7]**

a) Selection operator in Genetic Algorithm.

b) Stopping conditions used in genetic algorithms

OR

Q4) a) What are types of mutation and cross over techniques? Explain in brief. **[6]**

b) Explain Messy Genetic Algorithms. **[6]**

c) Explain - Binary Representations, Floating Point Representations used in Genetic Algorithms. **[5]**

Q5) a) Explain following Word embedding Techniques: **[8]**

i) Bag of Words

ii) TF-IDF

iii) Word2Vec

iv) GloVe

b) Explain the process of Neural Style Transfer and discuss its applications. **[5]**

c) Discuss the significance of pre-trained NLP BERT models and provide examples of their applications. **[5]**

OR

Q6) a) Describe the architecture of a Neural Machine Translation (NMT) model and discuss the role of Seq2Seq in NMT. **[9]**

b) Define BLEU Score and BERT Score as metrics for evaluating machine translation. Compare traditional metrics with neural metrics in machine translation evaluation. **[9]**

Q7) a) Describe the Network Theory Model in artificial immune systems. **[6]**

b) Describe the working of the Artificial Immune System Algorithm. **[5]**

c) Explain the concept of danger theory in the context of artificial immune systems. **[6]**

OR

Q8) a) Explain how the Clonal Selection Theory Model contributes to the development of artificial immune systems? **[6]**

b) Explain the concept of the natural immune system. Compare it with artificial immune models. **[5]**

c) Discuss the role of dendritic cells in the artificial imnrnne system. How are dendritic cell-based models utilized in problem-solving and optimization tasks? **[6]**