Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Scheme and detailed Syllabus (DJ19)

of

Honors Degree Program

in

Intelligent Computing

Revision: 1 (2022)

With effect from the Academic Year: 2022-2023

Scheme for Honors in Intelligent Computing: Department of Computer Engineering
(Academic Year 2022-2023)

Sr.	Course Code	Course	Teaching Scheme (hrs.)				Continuous Assessment (A) (marks)			Semester End Assessment (B) (marks)					(A+B)	Total Credits
			Th	P	T	Credits	Th	T/W	Total CA (A)	Th / Cb	O	P	O & P	Total SEA (B)		
Sem V																
1	DJ19CEHN1C1	Nature Inspired Computing	4	--	--	4	25	--	25	75	--	--	--	75	100	**4**
Sem VI																
2	DJ19CEHN1C2	Ubiquitous Computing	4	--	--	4	25	--	25	75	--	--	--	75	100	**4**
3	DJ19CEHN1L1	Ubiquitous Computing Laboratory	--	2	--	1	--	25	25	--	--	--	25	25	50	**1**
Sem VII																
4	DJ19CEHN1C3	Bayesian Computing	4	--	--	4	25	--	25	75	--	--	--	75	100	**4**
5	DJ19CEHN1L2	Bayesian Computing Laboratory	--	2	--	1	--	25	25	--	--	--	25	25	50	**1**
Sem VIII																
6	DJ19CEHN1C4	Intelligent Security System	4	--	--	4	25	--	25	75	--	--	--	75	100	**4**
		Total	**16**	**4**	**0**	**18**	**100**	**50**	**150**	**300**	**0**	**0**	**50**	**350**	**500**	**18**

Scheme for Honors in Intelligent Computing: Department of Computer Engineering
(Academic Year 2022-2023)
Assessment Scheme

Continuous Assessment (A):

Course	Assessment Tools	Marks	Time (hrs.)
Theory	One Term test (based on 40 % syllabus)	25 each (Avg.25)	1
	Second Term test (next 40 % syllabus) / presentation / assignment / course project / group discussion / any other.		as applicable
Audit course	Performance in the assignments / quiz / power point presentation / poster presentation / group project / any other tool.	--	
Laboratory	Performance in the laboratory and documentation.	25	
Tutorial	Performance in each tutorial & / assignment.	25	
Laboratory &Tutorial	Performance in the laboratory and tutorial.	25	

The final certification and acceptance of term work will be subject to satisfactory performance upon fulfilling minimum passing criteria in the term work / completion of audit course.

Semester End Assessment (B):

Course	Assessment Tools	Marks	Time (hrs.)
Theory / * Computer based	Written paper based on the entire syllabus.	75	3
	* Computer based assessment in the college premises.		
Oral	Questions based on the entire syllabus.	25	as applicable
Practical	Performance of the practical assigned during the examination and the output / results obtained.	25	2
Oral & Practical	Project based courses - Performance of the practical assigned during the examination and the output / results obtained. Based on the practical performed during the examination and on the entire syllabus.	as per the scheme	2

Prepared by Checked by Department Coordinator Principal

Honors in Intelligent Computing **Semester: V**

Program: Computer Engineering

Course: Nature Inspired Computing (DJ19CEHN1C1)

Pre-requisite: --

1. Algorithms

Objectives:

1. To learn how natural and biological systems influence computational field
2. To understand the strengths and weaknesses of nature-inspired algorithms
3. To learn the functionalities of various Bio-inspired optimization algorithms

Outcomes: On completion of the course, the learner will be able to:

1. Understand the natural phenomena that inspire the algorithms
2. Apply nature-inspired algorithms to optimization
3. Select the appropriate strategy or optimal solution based on bio-inspired algorithms

Bayesian Computing (DJ19CEHN1C1**)**		
Unit	**Description**	**Duration**
1	**Introduction to Natural Computing** From nature to natural computing, sample idea, Philosophy of natural computing, Natural computing approaches, Natural Phenomena, Models, and Metaphors, From Nature to Computing and Back Again, General Concepts – Individuals, Entities, Agents; Parallelism and Distributivity; Interactivity; Adaptation; Feedback; Self-Organization; Bottom-Up Vs Top-Down	08
2	**Artificial Neural Networks** Biological Nervous Systems, Artificial Neural Networks, Neuron Models, Architectures, Supervised learning: Perceptron algorithm, Back Propagation Algorithm, Unsupervised learning: Self-organizing maps, ART, Reinforcement learning	09
3	**Evolutionary Computing – Genetic Algorithms** Basic Principles of Genetics, Fitness Function; Selection: Selective Pressure, Random Selection, Proportional Selection, Tournament Selection, Rank-Based Selection, Boltzmann	09

	Selection, Elitism; Reproduction Operators: Crossover operator, Mutation; Application: Pattern Recognition, Numerical Function Optimization.	
4	**Swarm Intelligence**: Particle Swarm Optimization: Basic Particle Swarm Optimization: Global Best PSO, Local Best PSO, Velocity Components; Basic PSO parameters, Single Solution Particle Swarm Optimization: Guaranteed Convergence PSO, Social-Based Particle Swarm Optimization, Hybrid Algorithms, Sub-Swarm Based PSO, Multi-Start PSO Algorithms, Repelling Methods, Binary PSO; Application	09
5	**Ant Algorithm**: Simple Ant Colony Optimization, Ant Colony Optimization Meta-Heuristic, Cemetery Organization and Brood Care, Division of Labor, Application: Travelling Salesman Problem	08
6	**Artificial Immune Models:** Natural Immune System: Classical view, Antibodies and Antigens, White Cells, Immunity types, Network Theory, Danger Theory; Artificial Immune Models: Artificial Immune system algorithm, classical view models, Clonal Selection Theory: CLONALG; Network Theory Models; Danger Theory Models; Application: Intrusion Detection	09
	Total	**52**

Books Recommended:

Text Books:

1. L. N. de Castro, "Fundamentals of Natural Computing: Basic Concepts, Algorithms and Applications", 2006, CRC Press, ISBN-13: 978-1584886433
2. Andries P. Engelbrecht, "Computational Intelligence an Introduction", Wiley, 2nd Edition
3. Tom Mitchell, Machine Learning, McGraw Hill, 1997, 0-07-042807-7

Reference Books:

1. D. Floreano and C. Mattiussi, "Bio-Inspired Artificial Intelligence: Theories, Methods, and Technologies", 2008, MIT Press, ISBN-13: 978-0262062718
2. Russell C. Eberhart, Yuhui Shi, James Kennedy, "Swarm Intelligence: The Morgan Kaufmann Series in Evolutionary Computation", 1st Edition, ISBN-13: 978- 1558605954

3. Sam Jones (Editor), “Bio Inspired Computing-Recent Innovations and Applications”, Clanrye International; 2nd edition (2 January 2015), ISBN-10: 1632400812
4. Yang Xiao (Editor), “Bio-Inspired Computing and Networking”, CRC Press,

Prepared by Checked by Head of the Department Principal