IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.) [Computer Science & Information Technology]

IV Semester

S.No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	**ESC-CSIT401**	ESC	**Analog & Digital Communication**	70	20	10	60	40	**200**	3	–	2	**4**
2.	**PCC-CSIT401**	PCC	**Discrete Structure**	70	20	10	–	–	**100**	3	1	–	**4**
3.	**PCC-CSIT402**	PCC	**Object Oriented Programming System**	70	20	10	60	40	**200**	2	–	4	**4**
4.	**PCC-CSIT403**	PCC	**Analysis & Design of Algorithm**	70	20	10	60	40	**200**	2	1	2	**4**
5.	**PCC-CSIT404**	PCC	**Programming in PYTHON**	–	–	–	60	40	**100**	–	–	4	**2**
6.	**HSMC-CSIT401**	HSMC	**Soft Skill & Interpersonal Communication-I**	70	20	10	–	–	**100**	3	–	–	**3**
7.	**MC-4**	MC	**Constitution of India/ Essence of Indian Traditional Knowledge**	–	–	–	–	–	–	2	–	–	**0**
		Total		**350**	**100**	**50**	**240**	**160**	**900**	**15**	**2**	**12**	**21**

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	1 Credit	1 Credit

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IV Semester

ESC-CSIT401	Analog & Digital Communication	3L: 0T: 2P (4 Hrs.)	Credits:04

Prerequisite: Mathematics, Basics of Electronics.

Course Objective: The course is designed to cover the fundamentals, principles, concepts, and techniques of analog communication systems like various modulation techniques, data transmission, communication technologies, time-domain and frequency domain multiplexing technique and noise analysis. To understand the key modules of digital communication systems with emphasis on digital modulation techniques.

Course Content:

Module 1: **(8 Hrs.)**

Signals and Systems: Introduction of a communication system, signal-definition, types of signals. System definition, classification of systems. Fourier transforms: Time domain and frequency domain representation of signal, Fourier Transform and its properties, Transform of Gate, unit step, constant, impulse, sine and cosine wave. Shifting property of delta function, convolution, time and frequency convolution theorems.

Module 2: **(8 Hrs.)**

Amplitude Modulation: Modulation, need of modulation, types of modulation techniques, AM modulators, advantages and disadvantages of AM. Suppressed carrier amplitude modulation systems, DSB-SC, SSB-SC, VSB-SC systems, comparison of various amplitude modulation systems. Demodulation of AM, square law and envelope detector, synchronous detection of AM, Design of AM transmission system.

Module 3: **(8 Hrs.)**

Angle modulation: Introduction and types of angle modulation, frequency modulation, frequency deviation, modulation index, deviation ratio, bandwidth requirement of FM wave, types of FM. Phase modulation, difference between FM and PM, Direct and indirect method of Design FM Transmitter, FM demodulators- slope detector, Foster seeley discriminator, ratio detector. Introduction to pulse modulation systems.

Module 4: **(8 Hrs.)**

Sampling of signal: sampling theorem. Pulse amplitude modulation (PAM), Time division, multiplexing (TDM). Types of sampling, Aperture effect, Introduction to pulse position and pulse duration modulations, Digital signal, Quantization, Pulse code modulation, signal to noise ratio, Companding, Data rate and Baud rate, Bit rate, multiplexed PCM signal, Differential PCM (DPCM), Delta Modulation (DM) and Adaptive Delta Modulation (ADM), comparison of various systems.

Module 5: **(8 Hrs.)**

Digital modulations Techniques: Amplitude shift keying (ASK), Binary Phase Shift keying (BPSK), Differential phase shift keying (DPSK), offset and non-offset Quadrature phase shift keying (QPSK), M-Ary PSK, Binary frequency Shift Keying (BFSK), M-Ary FSK Quadrature Amplitude modulation (QAM).

Course outcomes:

Students earning credits will develop ability to:

1. Apply Fourier transforms to solve communication engineering problems.
2. Demonstrate AM transmitters and receivers.
3. Demonstrate FM transmitters and receivers.
4. Convert Analog signals to Digital signals.
5. Compare different digital modulation techniques.

