J. C. BOSE UNIVERSITY OF SCIENCE AND TECHNOLOGY, YMCA, FARIDABAD
B.Tech. (Computer Engineering Specialization in Data Science)

Scheme of Studies/Examination

Semester- 5

S. No	Category	Course Code	Course Title	Hours per week			Credits	Marks for Sessional	Marks for End Term Examination	Total
				L	T	P				
1	PCC	PCC-DS-501	Principles of Artificial Intelligence	3	0	0	3	25	75	100
2	PCC	PCC-CS-404	Design and Analysis of Algorithms	3	0	0	3	25	75	100
3	PCC	PCC-DS-502	Soft Computing Principles	3	0	0	3	25	75	100
4	PCC	PCC-CS-403	Operating System	3	0	0	3	25	75	100
5	BSC	BSC-01	Biology	2	1	0	3	25	75	100
6	PCC	PCC-DS-503	Computer Architecture	3	0	0	3	25	75	100
7	MC	MC-01	Constitution of India	2	0	0	0	25	75	100
8	Capstone Project	PROJ-CS-501	Project-III	0	0	4	2	25	75	100
9	PCC	PCC-DS-504	Soft Computing Principles lab	0	0	4	2	15	35	50
10	PCC	PCC-CS-406	Operating System Lab	0	0	4	2	15	35	50
11	VAC	H-102	Universal Human Values 2: Understanding Harmony	0	0	2	0	15	35	50
Total				**19**	**1**	**14**	**24**	**245**	**705**	**950**

Note:

(a) Theory exams will be of 03 hours duration and Practical exams will be of 02 hours duration

(b) Additional 3 credits per year to be earned through MOOCs

PCC-DS-501
SUBJECT NAME: ARTIFICIAL INTELLIGENCE
CREDITS: 3

SESSIONAL:	**25**	**L**	**T**	**P**
THEORY EXAM:	**75**	**3**	**0**	**0**
TOTAL:	**100**			

Course objectives:

1. To understand achievements of AI and the theory underlying those achievements and review "conventional" searching methods including breadth-first, depth-first, best-first search any many more heuristic techniques. Heuristic functions and their effect on performance of search algorithms.
2. To represent the knowledge in different forms in AI.
3. To understand and apply reasoning in Different areas of AI.
4. To learn the different methods of Planning and learning, Neural network and genetic algorithms. Architecture of Rule based and Non Rule based expert system

Course Contents:

Unit-I **BASICS OF AI:** Definition of AI, History, Domains AI, Proposing and evaluating AI applications, AI problems & State space, Some examples problems representations like Travelling Salespersons, Syntax analysis Problem, Basic issues to solve AI problems, Underlying assumptions, AI techniques, Level of model, Criteria for success

Unit II **SEARCH AND PLANNING**: Control strategies, Uninformed Search (DFS, BFS, IDDFS), Heuristic Search Techniques**:** Generate & Test: Hill Climbing(simple & steepest), Best first search/A*, Problem Reduction/AO*, Constraint satisfaction, MEA, Simulated annealing, Constraint Satisfaction Problems

Unit-III **KNOWLEDGE REPRESENTATION TECHNIQUES AND REASONING:** Syntax & Semantic for Propositional logic, Syntax & Semantic for Predicate Logic, Problems with FOPL, Resolution of proposition logic, Semantic nets, Frames, Conceptual Graphs, Scripts, Baye‟sTheorm, Demster Shafer Theory of Evidence, Fuzzy Reasoning, Temporal Reasoning

Unit-IV **PLANNING & LEARNING:** Planning, Planning in Situational calculus, Representation for planning, Partial order planning, Partial order planning algorithm, Learning by Examples, Learning by Analogy, Explanation based learning, Neural nets, Genetics algorithms, Architecture of expert system(Rule Based and Non-Rule Based)

Course outcomes:

After undergoing the course, Students will be able to:

a. Understand the importance, the basic concepts and the Applications of AI and Apply various search techniques used for Intelligent systems
b. Efficiently represent the various knowledge representation schemes used for intelligent systems.
c. Apply Reasoning in different areas of AI
d. Apply Soft computing techniques (like ANN and GA) to solve the AI problem. Also understand the phases and the architecture of various advanced system like NLP based system and Expert System.

