MANIPAL INSTITUTE OF TECHNOLOGY

Manipal University, Manipal
Karnataka -576104

COURSE PLAN

Department	:	Information and Communication Technology
Course Name & code	:	Natural Computing [ICT 4011]
Semester & branch	:	VII SEM , Computer & Communication Engineering
Name of the faculty	:	Ms. AKSHATA K. NAIK
No of contact hours/week:		3

ASSESSMENT PLAN:

1. **In Semester Assessments - 50 %**
   - Written tests : 2 Tests of 15 Marks Each (MAX 30 Marks)
   - Assignment/Quiz/ Seminar : 3 Assignments of 6 + 6 + 8 = 20Marks (MAX 20 Marks)

2. **End Semester Examination - 50 %**
   - Written examination of 3 hours duration (Max. Marks: 50)

Portions for Assignment/Quiz/Seminar etc....	
Sl. no.	**Topics/Lessons**
1	L01 - L15
2	L16 - L28
3	L01 - L36
4	
5	
Portions for Sessional Test	
Test no.	**Topics/Lessons**
1	L01 - L19
2	L20 - L31

Course Outcomes (COs)

At the end of this course, the student should be able to:

		No. of Contact Hours	Program Outcomes (POs) addressed
CO1:	Describe the formal models of computation, such as Finite Automata, Push Down Automata, and Turing Machines	06	
CO2:	Understand the concepts and complexity behind Natural Computing	13	
CO3:	Apply the concepts of natural processes for DNA, Peptide, Membrane and Chemical Computation	17	
CO4:			
CO5:			
CO6:			

Course Plan

L. No.	Topics	Course Outcome Addressed
L0	Introduction to the course	
L1	Deterministic Finite Automata	CO1
L2	Non-Deterministic Finite Automata	CO1
L3	Push Down Automata	CO1
L4	Linear Bounded Automata	CO1
L5	Turing Machine	CO1
L6	Turing Machine	CO1
L7	Basic Notations of Biochemistry & Molecular Biology	CO2
L8	Introduction to DNA Computing	CO2
L9	DNA Encoding Scheme	CO2
L 10	Comparison of DNA Computing & Conventional Computing	CO2
L11	Application of DNA Computing	CO2
L12	DNA Computation Model : Lipton Model	CO3

L. No.	Topics	Course Outcome Addressed
L 13	DNA Computation Model : Sticker Model	CO3
L 14	DNA Computation Model : DNA Splicing Model	CO3
L 15	DNA Computation Model : Hairpin Model	CO3
L16	DNA Computation Model : DNA Self-Assembly Model	CO3
L 17	Experiments in Self Assembly	CO2
L18	Error Corrections in Self Assembly	CO2
L19	DNA Origami (2D & 3D)	CO2
L 20	Quantum Turing Machine & Quantum Languages	CO2
L 21	Computation by circuits	CO2
L 22	Thermodynamics of Computation	CO2
L23	Algorithmic Botany	CO3
L 24	Cellular Automata	CO3
L25	Algorithms for Natural Security	CO2
L 26	Algorithms for Natural Cryptography	CO3
L27	Bacterial Computers & Data Storage	CO3
L 28	Introduction to Peptide Computing	CO2
L29	Peptide Computing Models	CO3
L 30	Solving Problems by Peptide Computers	CO3
L31	Membrane Computing	CO3
L32	Membrane Computing	CO3
L33	Membrane Computing	CO3
L 34	Chemical Computing	CO3
L 35	Chemical Computing	CO3
L 36	Chemical Computing	CO3

L. No.	Topics	Course Outcome Addressed

References:

1. Leandro Nunes de Castro, Fundamentals of Natural Computing: Basic Concepts,Algorithms and Apllications, CRC Press, USA, 2006
2. Zoya Ignatova, Israel Martnez-Prez, and Karl-Heinz Zimmermann, DNA Computing Models (1 ed.),Springer, 2008
3. Martyn Amos, Theoretical and Experimental DNA Computation,Springer, 2005
4. John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation,Pearson Asia,2001
5.
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Submitted by: Ms. Akshata K. Naik

(Signature of the faculty)

Date: 27/07/2017

Approved by: Dr. BALACHANDRA

27/7/17

Dr. Balachandra
Professor & Head
Dept. of Information & Communication Technology
M.I.T., Manipal - 576 104

(Signature of HOD)

Date: 27/7/17

FACULTY MEMBERS TEACHING THE COURSE (IF MULTIPLE SECTIONS EXIST):

FACULTY	SECTION	FACULTY	SECTION
Ms. Akshata K. Naik	CCE A, CCE B		

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