List of Text Books /Reference Books:

1. Singh & Sapre, “Communication Systems”, TMH.
2. Taub Schilling, “Principles of Communication Systems”, TMH.
3. W. Tomasi “Electronic Communications Systems”, Pearson Education Pvt. Ltd.
4. Abhay Gandhi, “Analog and Digital Communication”, CENGAGE Learning.
5. Simon Haykin, “Communication Systems”, 4th Edition, John Wiley & Sons, 2004.
6. B. P. Lathi, “Modern Analog and Digital Communication Systems”,
7. Blake, “Electronic Communication Systems”, Thomson Delmar Publications, 2002.
8. Martin S. Roden, “Analog and Digital Communication System”, 3rd Edition, Prentice Hall of India, 2002.
9. B. Sklar, “Digital Communication Fundamentals and Applications” 2nd Edition Pearson Education 2007.

List of Experiments List:-

1. To perform & analysis of AM Modulation and Demodulation (Envelope Detector)
2. To perform & analysis of Frequency modulation using reactance modulator.
3. To perform & analysis of Frequency modulation using varactor modulator.
4. To perform & analysis of Pulse Amplitude Modulation and Demodulation
5. To perform & analysis of Pre-emphasis and De-emphasis
6. To perform & analysis of Analog Multiplexing.
7. To perform & analysis of Amplitude Modulation using Pspice
8. To perform & analysis of Receiver characteristics (selectivity, sensitivity, fidelity).
9. To perform & analysis of Operation of foster-seeley loop detector.
10. To perform & analysis of Operation of ratio detector.

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IV Semester

PCC- CSIT401	Discrete Structure	3L : 1T : 0P (4 hrs.)	Credits:04

Prerequisite: Nil

Course Objective:

This course introduces the applications of discrete mathematics in the field of computer science. It covers sets, logic, proving techniques, combinatory, functions, relations, Graph theory and algebraic structures.

Course Content:

Module 1: **(10 hrs.)**

Set Theory, Relation, Function, Theorem Proving Techniques : Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, Equivalence relation, Partial ordering relation, Job- Scheduling problem Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions, pigeonhole principle. Theorem proving Techniques: Mathematical induction, Proof by contradiction.

Module 2: **(08 hrs.)**

Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

Module 3: **(08 hrs.)**

Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Normal Forms, Universal and existential quantifiers.

Module 4: **(08 hrs.)**

Graph Theory: Introduction and basic terminology of graphs, Planer graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs.

Module 5: **(10 hrs.)**

Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded and complemented lattices. Combinatorics: Introduction, Permutation and combination, Recurrence Relation and Generating Function: Introduction to Recurrence Relation and Recursive algorithms, linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions, Generating functions, Solution by method of generating functions.

Course Outcome:

1. Describe sets, relations, functions and mathematical induction.
2. Formulate and solve Groups and Rings problems
3. Apply Propositional logic and finite state automata to solve problems
4. Apply the Concepts of Graph theory to Solve real world problems.
5. Formulate and solve Poset and recurrence relations.

List of Text Books / Reference Books:

1. C.L.Liu, “Elements of Discrete Mathematics” Tata McGraw-Hill Edition.
2. J Trembley, R Manohar; “Discrete Mathematical Structure with Application CS”, 2001 McGraw Hill.
3. Kenneth H. Rosen, “Discrete Mathematics and its applications”,7^{th} Ed., McGraw Hill.
4. R K Bisht, H S Dhami, “Discrete Mathematics”,2015, Oxford University Press
5. P C Biswal, ”Discrete Mathematics & Graph Theory”, 4^{th} Ed. , PHI

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IV Semester

PCC-CSIT402	Object Oriented Programming System	2L : 0T : 4P (6 hrs.)	Credits:04

Prerequisite: Basic of C language

Course Objective:

The course is designed to provide complete knowledge of Object Oriented Programming through and to enhance the programming skills of the students by giving practical assignments to be done in labs. Its main objective is to teach the basic concepts and techniques which form the object oriented programming paradigm.

Course Content:

Module 1: **(08 hrs.)**

Introduction to Object Oriented Programming, Comparison with Procedural Programming, features of Object oriented paradigm, merits and demerits of OO methodology; Introduction to Java Development Kit (JDK) & Java virtual machine (JVM); Linker & Loader; Data Encapsulation: Concept of Classes & Objects; State, Behavior & Identity of an object.

Module 2: **(08 hrs.)**

Data Abstraction and Message Passing: Methods, Calling of constructors, Decision making constructs, Control loops, Keywords: this, static; Access modifiers, Arrays within a class, String Class.

Module 3: **(10 hrs.)**

Relationship between classes: Generalization- Inheritance, Types of Inheritance, Ambiguity in multiple inheritances, Concept of interfaces; Specialization- Association, Aggregation and Composition; Static and Dynamic Binding: Polymorphism, Method Overriding & Overloading; Keywords: super, abstract, final.