Reference Books:

1. David W. Rolston: Principles of Artificial Intelligence and Expert System Development, McGraw Hill Book Company.
2. Artificial Intelligence by Elain Rich & Kevin Knight, TMH
3. Principals of AI(Nills .J.Nilsson)
4. DAN. W.Petterson
5. AI by Russel and Norvig, Pearson education
6. Petrick Henry Winston(AI)

CODE: PCC-CS-404
SUBJECT NAME: Design and Analysis of Algorithms

CREDITS: 3

SESSIONAL:	**25**	**L**	**T**	**P**
THEORY EXAM:	**75**	**3**	**0**	**0**
TOTAL:	**100**			

Course Objectives:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

Course Contents:

MODULE-1: INTRODUCTION

Characteristics of algorithm, Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters‟ theorem.

MODULE-2: FUNDAMENTAL ALGORITHMIC STRATEGIES

Brute-Force, Greedy, Dynamic Programming, Branch and-Bound and backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, Bin Packing, Knapsack, Job sequencing with deadline, Optimal Binary Search tree, N-Queen problem, Hamiltonian Cycle, TSP, Heuristics – characteristics and their application domains.

MODULE-3: GRAPH AND TREE TRAVERSAL ALGORITHMS

Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

MODULE-4: TRACTABLE AND INTRACTABLE PROBLEMS

Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard, Cook's theorem, Standard NP-complete problems and Reduction techniques.

MODULE-5: ADVANCED TOPICS

Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE

Course Outcomes:

1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
2. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
4. Describe the dynamic-programming paradigm and explain when an algorithmic design

situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.

Reference Books :

1. Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, "*Introduction to Algorithms",* MIT Press/McGraw-Hill; 3rd edition, [ISBN: 978-0262533058], 2009.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "*Fundamentals of Algorithms",* Universities Press; 2nd edition [ISBN:978-8173716126],2008.
3. Jon Kleinberg and ÉvaTardos, "*Algorithm Design",* Pearson Publisher; 1st edition [ISBN:978-0321295354],2012.
4. Michael T Goodrich and Roberto Tamassia, "*Fundamentals of Algorithms"* Wiley Press; 1st edition [ISBN:978-8126509867],2006.

CODE: PCC-DS-502
SUBJECT NAME: SOFT COMPUTING
CREDITS: 3

		L	T	P
SESSIONAL:	**25**			
THEORY EXAM:	**75**	**3**	**0**	**0**
TOTAL:	**100**			

Course Objectives

1. Basic techniques related to Soft Computing and their roles in building intelligent machines
2. How to identify and select the suitable soft computing technology for solving the real world problem
3. How to design the suitable soft computing based framework for solving the real world problem
4. How to implement soft computing based solutions for real-world problems.

Unit I

Introduction to Soft Computing, Requirement of Soft computing, Soft computing Vs Hard Computing, Major domains covered under Soft Computing

Unit II

Biological neural network, Artificial Neural Network, Learning rules and various activation functions, Single layer Perceptrons , AND OR and NOT type classifiers, XOR problem, Back Propagation networks, Architecture of Backpropagation(BP) Networks, Backpropagation Learning, Gradient Descent Method, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map.

Unit III

Fuzzy Systems: Fuzzy Set theory, Fuzzy versus Crisp set, s-norm, t-norm, complement norm, aggregation norms, concept of fuzzy numbers, Fuzzification, Minmax Composition, Defuzzification Method, Fuzzy Logic, Fuzzy Rule based systems, Fuzzy Decision Making, Fuzzy Control Systems. K means clustering, fuzzy c means clustering.

UNIT IV

Genetic Algorithm: History of Genetic Algorithms (GA), Working Principle, Various Encoding methods, Fitness function, GA Operators- Reproduction, Crossover, Mutation, Convergence of GA, Bit wise operation in GA, Multi-level Optimization. Solving Knapsack and Travelling Salesman Problem using GA.

Course Outcomes

1. Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems
2. Apply Genetic algorithms in solving combinatorial optimization problems.
3. Apply Neural networks in classification, regression, clustering and other problems related to inductive learning

Reference Books:

1. Fuzzy Sets and Fuzzy Logic: Theory and Applications, George J Klir and Bo Yuan, PHI
2. Neural Networks, A Classroom Approach, Satish Kumar, Tata McGraw Hill
3. Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, S.Rajasekaran, G. A. Vijayalakshami, PHI.
4. Genetic Algorithms: Search and Optimization, E. Goldberg.

CODE: PCC-CS-403
SUBJECT NAME: OPERATING SYSTEM
CREDITS: 3

SESSIONAL:	**25**	**L**	**T**	**P**
THEORY EXAM:	**75**	**3**	**0**	**0**
TOTAL:	**100**			

Course Objectives:

1. To understand evolution and types of OS and to understand the structure, components and functions of OS.
2. To learn about Processes, threads and various Scheduling policies.
3. To understand process concurrency and synchronization.
4. To understand the principles of concurrency and Deadlocks.
5. To understand various memory management schemes.
6. To understand virtual memory management, Disk management, I/O management and File systems

Course Contents:

MODULE-1: Introduction: Concept of Operating Systems, Generations of Operating systems,

Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems and Hybrid architecture.

MODULE-2: Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching, Concept of multithreads.

Process Scheduling: Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and non-pre-emptive, FCFS, SJF, RR, Multilevel.

MODULE-3: Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware solution, Strict Alternation, Peterson's Solution, Semaphores. Classical IPC Problems: The Producer/Consumer Problem, Reader's & Writer Problem etc.

MODULE-4: Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock

MODULE-5: Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation Fixed and variable partition Internal and External fragmentation and Compaction; Paging: Principle of operation Page allocation Hardware support for paging, Protection and sharing, Disadvantages of paging, segmentation.

Virtual Memory: Basics of Virtual Memory, Locality of reference, Page fault, Working Set, Dirty page/Dirty bit Demand paging, Page Replacement algorithms: Optimal, First in First out (FIFO) and Least Recently used (LRU).

MODULE-6: I/O Hardware: I/O devices, Device controllers, Direct memory access, Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms.

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation.

Course Outcomes:

After the completion of the course, the students will be able to:

1. Learn the basic concepts of operating system, its various types and architecture
2. Learn and implement process management issues including process life cycle, scheduling, synchronization and deadlocks
3. Learn and implement memory management issues including memory partitioning, memory allocation and virtual memory concept
4. Learn and implement files systems and I/O systems including file management and disk management

Reference Books:

1. Abraham Silberschatz, Peter Galvin, Greg Gagne, “Operating System Concepts Essentials”, 9th Edition, Wiley Asia Student Edition.
2. Naresh Chauhan, "Principles of Operating Systems,", Oxford University Press India, 2014.
3. William Stallings, “Operating Systems: Internals and Design Principles”, 5th Edition, Prentice Hall of India

CODE: BSC-01

SUBJECT NAME: BIOLOGY
CREDITS: 3

SESSIONAL:	**25**	**L**	**T**	**P**
THEORY EXAM:	**75**	**3**	**0**	**0**
TOTAL:	**100**			

Course Objectives:

At the end of this course, students will be able to understand:

1) Biology is an important scientific discipline as Mathematics, Physics and Chemistry.
2) "Genetics" is to Biology what Newton‟s Laws are to physical sciences.
3) All forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine
4) Without catalysis, life would not have exist on earth .
5) Molecular basis of coding and decoding (genetic information) is universal
6) Fundamental principles of chemical and physical energy transactions are the same in physical/chemical and biological world

Course Contents:

MODULE 1: INTRODUCTION

Purpose: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry. Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observationof Robert Brown and Julius Mayor. These examples will highlight the fundamental importance of observations in any scientific inquiry.