Module 4: **(08 hrs.)**

Concept of Packages, Need of package; Basic idea of exception handling, stack based execution and exception propagation, Exception types: Exception Handling Try, Catch, Finally, Throw statement, Assertions.

Module 5: **(08 hrs.)**

Overview of Simple threads, Basic idea of Multithreaded Programming, Thread synchronization: Locks, synchronized methods, synchronized block, thread scheduling, Producer-consumer relationship, Daemon thread, Case Study: Chabot implementation etc.

Course Outcome:

1. Understand object oriented programming concepts, core JAVA and apply them in solving Problems.
2. Develop skill in data abstraction and message passing
3. Understand fundamentals of relationship amongst objects
4. Learn about the need of exception and errors
5. Develop ability to write a computer program to solve specified problems

List of Text Books / Reference Books:

1. G. Booch, "Object Oriented Analysis & Design", Pearson.
2. Barbara Liskov, Program Development in Java, Addison-Wesley, 2001
3. James Martin, "Principles of Object Oriented Analysis and Design", Prentice Hall/PTR.
4. Peter Coad and Edward Yourdon, "Object Oriented Design", Prentice Hall/PTR.
5. Herbert Schildt, "Java 2: The Complete Reference", 7th Edition, McGraw-Hill

List of Experiments:

1. A gardener plants a daisy flower and observes that on the first day the flower has 1 petal, on the second day the flower has 2 petals, on the third day it has 3 petals, on fourth day it has 5 petals, on fifth day it has 8 petals. Write a program to calculate how many petals will be there on the daisy flower on ninth day?
2. The Marks obtained by the class of 10 students are 45,50,66,32,80,77,59,63,71,85 respectively. Write a program for following
   - Arrange and print the marks in descending order
   - Calculate the average marks of the class
   - Find out whether any student got 95 marks(if yes print –"Student exist" and if no print – "Student doesn't exist")
3. WAP for the following calculating
   - Sum of square of given even numbers from 1 to 20
   - Sum of square of given odd numbers from 21 to 40
4. In the school while prayer assembly the 12 std boys and girls heights(in feet) are : Boys – 5.3, 5.6, 6.3, 5.9, 5.11
   Girls – 5.1, 5.9, 5.0, 5.5, 5.6
   Write a program for finding:
   - Tallest height in boys
   - Tallest height in girl
   - Tallest height in the class
   - Is there any student having height above 6.2 feet (o/p True or False)
   - How many boys have height between 5.5 and 5.9 feet
5. Create an abstract class Account. Inherit this class into two classes as CurrentAccount and SavingAccount. Identify the below attributes & methods and place them in suitable classes so as achieve best outcomes:
   - Attributes: Name_of_customer, Address, MobileNo, type_of_account, balanceAmt, etc
   - Methods: withdrawal, deposit, displayInfo, viewBalance, calculateInterest (saving 6% & current 1%).
6. Write a program which does following on a given String. Count the number of occurrence of a particular character. (e.g. "assassinations" here 's' had come 5 times)
7. Write a program that takes a string (e.g. "apple is a fruit"). Obtain a substring from this string but starting from a second occurrence of a particular character (suppose. 'a') then output should be ("a fruit").
8. WAP to check weather a given string is a substring of other string. (e.g. "drinking" and other

string is “packages drinking water” so here first string a substring of second hence the result must be TRUE).

9. Write a java program showing the concept of keywords this in java.
10. Write a java program showing the concept ofconstructor in java.
11. Write a java program showing the concept of Inheritance, super keyword & Interfaces in java.
12. Write a java program showing the concept of file handling injava.
13. Write a java program showing the concept of multithreading injava.
14. Write a java program showing the concept of exceptionhandling in java.

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IV Semester

PCC-CSIT403	**Analysis & Design of Algorithm**	**2L : 1T : 2P (5 hrs.)**	**Credits:04**

Prerequisite: Data Structure & Algorithm

Course Objective:

Its main objective is to teach the basic concepts and techniques to analysis and Design of Algorithm.

Module 1: **(08 hrs.)**

Algorithms, Designing algorithms, analyzing algorithms, asymptotic notations, heap and heap sort. Introduction to divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, strassen's matrix multiplication.

Module 2: **(10 hrs.)**

Study of Greedy strategy, examples of greedy method like optimal merge patterns, Huffman coding, minimum spanning trees, knapsack problem, job sequencing with deadlines, single source shortest path algorithm

Module 3: **(08 hrs.)**

Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-Warshall algorithm.

Module 4: **(10 hrs.)**

Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph coloring problem etc. Introduction to branch & bound method, examples of branch and bound method like traveling salesman problem etc. Meaning of lower bound theory and its use in solving algebraic problem, introduction to parallel algorithms.

Module 5: **(08 hrs.)**

Binary search trees, height balanced trees, 2-3 trees, B-trees, basic search and traversal techniques for trees and graphs (In order, preorder, postorder, DFS, BFS), Non Deterministic algorithms, The classes: P, NP, NP Complete, NP Hard, Satisfiability problem, Proofs for NP Complete Problems: Clique, Vertex Cover. Introduction to approximate and randomized algorithms.

Course Outcome:

1. Understand and analyze the performance of recursive and non recursive algorithms and use of asymptotic notations to measure the performance of algorithms.
2. Identify and analyze different algorithm design techniques for problem solving.
3. Exemplifying and checking algorithms using Dynamic programming algorithm design techniques.
4. Interpreting Backtracking, Branch and Bound strategy, and evaluate various algorithms including parallel algorithms.
5. Analyze nonlinear data structure and identify different NP, NP-Hard, NP-Complete problems.

List of Text Books / Reference Books:

1. Coremen Thomas, Leiserson CE, Rivest RL, "Introduction to Algorithms" 3rd Ed,2009 PHI.
2. Horowitz & Sahani, "Analysis & Design of Algorithm" Computer Science Press.
3. Ullmann, " Design & Analysis of Computer Algorithms" Pearson.
4. Michael T Goodrich, Robarto Tamassia, "Algorithm Design", Wiely India.
5. Rajesh K Shukla, "Analysis and Design of Algorithms: A Beginner's Approach", Wiley.

List of Experiments:

Write a Program For:

1. Iterative and Recursive Binary Search.
2. Merge Sort.
3. Quick Sort.
4. Strassen's Matrix Multiplication.
5. Optimal merge patterns.
6. Huffman coding.
7. Minimum spanning trees using Kruskal's algorithm.
8. Minimum spanning trees using Prim's algorithm.
9. Single sources shortest path algorithm.
10. Floye-Warshal algorithm.
11. Traveling salesman problem.
12. Hamiltonian cycle problem.

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IV Semester

PCC-CSIT404	Programming in PYTHON	0L : 0T : 4P (4 hrs.)	Credits:02

Prerequisite:

Course Objective:

The course is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language. Learning Outcomes: Problem solving and programming capability

Course Content:

Module 1: **(07 hrs.)**

Introduction, History, Features, Python –Environment Setup Local Environment Setup, Getting Python, Installation of Python, Use of IDE

Module 2: **(10 hrs.)**

Python –Basic Syntax Python Identifiers, Reserved Words, Lines & Indentation, Multiline Statements, Quotation in Python, Comments & other useful constructs, Python –Variables Assigning Values to Variables, Multiple Assignment, Standard Data Types

Module 3: **(08 hrs.)**

Python –Variables, Assigning Values to Variables, Multiple Assignment, Standard Data Types; Python Numbers, Python Strings, Python Lists, Python Tuples, Dictionary, Data Type Conversion

Module 4: **(08 hrs.)**

Python –Basic Operators, Types of Operators, Arithmetic Operators, Comparison Operators, Assignment Operators, Bitwise Operators, Logical Operators, Operator Precedence, Python– Decision Making & Loops, Flowchart, If statement Syntax

Module 5: **(08 hrs.)**

Python-Functions, Syntax for defining a function, Calling a Function, Function Arguments, Anonymous Functions Python-Applications & Further Extensions, Data analysis packages.

Course Outcome:

1. Install Python and have knowledge of syntax of Python.
2. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python.
3. Express different Decision Making statements and Functions.
4. Develop code in Python using functions, loops, etc.
5. Design GUI Applications in Python and evaluate different database operations.

List of Text Books / Reference Books:

1. Eric Matthes, "Python Crash Course: A Hands-On, Project-Based Introduction to Programming", No Starch Press.
2. ZedA. Shaw, "Learn Python the Hard Way" (3rd Edition), Addison Wesley.
3. Paul Barry, "Head-First Python", O'Reilly.
4. John Zelle, Franklin,"Python Programming", Beedle & Associates Inc.

List of Experiments:

Write a Python program:

1. To find GCD of two numbers.
2. To find the square root of a number by Newton's Method.
3. To find the exponentiation of a number.
4. To find the maximum from a list of numbers.
5. To perform Linear Search
6. To perform binary search.
7. To perform selection sort.
8. To perform insertion sort.
9. To perform Merge sort.
10. To find first n prime numbers.
11. To multiply matrices.
12. For command line arguments.
13. To find the most frequent words in a text read from a file.
14. To simulate elliptical orbits in Pygame.
15. To bouncing ball in Pygame.
16. To demonstrate data analysis packages using python like Pandas, Filtering, etc.