MODULE 2: CLASSIFICATION

Purpose: To convey that classification per se is not what biology is all about. The underlying criterion, such as morphological, biochemical or ecological be highlighted. Hierarchy of life forms at phenomenological level. A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multicellular (b)ultrastructure-prokaryotes or eucaryotes. (c) energy and Carbon utilisation -Autotrophs,heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A.Thaliana, M. Musculus.

MODULE 3: Genetics

Purpose: To convey that "Genetics is to biology what Newton‟s laws are to Physical Sciences" Mendel‟s laws, Concept of segregation and independent assortment. Concept of allele. Genemapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics.Emphasis to be give not to the mechanics of cell division nor the phases but how genetic

material passes from parent to offspring. Concepts of recessiveness and dominance. Concept of

Mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using human genetics.

MODULE 4: BIOMOLECULES

Purpose: To convey that all forms of life has the same building blocks and yet them anifestations are as diverse as one can imagine Molecules of life. In this context discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.

MODULE 5: ENZYMES

Purpose: To convey that without catalysis life would not have existed on earth.Enzymology: How to monitor enzyme catalysed reactions. How does an enzyme catalyse reactions? Enzyme classification. Mechanism of enzyme action. Discuss at least two examples.Enzyme kinetics and kinetic parameters. Why should we know these parameters to understandbiology? RNA catalysis.

MODULE 6: INFORMATION TRANSFER

Purpose: The molecular basis of coding and decoding genetic information is universal Molecular basis of information transfer. DNA as a genetic material. Hierarchy of DNA structure from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Define gene in terms of complementation and recombination.

MODULE 7: MACROMOLECULAR ANALYSIS

Purpose: How to analyse biological processes at the reductionist level Proteins- structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.

MODULE 8: METABOLISM

Purpose: The fundamental principles of energy transactions are the same in physical andbiological world.Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergoinc reactions. Concept of Keq and its relation to standard free energy. Spontaneity. ATP as an energy currency. This should include the breakdown of glucose to CO2 +H2O (Glycolysis and Krebs cycle) and synthesis of glucose from CO2 and H2O (Photosynthesis).Energy yielding and energy consuming reactions. Concept of Energy Charge.

MODULE 9: MICROBIOLOGY

Concept of single celled organisms. Concept of species and strains. Identification andclassification of microorganisms. Microscopy. Ecological aspects of single celled organisms.

Sterilization and media compositions. Growth kinetics.

Course Outcomes:

At the end of this course, students are able to:

1) Classify enzymes and distinguish between different mechanisms of enzyme action.
2) Identify DNA as genetic material in the molecular basis if information transfer.
3) Analyse biological processes at the reductionist level.
4) Apply the thermodynamic principles to biological systems.
5) Identify and classify microorganisms.

Reference Books:

1. "Biology: A global approach" Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M,L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2. "Outlines of Biochemistry" , Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H.John Wiley and Sons
3. "Principles of Biochemistry (V Edition)", By Nelson, D. L.; and Cox, M. M.W.H.Freeman and Company
4. "Molecular Genetics (Second edition)", Stent, G. S.; and Calender, R. W.H. Freemanand company, Distributed by Satish Kumar Jain for CBS Publisher
5. "Microbiology" , Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C.Brown Publishers

CODE: PCC-DS-503

SUBJECT NAME: COMPUTER ARCHITECTURE
CREDITS: 3

SESSIONAL:	**25**	**L**	**T**	**P**
THEORY EXAM:	**75**	**3**	**0**	**0**
TOTAL:	**100**			

Course Objectives

1. To discuss the basic concepts of Computer Architecture and organization.
2. To give a clear view of how computer systems work.
3. To familiarize the students with concepts of parallel and pipelined implementations.
4. To introduce them to the state of art in this field

Course Contents:

Unit-I

INTRODUCTION AND GENERAL SYSTEM ARCHITECTURE:

CPU, memory, input-output subsystems, control unit. stored program control concept, Flynn‟s classification of computers (SISD, MISD, MIMD)

Register Transfer Language (concept of Register Transfers, Performing of arithmetic or logical operations, Fetching a word from memory, storing a word in memory), Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Register Transfer Operations: Arithmetic, Logical and Shift micro operation, : Data Representation: Fixed Point, Floating Point, (IEEE standard for Floating point numbers)

Unit-II

CONTROL DESIGN (Hardwired, Microprogrammed):

Hardwired Control Unit - computer instructions‟ Execution of a complete instruction (FetchDecode-Execute cycle), type of instructions, memory reference, register reference, I/O reference, design of Hardwired CU.

Micro Programmed Control Unit : Microinstruction, Micro-program sequencing in control memory, Wide-Branch addressing, Microinstruction with Next-address field, Prefetching Microinstruction).

Unit-III

PROCESSOR DESIGN:

Processor Organization: General register organization, Stack organization, Addressing modes, Instruction format, Data transfer and manipulations, Program Control, ReducedInstruction Set and Complex Instruction Set Computer.

Unit –IV

INPUT-OUTPUT ORGANIZATION:

I/O Interface, Modes of transfer, Interrupts and Interrupt handling, Direct Memory access, Input-Output processor.

Unit-V

MEMORY ORGANIZATION:

Memory Hierarchy, Main Memory (RAM and ROM Chips), Auxiliary memory, Associative memory, matching logic, Cache memory: locality of reference, mapping functions and write policies, Virtual Memory, Memory management hardware.

UNIT-VI

ADVANCED CONCEPTS :

Pipelined processors: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Parallel Processors: Introduction, Concurrent access, memory and cache coherence.

Course Outcomes:

At the end of the course, the students will be able to

1. Explain the functional capabilities of a stored program device and its various processing units.
2. Express the micro-operations needed to design the Arithmetic and logical unit of a computer system.
3. Specify the different types of instructions and their formats needed in the design of various functional units of the processor.
4. Analyze the performance measurement, data representation and memory Hierarchy of the computer system.

Reference Books

1. Computer System Architecture, M. Mano(PHI), Seventh edition 2007
2. Stallings, William : Computer Organization & Architecture(PHI), Seventh edition 2005
3. Computer Architecture and Organization", 3rd Edition by John P. Hayes WCB/McGraw-Hill

CODE: MC-01

SUBJECT NAME: CONSTITUTION OF INDIA/ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

CREDITS: 3

SESSIONAL: 25
THEORY EXAM: 75
TOTAL: 100

L	T	P
3	0	0

Course Objectives:

1) To enable the student understand the importance of constitution.
2) To understand the structure of executive, legislature and judiciary
3) To understand philosophy of fundamental rights and duties.
4) To understand the autonomous nature of constitutional bodies.
5) To understand the central and state relation, financial and administrative.

CONSTITUTION OF INDIA– BASIC FEATURES AND FUNDAMENTAL PRINCIPLES

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however,it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India‟s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values.

No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950.

The Indian judiciary and particularly the Supreme Court of India has played an historic role asthe guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

Course Contents

1. Meaning of the constitution law and constitutionalism.
2. Historical perspective of the Constitution of India.
3. Salient features and characteristics of the Constitution of India.
4. Scheme of the fundamental rights.
5. The scheme of the Fundamental Duties and its legal status.
6. The Directive Principles of State Policy – Its importance and implementation.
7. Federal structure and distribution of legislative and financial powers between theUnion and the States.
8. Parliamentary Form of Government in India – The constitution powers and status ofthe President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions : National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

Course Outcomes:

1) Able to understand the historical background of the constitutional making and its importance for building democratic India.
2) Able to apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission.
3) Able to analyse the history, features of Indian Constitution, the role of governors and chief ministers of state, role of state election commissioner, the decentralization of

power between central, state and local self-government.

4) Level organizations, various commissions viz SC/ST/OBC and women.

REFERENCES:

1. The Constitutional Law Of India 9th Edition, by Pandey. J. N.
2. The Constitution of India by P.M.Bakshi
3. Constitution Law of India by Narender Kumar
4. Bare Act by P. M. Bakshi

CODE: PCC-DS-504
SUBJECT NAME: SOFT COMPUTING LAB
CREDITS: 2

SESSIONAL:	**15**	**L**	**T**	**P**
END SEMESTER:	**35**	**0**	**0**	**4**
TOTAL:	**50**			

List of Experiments

Programming in Matlab for the following problems.

1. Classification of water temperature into appropriate fuzzy set (chilled, cool, normal, warm, hot, very hot) with membership.
2. Taking the human age from 1-100 years and classifying it into appropriate fuzzy sets (child, young, middle age, old, very old) with membership and plotting the graph.
3. Union of fuzzy sets using different s-norm formula and plotting the graph.
4. Intersection of fuzzy sets using different t-norm formula and plotting the graph.
5. Complement of fuzzy sets complement -norm formula and plotting the graph.
6. Design of a washing machine in the neural tool of Matlab.
7. Training of single perceptron as AND,OR and NOT type classifier using threshold activation.
8. Training of single perceptron as AND,OR and NOT type regression using sigmoidal activation and backpropagation.
9. Implementation of auto associative memory.
10. Implementation of hetero associative memory.
11. Implementation of ART network.
12. Solving knapsack using GA.
13. Solving TSP using GA.
14. Introduction to curve fitting in MATLAB using neural Tool

CODE: PCC-CS-406
SUBJECT NAME: OPERATING SYSTEM LAB
CREDITS: 2

SESSIONAL: 15
END SEMESTER: 35
TOTAL: 50

L	**T**	**P**
0	**0**	**4**

S.No.	Title
1	Study of **General UNIX commands** with their meaning, syntax and usage.
2	Study of **Directory Related UNIX** commands with their meaning, syntax and usage.
3	Study of **File related UNIX commands** with their meaning, syntax and usage.
4	Study of **Process Related UNIX Commands** with their meaning, syntax and usage.
5	Study of **User Communication UNIX commands** with their meaning, syntax and usage.
6	Study of **Simple Filter UNIX commands** with their meaning, syntax and usage.
7	Study of **Advanced filters UNIX Commands** with their meaning, syntax and usage.
8	Study of **System Administrative UNIX commands** with their meaning, syntax and usage.
9	Working with vi Editor
10	Write a shell program to calculate overtime pay of 5 employees; overtime is paid at the rate of Rs. 12/Hr for every hour worked above 40 hrs per week. Assume that no employee works for fraction of an hour.
11	Write a shell program to generate all combinations of „1“ , „2“ ,“3“ using for loop
12	Write a shell program that receives an argument & a string from the user. If the argument is 1 display the string in bold letters, for 2 display it in underline form; if 3 display it like blinking characters, if 4 then display it in reverse video character.

	13	Implementation of **CPU scheduling algorithms** First Come First Serve (FCFS), Priority scheduling-Priority Number Based, Shortest Process Next (SPN), Shortest Remaining time Next (SRN), Modified Round Robin, Highest response ratio Next (HRRN), Multi-Level Queue, Multi-Level Feedback Queue Scheduling).	

14	Implementation of **Page Replacement Algorithms** First in First out (FIFO), Least Recently Used (LRU), Optimal, Clock page replacement algorithms.
15	Implementation of **Banker's algorithm** for deadlock avoidance in multiple instances of resources.
16	Implementation of **disk scheduling algorithms** (First Come First Serve (FCFS), Shortest Seek Time First (SSTF), SCAN, Circular-SCAN (C-SCAN), F-Scan, N-step Scan, LOOK, C-LOOK).