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IV Semester

HSMC-CSIT401	Soft Skills & Interpersonal Communication-I	3L : 0T : 0P (3 hrs.)	Credits:03

Prerequisite:

Course Objectives:

The course will help students to learn effective communication skills, group and team building skills. It will help them to learn the goal setting process and thus become more effective in achieving it.

Course Content:

Module 1:

Introduction to Soft Skills: Importance of Soft Skills, Effective Communication Skills, Verbal: Oral and Written, Merits and Demerits. Non Verbal: Kinesics, Proxemics, Haptics, Chronemics, Paralanguage, Sign/Symbol, Meta Communication, and Cultural differences in Non-Verbal Communication

Module 2:

Aspects of Communication: Process of Listening, Types of Listening, Barriers to Listening, Strategies to Develop Listening Skills, Listening Comprehension, Culture as Communication, Communicating across Cultures, Communication Breakdown and ways to overcome

Module 3:

Interpersonal Skills: Introduction and Importance to Interpersonal Skills, Personal Attributes, Interpersonal Attributes, Decision making, Creative Problem Solving, Dealing with Glossophobia, Logical Reasoning, Tony Buzan's Mind Mapping Techniques: Argumentation, Inductive, Deductive reasoning, Persuasion

Module 4:

Group Behavior: Leadership skills, Team Management, Group Dynamics, Negotiation, Assertiveness, Emotional Intelligence

Module5:

Practical Approach to Soft Skills and Interpersonal Skills, Case Studies, SWOC Analysis and Goal Setting, Mindfulness Training, Brain Storming, Group Discussion, Team Building Activities.

Course Outcome:

The outcome of this course will be to make students aware about the different facets of self. It will also help them learn skills to strengthen their inner capacities so that they are able to understand themselves, think and act effectively to lead.

List of Text Books / Reference Books:

1. Soft Skills by G.S. Chouhan and Sangeeta Sharma, Wiley, New Delhi, 2016 Communication Skills by Sanjay Kumar and Pushplata, OUP, New Delhi, 2011
2. Communication Skill for Engineers and Scientist by Sangeeta Sharma and Vinod Mishra, PHI Learning, New Delhi, 2015
3. Developing Communication Skill by Krishna Mohan, Meera Banerji, McMillan India Limited,2018
4. Effective Listening Skills by Kratz, Abby Robinson. Toronto: ON: Irwin Professional Publishing, 1995.
5. Soft Skill for Everyone by Jeff Butterfield, Cengage Leaning, New Delhi, 2010.
6. Theories of Personality by Hall, Calvin S. et al. . New Delhi: Wiley. rpt. 2011.
7. Corporate Conversations by Holtz, Shel. New Delhi: PHI. 2007.
8. The Art of Public Speaking by Lucas, Stephen E. McGraw-Hill Book Co. International Edition, 11th Ed. 2014.
9. Winning at Interviews by Thorpe, Edgar and Showick Thorpe. Pearson Education. 2004.
10. Business Communication for Managers by Penrose, John M., et al. New Delhi: Thomson South Western. 2007

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IV Semester

MC-4	**Constitution of India/ Essence of Indian Traditional Knowledge**	**2L : 0T : 0P (2 hrs.)**	**Credits:00**

Prerequisite:

Course Objective:

The objective of this course is to focus on Indian traditional knowledge.

Course Content:

Module 1: **(08 hrs.)**

Introduction to Traditional Knowledge**:** Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge.

Module 2: **(08 hrs.)**

Protection of Traditional Knowledge: Protection of traditional knowledge: The need for protecting traditional knowledge, Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

Module 3: **(08 hrs.)**

Legal Frame Work and TK: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act).

The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

Module 4: **(08 hrs.)**

Traditional Knowledge and Intellectual Property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

Module 5: **(08 hrs.)**

Traditional Knowledge in Different Sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK. 139.

Course Outcome:

1. Understand the concept of Traditional knowledge and its importance
2. Know the need and importance of protecting traditional knowledge.
3. Know the various enactments related to the protection of traditional knowledge.
4. Understand the concepts of Intellectual property to protect the traditional knowledge.
5. Understand the traditional knowledge in different sectors.

List of Text Books / Reference Books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
3. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002. "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel