M.Sc., COMPUTER SCIENCE

Syllabus

Program Code: PCS

2023 - Onwards

MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with "A" Grade by NAAC

PASUMALAI, MADURAI – 625 004

GUIDLINESS FOR OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM

(FOR PG PROGRAM FROM 2023 -2024 ONWARDS)

ELIGIBILITY CONDITION FOR ADMISSION

For admission to Post Graduate Programmers (P.G) a candidate should have passed the 3years degree course (under 10 + 2 + 3 pattern) recognized by the university as equivalent there to.

DURATION

Two years. Each year consists of 2 semesters. The duration of a semester is 90 working days.

ATTENDANCE

75% of the classes in each semester shortage of attendance can be condoned as per existing university rules.

EVALUATION PROCEDURE:

A mark Statement with CGPA = $\frac{\sum(MarksXcredits)}{\sum(Credits)}$

Where the summations are over all paper appeared up to the current semester.

Examinations: 3 hours duration.

Total marks 100 for all papers

External Internal ratio 75:25 with 2 Internal tests.

Subjects of Study

The courses offered under the PG programs belong to the following categories:

1. Core Subjects
2. Electives
3. Non Major Electives (NME)
4. Skill Enhancement course

CBCS COURSE STRUCTURE - PG COURSES

M.A. (Tamil) - M.A. (English) – M.Com. – M.Com (CA) – M.S.W. M.Sc. (Mathematics) - M.Sc. (CS) - M.Sc. (CS&IT)

Semester–I	**Credit**	**Semester-II**	**Credit**	**Semester-III**	**Credit**	**Semester–IV**	**Credit**
1.1. Core-I	4	2.1. Core-IV	4	3.1. Core-VII	4	4.1. Core-X	4
1.2 Core-II	4	2.2 Core-V	4	3.2 Core-VII	4	4.2 Core-XI	4
1.3 Core – III	4	2.3 Core – VI	4	3.3 Core – IX	4	4.3 Core – XII	4
1.4 Elective (Generic / Discipline Centric)- I	3	2.4 Elective (Generic / Discipline Centric) – III	3	3.4 Elective (Generic / Discipline Centric) – V	3	4.4 Elective (Generic / Discipline Centric) – VI	3
1.5 Elective (Generic / Discipline Centric)-II	3	2.5 Elective (Generic / Discipline Centric)-IV	3	3.5 Core Industry Module	3	4.5 Project with Viva-Voce	3
1.6Ability Enhancement Course- Soft Skill -1	2	2.6 Ability Enhancement Course - Soft Skill -2	2	3.6 Ability Enhancement Course- Soft Skill -3	2	4.6 Ability Enhancement Course- Soft Skill -4	2
Skill Enhancement Course SEC 1	2	2.7 Skill Enhancement Course SEC 2	2	3.7 Skill Enhancement Course – Term Paper and Seminar Presentation SEC 3	2	4.7 Skill Enhancement Course - Professional Competency Skill	2
				3.8 Internship/ Industrial Activity	2	4.8 Extension Activity	1
	22		**22**		**24**		**23**
						Total Credit Points	**91**

QUESTION PAPER PATTERN FOR THE CONTINUOUS INTERNAL ASSESSMENT

Note: Duration – 1 hour 30 minutes

The components for continuous internal assessment are:

Part –A

Four multiple choice questions (answer all)	4 x01= 04 Marks

Part –B

Two questions (‘either …. or ‘type)	2 x 05=10 Marks

Part –C

Two questions (‘either …. or ‘type)	2 x 08=16 Marks

Total	40 Marks

The components for continuous internal assessment are:

(40 Marks of two continuous internal assessments will be converted to 15 marks)

Two tests and their average	--15 marks
Seminar /Group discussion	--5 marks
Assignment	--5 marks

Total	25 Marks

OUTCOME BASED EDUCATION

1. Course is defined as a theory, practical or theory cum practical subject studied in a semester. For e.g. Computer Applications Management

2. Course Outcome (CO) Course outcomes are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Outcomes may be specified for each course based on its weightage.

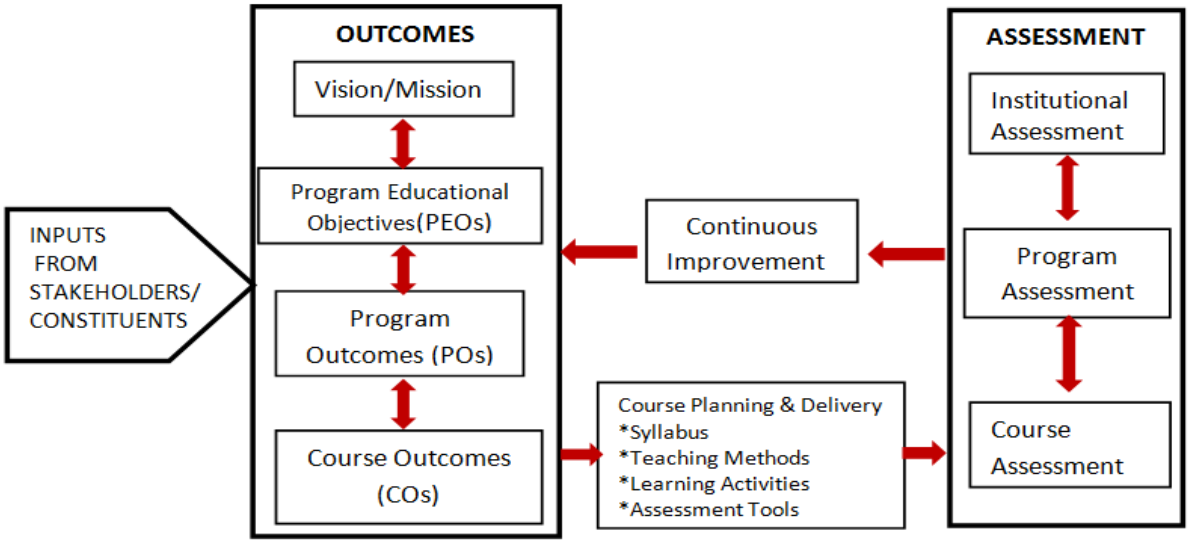
3. Program is defined as the specialization or discipline of a Degree. It is the interconnected arrangement of courses, co-curricular and extracurricular activities to accomplish predetermined objectives leading to the awarding of a degree.

4. Program Outcomes (POs) Program outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be Guidelines for Outcome Based Education System 4 aligned closely with Graduate Attributes.

5. Program Educational Objectives (PEOs) of a program are the statements that describe the expected achievements of graduates in their career, and also in particular, what the graduates are expected to perform and achieve during the first few years after graduation.

6. Program Specific Outcomes (PSO) are what the students should be able to do at the time of graduation with reference to a specific discipline. Usually there are two to four PSOs for a Program.

7. Graduate Attributes (GA): The graduation attributes, are exemplars of the attributes expected of a graduate from a Program



INSTITUTIONAL VISION

To Mould the learners into accomplished individuals by providing them with a stimulus for social change through character, confidence and competence.

INSTITUTIONAL MISSION

1. Enlightening the learners on the ethical and environmental issues.

2. Extending holistic training to shape the learners in to committed and competent citizens.

3. Equipping them with soft skills for facing the competitive world.

4. Enriching their employability through career oriented courses.

5. Ensuring accessibility and opportunity to make education affordable to the underprivileged.

Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Mathematics based problem solving skills are included as mandatory components in the ‘Training for Competitive Examinations’ course at the final semester, a first of its kind.

- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS),
MADURAI – 625 004
M. SC COMPUTER SCIENCE CURRICULUM
(For the student admitted during the academic year 2023-2024 onwards)

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
FIRST SEMESTER						
Part – III	**Core Courses**					
23PCSCC11	ANALYSIS AND DESIGN OF ALGORITHMS	6	5	25	75	100
23PCSCC12	OBJECT ORIENTED ANALYSIS AND DESIGN & C++	6	5	25	75	100
23PCSCC13	PYTHON PROGRAMMING	6	5	25	75	100
23PCSCP11	ALGORITHM AND OOPS LAB	4	3	25	75	100
23PCSCP12	PYTHON PROGRAMMING LAB	4	3	25	75	100
Part – III	**Elective Course**					
23PCSEC11	ADVANCED SOFTWARE ENGINEERING	4	3	25	75	100
	Total	30	24	150	450	600
SECOND SEMESTER						
Part – III	**Core Courses**					
23PCSCC21	DATA MINING AND WAREHOUSING	6	5	25	75	100
23PCSCC22	ADVANCED OPERATING SYSTEMS	6	5	25	75	100
23PCSCC23	ADVANCED JAVA PROGRAMMING	6	5	25	75	100
23PCSCP21	ADVANCED JAVA PROGRAMMING LAB	6	4	25	75	100
Part – III	**Elective Course**					
23PCSEC21	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	4	3	25	75	100
Part – IV	**Skill Enhancement course**					
23PCSSP21	DATA MINING LAB USING R	2	2	25	75	100
	Total	30	24	150	450	600


FIRST SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE

FOR THOSE WHO JOINED IN 2023-2024 AND AFTER

Course Name	ANALYSIS AND DESIGN OF ALGORITHMS			
Course Code	23PCSCC11	**L**	**P**	**C**
Category	CORE	6	-	5

COURSE OBJECTIVES:

The main objectives of this course are to:

- Enable the students to learn the Elementary Data Structures and algorithms.
- Presents an introduction to the algorithms, their analysis and design
- Discuss about Basic Traversal And Search Techniques
- Understand the Divide and Conquer method, Dynamic Programming and Backtracking for problem solving
- Understood the various design and analysis of the algorithms.

UNIT - I	**INTRODUCTION**	**18 hours**

Introduction: - Algorithm Definition and Specification – Space complexity-Time Complexity- Asymptotic Notations - Elementary Data Structure: Stacks and Queues – Binary Tree - Binary Search Tree - Heap – Heap sort- Graph.

UNIT - II	**TRAVERSAL AND SEARCH TECHNIQUES**	**18 hours**

Basic Traversal And Search Techniques: Techniques for Binary Trees-Techniques for Graphs -Divide and Conquer: - General Method – Binary Search – Merge Sort – Quick Sort.

UNIT - III	**GREEDY METHOD**	**18 hours**

The Greedy Method: - General Method–Knapsack Problem–Minimum Cost Spanning Tree– Single Source Shortest Path.

UNIT - IV	**DYNAMIC PROGRAMMING**	**16 hours**

Dynamic Programming-General Method–Multistage Graphs–All Pair Shortest Path–Optimal Binary Search Trees – 0/1 Knapsacks – Traveling Salesman Problem – Flow Shop Scheduling.

UNIT - V	**BACK TRACKING**	**18 hours**

Backtracking:- General Method–8-Queens Problem–Sum Of Subsets–Graph Coloring – Hamiltonian Cycles – Branch And Bound: - The Method – Traveling Salesperson.

UNIT -VI	**Contemporary Issues**	**2 hours**

Expert lectures, online seminars– webinars

Total Lecture Hours	**90 hours**

BOOKS FOR STUDY:

- Ellis Horowitz, “Computer Algorithms”, Galgotia Publications.
- Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms".

BOOKS FOR REFERENCES:

- Goodrich, “Data Structures & Algorithms in Java”, Wiley 3rd edition.
- Skiena, ”The Algorithm Design Manual” ,Second Edition, Springer, 2008
- Anany Levith, ”Introduction to the Design and Analysis of algorithm”, Pearson Education Asia, 2003.
- Robert Sedgewick, Phillipe Flajolet, ”An Introduction to the Analysis of Algorithms”, Addison- Wesley Publishing Company,1996.

WEB RESOURCES:

- **https://nptel.ac.in/courses/106/106/106106131/**
- **https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm**
- **https://www.javatpoint.com/daa-tutorial**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**80%**	No Changes Made		New Course			

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Get knowledge about algorithms and determines their time complexity. Demonstrate specific search and sort algorithms using divide and conquertechnique.	**K1,K2**
CO2	Gain good understanding of Greedy method and its algorithm.	**K2,K3**
CO3	Able to describe about graphs using dynamic programming technique.	**K3,K4**
CO4	Demonstrate the concept of backtracking & branch and bound technique.	**K5, K6**
CO5	Explore the traversal and searching technique and apply it for trees and graphs	**K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	S	L	M	L	S	M
CO2	S	S	S	S	S	M	S	M	S	M
CO3	S	S	S	S	S	M	S	M	S	M
CO4	S	S	S	S	S	M	S	M	S	M
CO5	S	S	S	S	S	M	S	M	S	M

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**3**	**2**	**3**
CO 3	**2**	**3**	**2**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**3**
WEITAGE	**14**	**15**	**14**	**14**	**15**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**93%**	**100%**	**93%**	**93%**	**100%**

LESSON PLAN:

UNIT	ANALYSIS AND DESIGN OF ALGORITHMS	HRS	PEDAGOGY
I	Introduction: - Algorithm Definition and Specification – Space complexity-Time Complexity- Asymptotic Notations - Elementary Data Structure: Stacks and Queues – Binary Tree - Binary Search Tree - Heap – Heap sort- Graph	**18**	**LCD, CHALK & TALK**
II	Basic Traversal And Search Techniques: Techniques for Binary Trees- Techniques for Graphs -Divide and Conquer: - General Method – Binary Search – Merge Sort – Quick Sort.	**18**	**LCD, CHALK & TALK**
III	The Greedy Method:- General Method–Knapsack Problem–Minimum Cost Spanning Tree– Single Source Shortest Path.	**18**	**LCD, CHALK & TALK**
IV	Dynamic Programming-General Method–Multistage Graphs–All Pair Shortest Path–Optimal Binary Search Trees – 0/1 Knapsacks – Traveling Salesman Problem – Flow Shop Scheduling	**16**	**LCD, CHALK & TALK**
V	Backtracking:- General Method–8-Queens Problem–Sum Of Subsets– Graph Coloring– Hamiltonian Cycles – Branch And Bound: - The Method – Traveling Salesperson	**18**	**LCD, CHALK & TALK**
VI	Contemporary Issues	**2**	**Expert lectures, online seminars–webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO2	**K1 – K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
CI AII	**CO3**	**K1 – K5**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO4	**K1 – K6**	2	K1,K2	2 (K3,K3)	2 (K5,K5)
Question Pattern CIA I & II		**No. of Questions to be asked**	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**2**			**2**	**3.6**	**7.2**
	K2	**2**			**2**	**3.6**	
	K3		**20**		**20**	**35.7**	**35.7**
	K4			**32**	**32**	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	**2**			**2**	**3.6**	**7.2**
	K2	**2**			**2**	**3.6**	
	K3		**20**		**20**	**35.7**	**35.7**
	K4			**16**	**16**	**28.57**	**57.1**
	K5			**16**	**16**	**28.57**	
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5-Evaluating, Justifying the problems with solutions.

K6- Combining the solutions with applications.

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	**COs**	**K - Level**	**Section A (MCQs)**		**Section B (Either / or Choice) With K - LEVEL**	**Section C (Either / or Choice) With K - LEVEL**
			No. of Questions	**K – Level**		
1	**CO1**	**K1-K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	**CO2**	**K1-K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	**CO3**	**K1-K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	**CO4**	**K1-K5**	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	**CO5**	**K1-K6**	2	K1,K2	2 (K3,K3)	2 (K6,K6)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	**Section A (Multiple Choice Questions)**	**Section B (Either or Choice**	**Section C (Either/ or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**			**5**	**3.57**	**3.57**
K2	**5**			**5**	**3.57**	**3.57**
K3		**50**		**50**	**35.72**	**35.72**
K4			**48**	**48**	**34.28**	**34.28**
K5			**16**	**16**	**11.43**	**11.43**
K6			**16**	**16**	**11.43**	**11.43**
Marks	**10**	**50**	**80**	**140**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions			**PART – A**		**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K3**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K5**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K5**	
20. a)	**Unit - V**	**CO5**	**K6**	
		OR		
20. b)	**Unit - V**	**CO5**	**K6**	

Course Name	OBJECT ORIENTED ANALYSIS AND DESIGN & C++			
Course Code	23PCSCC12	**L**	**P**	**C**
Category	CORE	6	-	5

COURSE OBJECTIVES:

The main objectives of this course are to:

- Present the object model, classes and objects, object orientation, machine view and model management view.
- Enables the students to learn the basic functions, principles and concepts of object oriented analysis and design.
- Enable the students to understand Basic statements of C++ language
- Motivate the students to learn the Constructors Inheritance and other concepts.
- Know the file concepts related to OOAD

UNIT - I	**OBJECT MODEL**	**18 hours**

The Object Model: The Evolution of the Object Model – Elements of the Object Model – Applyingthe Object Model. Classes and Objects: The Nature of an Object – Relationship among Objects**.**

UNIT - II	**CLASSES AND OBJECTS**	**18 hours**

Classes and Object: Nature of Class – Relationship Among classes – The Interplay of classes and Objects. Classification: The importance of Proper Classification –identifying classes and objects –Key Abstractions and Mechanism.

UNIT - III	**C++ INTRODUCTION**	**18 hours**

Introduction to C++- Input and output statements in C++-Declarations-control structures– Functions in C++.

UNIT - IV	**INHERITANCE AND OVERLOADING**	**16hours**

Classes and Objects–Constructors and Destructors–operators overloading–Type Conversion-Inheritance – Pointers and Arrays.

UNIT - V	**POLYMORPHISM AND FILES**	**18 hours**

Memory Management Operators-Polymorphism–Virtual functions–Files–Exception Handling –String Handling -Templates.

UNIT - VI	**Contemporary Issues**	**2 hours**

Expert lectures, online seminars –webinars

Total Lecture Hours	**90 hours**

BOOKS FOR STUDY:

- "Object Oriented Analysis and Design with Applications", Grady Booch, Second Edition, Pearson Education.
- "Object-Oriented Programming with ANSI & Turbo C++" ,Ashok N. Kamthane, First Indian Print - 2003, Pearson Education.

BOOKS FOR REFERENCES:

- Balagurusamy "Object Oriented Programming with C++", TMH, Second Edition, 2003.

WEB RESOURCES:

- **https://onlinecourses.nptel.ac.in/noc19_cs48/preview**
- **https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/**
- **https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.html**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**100%**	No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the concept of Object-Oriented development and modeling techniques	**K1,K2**
CO2	Gain knowledge about the various steps performed during object design	**K2,K3**
CO3	Abstract object-based views for generic software systems	**K3**
CO4	Link OOAD with C++ language	**K4,K5**
CO5	Apply the basic concept of OOPs and familiarize to write C++ program	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	M	S	S
CO2	S	S	S	M	S	M	S	M	S	S
CO3	S	S	S	M	S	M	S	M	S	S
CO4	S	S	S	M	S	M	S	M	S	S
CO5	S	S	S	M	S	M	S	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**2**	**2**	**3**
CO 3	**3**	**2**	**2**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**2**
CO 5	**3**	**3**	**3**	**3**	**3**
WEITAGE	**15**	**14**	**13**	**14**	**14**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100%**	**93%**	**86%**	**93%**	**93%**

LESSON PLAN:

UNIT	OBJECT ORIENTED ANALYSIS AND DESIGN & C++	HRS	PEDAGOGY
I	The Object Model: The Evolution of the Object Model – Elements of the Object Model – Applyingthe Object Model. Classes and Objects: The Nature of an Object – Relationship among Objects.	**18**	**LCD, BLACK BOARD**
II	Introduction to C++- Input and output statements in C++-Declarations-control structures– Functions in C++.	**18**	**LCD, BLACK BOARD**
III	Introduction to C++- Input and output statements in C++-Declarations-control structures– Functions in C++.	**18**	**LCD, BLACK BOARD**
IV	Classes and Objects–Constructors and Destructors–operators overloading–Type Conversion- Inheritance – Pointers and Arrays.	**16**	**LCD, BLACK BOARD**
V	Memory Management Operators-Polymorphism–Virtual functions–Files–Exception Handling –String Handling -Templates	**18**	**LCD, BLACK BOARD**
VI	Contemporary Issues	**2**	**Expert lectures, online seminars , webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO2	**K1 – K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
CI AII	**CO3**	**K1 – K5**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO4	**K1 – K6**	2	K1,K2	2 (K3,K3)	2 (K5,K5)
Question Pattern CIA I & II		**No. of Questions to be asked**	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**2**			**2**	**3.6**	**7.2**
	K2	**2**			**2**	**3.6**	
	K3		**20**		**20**	**35.7**	**35.7**
	K4			**32**	**32**	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	**2**			**2**	**3.6**	**7.2**
	K2	**2**			**2**	**3.6**	
	K3		**20**		**20**	**35.7**	**35.7**
	K4			**16**	**16**	**28.57**	**57.1**
	K5			**16**	**16**	**28.57**	
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5-Evaluating,Justifying the problems with solutions.

K6- Combining the solutions with applications.

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	**COs**	**K - Level**	**Section A (MCQs)**		**Section B (Either / or Choice) With K - LEVEL**	**Section C (Either / or Choice) With K - LEVEL**
			No. of Questions	**K – Level**		
1	CO1	**K1-K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	**K1-K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	**K1-K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	**K1-K5**	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	**K1-K6**	2	K1,K2	2 (K3,K3)	2 (K6,K6)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	**Section A (Multiple Choice Questions)**	**Section B (Either or Choice**	**Section C (Either/ or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**			**5**	**3.57**	**3.57**
K2	**5**			**5**	**3.57**	**3.57**
K3		**50**		**50**	**35.72**	**35.72**
K4			**48**	**48**	**34.28**	**34.28**
K5			**16**	**16**	**11.43**	**11.43**
K6			**16**	**16**	**11.43**	**11.43**
Marks	**10**	**50**	**80**	**140**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions			**PART – A**		**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K3**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K5**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K5**	
20. a)	**Unit - V**	**CO5**	**K6**	
		OR		
20. b)	**Unit - V**	**CO5**	**K6**	

Course Name	PYTHON PROGRAMMING			
Course Code	23PCSCC13	**L**	**P**	**C**
Category	CORE	6	-	5

COURSE OBJECTIVES:

The main objectives of this course are to:

- Presents an introduction to Python, creation of web applications, network applications and working in the clouds
- Use functions for structuring Python programs
- Understand different Data Structures of Python
- Represent compound data using Python lists, tuples and dictionaries

UNIT - I INTRODUCTION 18hours

Python: Introduction–Numbers–Strings–Variables–Lists–Tuples–Dictionaries–Sets– Comparison.

UNIT - II CODE STRUCTURES 18hours

Code Structures: if, elseif, and else – Repeat with while – Iterate with for – Comprehensions – Functions – Generators – Decorators – Namespaces and Scope – Handle Errors with try and except – User Exceptions.

UNIT - III MODULES, PACKAGES AND CLASSES 18hours

Modules, Packages, and Programs: Standalone Programs – Command-Line Arguments – Modules and the import Statement – The Python Standard Library. **Objects and Classes:** Define a Class with class – Inheritance – Override a Method – Add a Method – Get Help from Parent with super–In self Defense –Get and Set Attribute Values with Properties –Name Mangling for Privacy –Method Types – Duck Typing – Special Methods –Composition.

UNIT - IV DATA TYPES AND WEB 16hours

Data Types: Text Strings–Binary Data. **Storing and Retrieving Data:** File Input/Output– Structured Text Files – Structured Binary Files - Relational Databases – No SQL Data Stores.
Web: Web Clients –Web Servers–Web Services and Automation

UNIT - V SYSTEMS AND NETWORKS 18hours

Systems: Files–Directories–Programs and Processes–Calendars and Clocks.
Concurrency: Queues– Processes–Threads–Green Threads and gevent–twisted–Redis.
Networks: Patterns – The Publish-Subscribe Model – TCP/IP – Sockets – Zero MQ –Internet Services – Web Services and APIs – Remote Processing – Big Fat Data and Map Reduce – Workingin the Clouds.

UNIT - VI Contemporary Issues 2 hours

Expert lectures, online seminars –webinars

Total Lecture Hours **90hours**

BOOKS FOR STUDY:

- Bill Lubanovic, "Introducing Python", O'Reilly, First Edition-Second Release, 2014.
- Mark Lutz, "Learning Python", O'Reilly, Fifth Edition, 2013.

BOOKS FOR REFERENCES:

- David M. Beazley, "Python Essential Reference", Developer's Library, Fourth Edition, 2009.
  Sheetal Taneja, Naveen Kumar, "Python Programming-A Modular Approach" ,Pearson Publications.

WEB RESOURCES:

- **https://www.programiz.com/python-programming/**
- **https://www.tutorialspoint.com/python/index.html**
- **https://onlinecourses.swayam2.ac.in/aic20_sp33/preview**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**100 %**	No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the basic concepts of Python Programming	**K1,K2**
CO2	Understand File operations, Classes and Objects	**K2,K3**
CO3	Acquire Object Oriented Skills in Python	**K3,K4**
CO4	Develop web applications using Python	**K5**
CO5	Develop Client Server Networking applications	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	M
CO2	S	S	S	S	S	S	S	M	S	M
CO3	S	S	S	S	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	S	M
CO5	S	S	S	S	S	S	S	M	S	M

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	3	3

CO 2	**3**	**3**	**3**	**3**	**3**
CO 3	**3**	**2**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**2**	**3**	**3**
WEITAGE	**15**	**15**	**14**	**15**	**14**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100**	**93.3**	**93.3**	**100**	**100**

LESSON PLAN:

UNIT	PYTHON PROGRAMMING	HRS	PEDAGOGY
I	**Python:** Introduction–Numbers–Strings–Variables–Lists–Tuples–Dictionaries–Sets– Comparison.	**18**	**LCD, CHALK & TALK**
II	**Code Structures:** if, elseif, and else – Repeat with while – Iterate with for – Comprehensions –Functions – Generators – Decorators – Namespaces and Scope – Handle Errors with try and except – User Exceptions	**18**	**LCD, CHALK & TALK**
III	**Modules, Packages, and Programs:** Standalone Programs – Command-Line Arguments – Modules and the import Statement – The Python Standard Library. **Objects and Classes:** Define a Class with class – Inheritance – Override a Method – Add a Method – Get Help from Parent with super–In self Defense –Get and Set Attribute Values with Properties –Name Mangling for Privacy –Method Types – Duck Typing – Special Methods –Composition	**18**	**LCD, CHALK & TALK**
IV	**Data Types:** Text Strings–Binary Data. **Storing and Retrieving Data:** File Input/Output– Structured Text Files – Structured Binary Files - Relational Databases – No SQL Data Stores. **Web:** Web Clients –Web Servers–Web Services and Automation	**16**	**LCD, CHALK & TALK**
V	**Systems:** Files–Directories–Programs and Processes– Calendars and Clocks. **Concurrency:** Queues Processes – Threads – Green Threads and gevent–twisted–Redis. **Networks:** Patterns – The Publish-Subscribe Model – TCP/IP – Sockets – Zero MQ –Internet Services – Web Services and APIs – Remote Processing – Big Fat Data and Map Reduce – Workingin the Clouds.	**18**	**LCD, CHALK & TALK**
VI	Contemporary Issues	**2**	**Expert lectures, online seminars – webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO2	**K1 – K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
CI AII	**CO3**	**K1 – K5**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO4	**K1 – K6**	2	K1,K2	2 (K3,K3)	2 (K5,K5)
Question Pattern CIA I & II		**No. of Questions to be asked**	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**2**			**2**	**3.6**	**7.2**
	K2	**2**			**2**	**3.6**	
	K3		**20**		**20**	**35.7**	**35.7**
	K4			**32**	**32**	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	**2**			**2**	**3.6**	**7.2**
	K2	**2**			**2**	**3.6**	
	K3		**20**		**20**	**35.7**	**35.7**
	K4			**16**	**16**	**28.57**	**57.1**
	K5			**16**	**16**	**28.57**	
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5- Evaluating, Justifying the problems with solutions.

K6- Combining the solutions with applications.

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	**COs**	**K - Level**	**Section A (MCQs)**		**Section B (Either / or Choice) With K - LEVEL**	**Section C (Either / or Choice) With K - LEVEL**
			No. of Questions	**K – Level**		
1	**CO1**	**K1-K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	**CO2**	**K1-K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	**CO3**	**K1-K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	**CO4**	**K1-K5**	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	**CO5**	**K1-K6**	2	K1,K2	2 (K3,K3)	2 (K6,K6)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	**Section A (Multiple Choice Questions)**	**Section B (Either or Choice**	**Section C (Either/ or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**			**5**	**3.57**	**3.57**
K2	**5**			**5**	**3.57**	**3.57**
K3		**50**		**50**	**35.72**	**35.72**
K4			**48**	**48**	**34.28**	**34.28**
K5			**16**	**16**	**11.43**	**11.43**
K6			**16**	**16**	**11.43**	**11.43**
Marks	**10**	**50**	**80**	**140**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions			**PART – A**		**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K3**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K5**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K5**	
20. a)	**Unit - V**	**CO5**	**K6**	
		OR		
20. b)	**Unit - V**	**CO5**	**K6**	

Course Name	ALGORITHM AND OOPS LAB			
Course Code	23PCSCP11	**L**	**P**	**C**
Category	CORE	-	4	3

COURSE OBJECTIVES:

The main objectives of this course are to:

- This course covers the basic data structures like Stack, Queue, Tree, List.
- This course enables the students to learn the applications of the data structures using various techniques.
- It also enable the students to understand C++ language with respect to OOAD concepts
- Application of OOPS concepts.

LIST OF PROGRAMS **60 Hours**

1) Write a program to solve the tower of Hanoi using recursion.
2) Write a program to traverse through binary search tree using traversals.
3) Write a program to perform various operations on stack using linked list.
4) Write a program to perform various operation in circular queue.
5) Write a program to sort an array of an elements using quick sort.
6) Write a program to solve number of elements in ascending order using heap sort.
7) Write a program to solve the knapsack problem using greedy method
8) Write a program to search for an element in a tree using divide& conquer strategy.
9) Write a program to place the 8 queen son an 8X8matrixso that no two queens Attack.
10) Write a C++ program to perform Virtual Function
11) Write a C++ program to perform Parameterized constructor
12) Write a C++ program to perform Friend Function
13) Write a C++ program to perform Function Overloading
14) Write a C++ program to perform Single Inheritance
15) Write a C++program to perform Employee Details using files.

Expert lectures, online seminars –webinars

Total Lecture Hours **60**

BOOKS FOR STUDY:

- Goodrich,"Data Structures & Algorithms in Java",Wiley3rd edition.
- Skiena,"The Algorithm Design Manual", Second Edition,Springer,2008

BOOKS FOR REFERENCES:

- Anany Levith, "Introduction to the Design and Analysis of algorithm", Pearson Education Asia, 2003.
- Robert Sedgewick, Phillipe Flajolet,"An Introduction to the Analysis of Algorithms", Addison-Wesley Publishing Company, 1996.

WEB RESOURCES:

- **https://onlinecourses.nptel.ac.in/noc19_cs48/preview**
- **https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/**
- **https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_objec_oriented_analysis.html**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**100 %**	No Changes Made	-	New Course	✓		
*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**								

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the concepts of object oriented with respect to C++	**K1,K2**
CO2	Able to understand and implement OOPS concepts	**K2,K3**
CO3	Implementation of data structures like Stack, Queue, Tree, List using C++	**K3,K4**
CO4	Application of the data structures for Sorting, Searching using different techniques.	**K4,K5**
CO5	Code, debug and test the programs with appropriate test cases	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	M	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**2**	**3**	**3**
CO 3	**3**	**3**	**3**	**2**	**3**
CO 4	**3**	**2**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**3**
WEITAGE	**15**	**14**	**13**	**13**	**15**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100%**	**93%**	**93%**	**93%**	**100%**

LESSON PLAN:

S. No	ALGORITHM AND OOPS LAB	HRS	PEDAGOGY
1.	Write a program to solve the tower of Hanoi using recursion.	60	LCD, HANDS ON TRAINING
2.	Write a program to traverse through binary search tree using traversals.		
3.	Write a program to perform various operations on stack using linked list.		
4.	Write a program to perform various operation in circular queue.		
5.	Write a program to sort an array of an elements using quick sort.		
6.	Write a program to solve number of elements in ascending order using heap sort.		
7.	Write a program to solve the knapsack problem using greedy method		
8.	Write a program to search for an element in a tree using divide& conquer strategy.		
9.	Write a program to place the 8 queen son an 8X8matrixso that no two queens Attack.		
10.	Write a C++ program to perform Virtual Function		
11.	Write a C++ program to perform Parameterized constructor		
12.	Write a C++ program to perform Friend Function		
13.	Write a C++ program to perform Function Overloading		
14.	Write a C++ program to perform Single Inheritance		
15.	Write a C++program to perform Employee Details using files		

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
CIA	**CO1**	**K1**	2				
	CO2	**K3**		5			
	CO3	**K4**			5		
	CO4	**K5, K6**				10	
	CO5	**K2**					3
Question Pattern CIA		**No. of Questions to be asked**	2	2	2	2	2
		No. of Questions to be answered	2	2	2	2	2
		Marks for each question	1	2.5	2.5	5	1.5
		Total Marks for each section	2	3	5	5	5

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	**2**					**2**	**8**	**8**
	K2		**3**				**3**	**12**	**12**
	K3			**5**			**5**	**20**	**20**
	K4				**5**		**5**	**20**	**20**
	K5					**5**	**5**	**20**	**20**
	K6					**5**	**5**	**20**	**20**
	Marks	**2**	**3**	**5**	**5**	**10**	**25**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5-Evaluating, Justifying the problems with solutions

K6-Creating solutions for applications

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
S. No.	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
1	**CO1**	**K1**	6				
2	**CO2**	**K3**		15			
3	**CO3**	**K4**			15		
4	**CO4**	**K5, K6**				30	
5	**CO5**	**K2**					9
No. of Questions to be Asked			2	2	2	2	2
No. of Questions to be answered			2	2	2	2	2
Marks for each question			3	7.5	7.5	15	4.5
Total Marks for each section			6	15	15	30	9

Distribution of Marks with K Level								
K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	6					6	8	8
K2		9				9	12	12
K3			15			15	20	20
K4				15		15	20	20
K5					15	6	20	20
K6					15	9	20	20
Marks	6	9	15	15	30	75	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Course Name	PYTHON PROGRAMMING LAB			
Course Code	23PCSCP12	**L**	**P**	**C**
Category	CORE	-	4	3

COURSE OBJECTIVES:

The main objectives of this course are to:

- This course presents an overview of elementary data items, lists, dictionaries, sets and tuples
- To understand and write simple Python programs
- To Understand the OOPS concepts of Python
- To develop web applications using Python

List of Programs **60 Hours**

Implement the following in Python:

1. Programs using elementary data items, lists, dictionaries and tuples
2. Programs using conditional branches,
3. Programs using loops.
4. Programs using functions
5. Programs using exception handling
6. Programs using inheritance
7. Programs using polymorphism
8. Programs to implement file operations.
9. Programs using modules.
10. Programs for creating dynamic and interactive web pages using forms.

Total Lecture Hours **60 Hours**

BOOKS FOR STUDY:

- Bill Lubanovic, “Introducing Python”, O’Reilly, First Edition-Second Release, 2014.
- Mark Lutz, “Learning Python”, O’Reilly, Fifth Edition, 2013.

BOOKS FOR REFERENCES:

- David M. Beazley, “Python Essential Edition, 2009.
- Sheetal Taneja, Naveen Kumar, Approach” ,Pearson Publications.

WEB RESOURCES:

- **https://www.programiz.com/python-programming/**
- **https://www.tutorialspoint.com/python/index.html**
- **https://onlinecourses.swayam2.ac.in/aic20_sp33/preview**

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED		ENTREPRENEURSHIP				
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL			
Changes Made in the Course	Percentage of Change		**100 %**	No Changes Made		New Course	✓			
*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**										

COURSE OUTCOMES:		**K LEVEL**
On the successful completion of the course, student will be able to:		
CO1	Able to write programs in Python using OOPS concepts	**K1**
CO2	To understand the concepts of File operations and Modules in Python	**K2**
CO3	Implementation of lists, dictionaries, sets and tuples as programs	**K3**
CO4	To develop web applications using Python	**K4**
CO5	Code, debug and test the programs with appropriate test cases	**K5**

K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create

Mapping with Programming Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	M
CO2	S	S	S	S	S	S	S	M	S	M
CO3	S	S	S	S	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	S	M
CO5	S	S	S	S	S	S	S	M	S	M

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	2
CO 3	3	3	2	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
WEITAGE	15	15	14	14	15
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	100%	93%	100%	93%

LESSON PLAN:			
S. No.	**PYTHON PROGRAMMING LAB**	**HRS**	**PEDAGOGY**
	Implement the following in Python:		
1.	Programs using elementary data items, lists, dictionaries and tuples		
2.	Programs using conditional branches,		
3.	Programs using loops.		
4.	Programs using functions		
5.	Programs using exception handling	60	**LCD & HANDS ON TRAINING**
6.	Programs using inheritance		
7.	Programs using polymorphism		
8.	Programs to implement file operations.		
9.	Programs using modules.		
10.	Programs for creating dynamic and interactive web pages using forms.		

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
CIA	**CO1**	**K1**	5				
	CO2	**K2**		5			
	CO3	**K3**			5		
	CO4	**K4**				5	
	CO5	**K5**					5
Question Pattern CIA		**No. of Questions to be asked**	2	2	2	2	2
		No. of Questions to be answered	2	2	2	2	2
		Marks for each question	2.5	2.5	2.5	2.5	2.5
		Total Marks for each section	5	5	5	5	5

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	5					2	8	8
	K2		5				3	12	12
	K3			5			5	20	20
	K4				5		5	20	20
	K5					5	5	20	20
	K6						5	20	20
	Marks	5	5	5	5	5	25	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5-Evaluating, Justifying the problems with solutions

K6-Creating solutions for applications

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
S. No.	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
1	**CO1**	**K1**	15				
2	**CO2**	**K2**		15			
3	**CO3**	**K3**			15		
4	**CO4**	**K4**				15	
5	**CO5**	**K5**					15
No. of Questions to be Asked			2	2	2	2	2
No. of Questions to be answered			2	2	2	2	2
Marks for each question			7.5	7.5	7.5	7.5	7.5
Total Marks for each section			15	15	15	15	15

Distribution of Marks with K Level								
K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	15					15	20	20
K2		15				15	20	20
K3			15			15	20	20
K4				15		15	20	20
K5					15	15	20	20
Marks	6	9	15	15	30	75	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Course Name	ADVANCED SOFTWARE ENGINEERING			
Course Code	23PCSEC11	**L**	**P**	**C**
Category	ELECTIVE	4	-	3

COURSE OBJECTIVES:

The main objectives of this course are to:

- Introduce to Software Engineering, Design, Testing and Maintenance.
- Enable the students to learn the concepts of Software Engineering.
- Learn about Software Project Management, Software Design & Testing.

UNIT - I INTRODUCTION 12hours

Introduction: The Problem Domain – Software Engineering Challenges - Software Engineering Approach – Software Processes: Software Process – Characteristics of a Software Process – Software Development Process Models – Other software processes.

UNIT - II SOFTWARE REQUIREMENTS 12hours

Software Requirements Analysis and Specification: Requirement engineering – Type of Requirements – Feasibility Studies – Requirements Elicitation – Requirement Analysis – Requirement Documentation – Requirement Validation – Requirement Management – SRS - Formal System Specification – Axiomatic Specification – Algebraic Specification - Case study: Student Result management system. Software Quality Management –Software Quality, SoftwareQuality Management System, ISO 9000, SEI CMM.

UNIT - III PROJECT MANAGEMENT 12hours

Software Project Management: Responsibilities of a software project manager – Project planning – Metrics for Project size estimation – Project Estimation Techniques – Empirical Estimation Techniques – COCOMO – Halstead‟s software science – Staffing level estimation – Scheduling–Organization and Team Structures – Staffing – Risk management – Software Configuration Management – Miscellaneous Plan.

UNIT - IV SOFTWARE DESIGN 10hours

Software Design: Outcome of a Design process – Characteristics of a good software design –Cohesion and coupling - Strategy of Design – Function Oriented Design – Object Oriented Design - Detailed Design - IEEE Recommended Practice for Software Design Descriptions.

UNIT - V SOFTWARE TESTING 12hours

Software Testing: A Strategic approach to software testing – Terminologies – Functional testing– Structural testing – Levels of testing – Validation testing - Regression testing – Art of Debugging–Testing tools-Metrics-Reliability Estimation. Software Maintenance -Maintenance Process - ReverseEngineering – Software Re-engineering - Configuration Management Activities.

UNIT - VI Contemporary Issues 2hours

Expert lectures, online seminars –webinars

Total Lecture Hours 60hours

BOOKS FOR STUDY:

- An Integrated Approach to Software Engineering–Pankaj Jalote, Narosa Publishing House, Delhi,3rd Edition.
- Fundamentals of Software Engineering – Rajib Mall, PHI Publication, 3rd Edition.

BOOKS FOR REFERENCES:

- Software Engineering– K.K. Aggarwal and Yogesh Singh, New Age International Publishers, 3rd edition.
- A Practitioners Approach-Software Engineering,-R.S. Pressman, McGraw Hill.
- Fundamentals of Software Engineering – Carlo Ghezzi, M. Jarayeri, D. Manodrioli, PHI Publication.

WEB RESOURCES:

- **https://www.javatpoint.com/software-engineering-tutorial**
- **https://onlinecourses.swayam2.ac.in/cec20_cs07/preview**
- **https://onlinecourses.nptel.ac.in/noc19_cs69/preview**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**100%**	No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand about Software Engineering process	**K1,K2**
CO2	Understand about Software project management skills, design and qualitymanagement	**K2,K3**
CO3	Analyze on Software Requirements and Specification	**K3,K4**
CO4	Analyze on Software Testing, Maintenance and Software Re-Engineering	**K4,K5**
CO5	Designandconductvarioustypesandlevelsofsoftwarequalityforasoftware project	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	M	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**3**	**3**
CO 2	**2**	**3**	**3**	**3**	**3**
CO 3	**3**	**2**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**2**
WEITAGE	**15**	**14**	**14**	**15**	**15**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**93%**	**93%**	**100%**	**100%**	**93%**

LESSON PLAN:

UNIT	ADVANCED SOFTWARE ENGINEERING	HRS	PEDAGOGY
I	Introduction: The Problem Domain – Software Engineering Challenges - Software Engineering Approach – Software Processes: Software Process – Characteristics of a Software Process – Software Development Process Models – Other software processes	**12**	**LCD, CHALK & TALK**
II	Software Requirements Analysis and Specification: Requirement engineering – Type of Requirements – Feasibility Studies – Requirements Elicitation – Requirement Analysis – Requirement Documentation – Requirement Validation – Requirement Management – SRS - Formal System Specification – Axiomatic Specification – Algebraic Specification - Case study: Student Result management system. Software Quality Management –Software Quality, Software Quality Management System, ISO 9000, SEI CMM.	**12**	**LCD, CHALK & TALK**
III	Software Project Management: Responsibilities of a software project manager – Project planning – Metrics for Project size estimation – Project Estimation Techniques – Empirical Estimation Techniques – COCOMO – Halstead‟s software science – Staffing level estimation – Scheduling– Organization and Team Structures – Staffing – Risk management – Software Configuration Management – Miscellaneous Plan	**12**	**LCD, CHALK & TALK**
IV	Software Design: Outcome of a Design process – Characteristics of a good software design –Cohesion and coupling - Strategy of Design – Function Oriented Design – Object Oriented Design - Detailed Design - IEEE Recommended Practice for Software Design Descriptions.	**10**	**LCD, CHALK & TALK**
V	Software Testing: A Strategic approach to software testing – Terminologies – Functional testing– Structural testing – Levels of	**12**	**LCD, CHALK &**

	testing – Validation testing - Regression testing – Art of Debugging– Testing tools-Metrics-Reliability Estimation. Software Maintenance - Maintenance Process - ReverseEngineering – Software Re-engineering - Configuration Management Activities.		**TALK**
VI	Contemporary Issues	**2**	**Expert lectures, online seminars – webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO2	**K1 – K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
CI AII	**CO3**	**K1 – K5**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO4	**K1 – K6**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
Question Pattern CIA I & II		**No. of Questions to be asked**	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analysing, presentation and make inferences with evidences

K5- Evaluating, Justifying the problems with solutions.

K6- Combining the solutions with applications.

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			16	16	28.57	57.1
	K5			16	16	28.57	
	Marks	4	20	32	56	100	100

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	**Section A (Multiple Choice Questions)**	**Section B (Either or Choice**	**Section C (Either/ or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**			**5**	**3.57**	**3.57**
K2	**5**			**5**	**3.57**	**3.57**
K3		**50**		**50**	**35.72**	**35.72**
K4			**48**	**48**	**34.28**	**34.28**
K5			**16**	**16**	**11.43**	**11.43**
K6			**16**	**16**	**11.43**	**11.43**
Marks	**10**	**50**	**80**	**140**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K3**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K5**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K5**	
20. a)	**Unit - V**	**CO5**	**K6**	
		OR		
20. b)	**Unit - V**	**CO5**	**K6**	


SECOND SEMESTER

Course Name	DATA MINING AND WARE HOUSING			
Course Code	23PCSCC21	**L**	**P**	**C**
Category	CORE	6	-	5

COURSE OBJECTIVES:

The main objectives of this course are to:

- Enable the students to learn the concepts of Mining tasks, classification, clustering and Data Warehousing.
- Develop skills of using recent data mining software for solving practical problems. Develop and apply critical thinking, problem-solving, and decision-making skills.
- Develop and apply critical thinking, problem-solving, and decision-making skills

UNIT - I BASICS AND TECHNIQUES 18hours

Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective. Data mining techniques: Introduction – a statistical perspective on data mining – similaritymeasures – decision trees – neural networks – genetic algorithms.

UNIT - II ALGORITHMS 18hours

Classification: Introduction –Statistical –based algorithms -distance–based algorithms-decision tree-based algorithms-neural network–based algorithms–rule-based algorithms–combining techniques.

UNIT - III CLUSTERING AND ASSOCIATION 18hours

Clustering: Introduction–Similarity and Distance Measures–Outliers–Hierarchical Algorithms Partitional Algorithms.-Association rules: Introduction - large item sets - basic algorithms – parallel &distributed algorithms – comparing approaches- incremental rules – advanced association rules techniques – measuring the quality of rules.

UNIT - IV DATA WAREHOUSING AND MODELING 16hours

Data warehousing: introduction-characteristics of a data warehouse–data marts–other aspects Of data mart .Online analytical processing: Introduction –OLTP & OLAP systems Data modeling –star schema for multidimensional view –data modeling – multi fact star schema orsnow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.

UNIT - V APPLICATIONS OF DATA WAREHOUSE 10hours

Developing a data WAREHOUSE: why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations – crucial decisions in designing a data warehouse. Applications of data warehousing and data mining in government: Introduction - national data warehouses – other areas for data warehousing and data mining.

UNIT - VI CONTEMPORY ISSUES 2 hours

Expert lectures, online seminars –webinars

Total Lecture Hours	**90 Hours**

BOOKS FOR STUDY:

- Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson education,2003
- C.S.R. Prabhu, "Data Warehousing Concepts, Techniques, Products and Applications", PHI,Second Edition

BOOKS FOR REFERENCES:

- ArunK.Pujari, "Data Mining Techniques",Universities Press(India)Pvt. Ltd.,2003.
- AlexBerson, StephenJ.Smith,"DataWarehousing, DataMining and OLAP",TMCH, 2001
- Jiawei Han &Micheline Kamber, Academic press."Data Mining Concepts&Techniques",2001,

WEB RESOURCES:

- **https://www.javatpoint.com/data-warehouse**
- **https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/**
- **https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**80 %**	No Changes Made	-	New Course	-		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the basic data mining techniques and algorithms	**K1,K2**
CO2	Understand the Association rules, Clustering techniques and Data warehousing contents	**K2,K3**
CO3	Compare and evaluate different data mining techniques like classification, prediction, Clustering and association rule mining	**K4,K5**
CO4	Design data warehouse with dimensional modeling and apply OLAP operations	**K5,K6**
CO5	Identify appropriate data mining algorithms to solve real world problems	**K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	S	M	M	M	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**3**	**3**
CO 2	**2**	**3**	**3**	**3**	**2**
CO 3	**3**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**2**	**3**
WEITAGE	**14**	**15**	**14**	**14**	**14**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**93%**	**100%**	**100%**	**93%**	**93%**

LESSON PLAN:

UNIT	DATA MINING AND WARE HOUSING	HRS	PEDAGOGY
I	Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective. Data mining techniques: Introduction – a statistical perspective on data mining – similaritymeasures – decision trees – neural networks – genetic algorithms	**18**	**LCD CHALK & TALK**
II	Classification: Introduction –Statistical –based algorithms -distance– based algorithms-decision tree- based algorithms-neural network– based algorithms–rule-based algorithms–combining techniques	**18**	**LCD CHALK & TALK**
III	Clustering: Introduction–Similarity and Distance Measures–Outliers– Hierarchical Algorithms- Partitional Algorithms. Association rules: Introduction - large item sets - basic algorithms – parallel &distributed algorithms – comparing approaches- incremental rules – advanced association rules techniques – measuring the quality of rules	**18**	**LCD CHALK & TALK**
IV	Data warehousing: introduction-characteristics of a data warehouse–data marts–other aspects Of data mart .Online analytical processing: Introduction –OLTP & OLAP systems Data modeling –star schema for multidimensional view –data modeling – multi fact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.	**16**	**LCD CHALK & TALK**
V	Developing a data WAREHOUSE: why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations crucial decisions in designing a data warehouse. Applications of data warehousing and data mining in government:	**18**	**LCD CHALK & TALK**

	Introduction - national data warehouses – other areas for data warehousing and data mining		
VI	**Contemporary Issues**	**2**	**Expert lectures, online seminars – webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	2	K1,K2	2 (K3, K3)	2 (K4, K4)
	CO2	**K1 – K4**	2	K1,K2	2 (K3, K3)	2 (K4, K4)
CI AII	**CO3**	**K1 – K5**	2	K1,K2	2 (K3, K3)	2 (K4, K4)
	CO4	**K1 – K6**	2	K1,K2	2 (K3, K3)	2 (K5, K5)
Question Pattern CIA I & II		**No. of Questions to be asked**	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			16	16	28.57	57.1
	K5			16	16	28.57	
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5- Evaluating, Justifying the problems with solutions.

K6- Combining the solutions with applications.

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	**Section A (Multiple Choice Questions)**	**Section B (Either or Choice**	**Section C (Either/ or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**			**5**	**3.57**	**3.57**
K2	**5**			**5**	**3.57**	**3.57**
K3		**50**		**50**	**35.72**	**35.72**
K4			**48**	**48**	**34.28**	**34.28**
K5			**16**	**16**	**11.43**	**11.43**
K6			**16**	**16**	**11.43**	**11.43**
Marks	**10**	**50**	**80**	**140**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K3**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K5**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K5**	
20. a)	**Unit - V**	**CO5**	**K6**	
		OR		
20. b)	**Unit - V**	**CO5**	**K6**	

Course Name	ADVANCED OPERATING SYSTEMS			
Course Code	23PCSCC22	**L**	**P**	**C**
Category	CORE	6	-	5

COURSE OBJECTIVES:

The main objectives of this course are to:

- Enable the students to learn the different types of operating systems and their functioning.
- Gain knowledge on Distributed Operating Systems
- Gain in sight into the components and management aspects of realtime and mobile operating systems.
- Learn case studies in Linux Operating Systems.

UNIT - I BASICS OF OPERATING SYSTEMS 18hours

Basics of Operating Systems: What is an Operating System? – Main frame Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems –Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments -Process Scheduling – Cooperating Processes – Inter Process Communication- Deadlocks –Prevention – Avoidance – Detection – Recovery.

UNIT - II DISTRIBUTED OPERATING SYSTEMS 18 hours

Distributed Operating Systems: Issues – Communication Primitives – Lamport‟s Logical Clocks –Deadlock handling strategies – Issues in deadlock detection and resolution-distributed file systems–design issues – Case studies – The Sun Network File System-Coda.

UNIT - III REAL TIME OPERATING SYSTEM 18 hours

Realtime Operating Systems : Introduction – Applications of Real Time Systems – Basic Modelof Real Time System – Characteristics – Safety and Reliability - Real Time Task Scheduling

UNIT - IV HAND HELD SYSTEM 16 hours

Operating Systems for Hand held Systems: Requirements–Technology Overview–Hand held Operating Systems–Palm OS-Symbian Operating System-Android–Architecture of android– Securing hand held systems.

UNIT - V CASE STUDIES 18 hours

Case Studies : Linux System: Introduction – Memory Management – Process Scheduling – Scheduling Policy - Managing I/O devices – Accessing Files- iOS : Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer - File System.

UNIT – VI Contemporary Issues 2 hours

Expert lectures, online seminars–webinars

Total Lecture Hours 60 hours

BOOKS FOR STUDY:

- Abraham Silberschatz; Peter Baer Galvin; GregGagne,"Operating System Concepts", SeventhEdition, John Wiley & Sons, 2004.
- Mukesh Singhal and Niranjan G. Shivaratri, "Advanced Concepts in Operating Systems –Distributed, Database, and Multiprocessor Operating Systems", Tata McGraw-Hill, 2001.

BOOKS FOR REFERENCES:

- RajibMall,"Real-Time Systems:Theory and Practice",Pearson Education India,2006.
- Pramod Chandra P.Bhatt, An introduction to operating systems, concept and practice, PHI,Third edition, 2010.
- Daniel.P.Bovet&MarcoCesati,"UnderstandingtheLinuxkernel",3rd edition,O"Reilly,2005.
- Neil Smyth, "iPhone iOS 4 Development Essentials–X code", Fourth Edition, Payload media, 2011.

WEB RESOURCES:

- **https://onlinecourses.nptel.ac.in/noc20_cs04/preview**
- **https://www.udacity.com/course/advanced-operating-systems--ud189**
- **https://minnie.tuhs.org/CompArch/Resources/os-notes.pdf**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**100 %**	No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		K LEVEL
After studying this course, the students will be able to:		
CO1	Understand the design issues associated with operating systems	K1 to K2
CO2	Master various process management concepts including scheduling, deadlocks and distributed file systems	K3 to K4
CO3	Prepare Real Time Task Scheduling	K4 to K5
CO4	Analyze Operating Systems for Handheld Systems	K5
CO5	Analyze Operating Systems like LINUX and IOS	K5 to K6

K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	S	M	M	M	M
CO2	S	M	S	S	S	S	S	M	S	M
CO3	S	M	S	S	S	S	S	M	S	M
CO4	S	M	S	S	S	S	S	M	S	M
CO5	S	M	S	S	S	S	S	M	S	M

S- STRONG M – MEDIUM L - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	2
CO 5	3	3	2	3	3
WEITAGE	15	15	14	15	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100	100	93.3	100	93.3

LESSON PLAN:

UNIT	ADVANCED OPERATING SYSTEMS	HRS	PEDAGOGY
I	Basics of Operating Systems: What is an Operating System? – Main frame Systems –Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems –Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments -	18	LCD CHALK & TALK

	Process Scheduling – Cooperating Processes – Inter Process Communication- Deadlocks –Prevention – Avoidance – Detection – Recovery		
II	Distributed Operating Systems: Issues – Communication Primitives – Lamport‟s Logical Clocks – Deadlock handling strategies – Issues in deadlock detection and resolution-distributed file systems –design issues – Case studies – The Sun Network File System-Coda.	**18**	**LCD CHALK & TALK**
III	Operating Systems for Hand held Systems: Requirements–Technology Overview–Hand held Operating Systems–Palm OS-Symbian OperatingSystem-Android–Architecture of android– Securing hand held systems	**18**	**LCD CHALK & TALK**
IV	Data warehousing: introduction-characteristics of a data warehouse–data marts–other aspects Of data mart .Online analytical processing: Introduction –OLTP & OLAP systems Data modeling –star schema for multidimensional view –data modeling – multi fact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.	**16**	**LCD CHALK & TALK**
V	Case Studies : Linux System: Introduction – Memory Management – Process Scheduling – Scheduling Policy - Managing I/O devices – Accessing Files- iOS : Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer - File System	**18**	**LCD CHALK & TALK**
VI	Contemporary Issues	**2**	**Expert lectures, online seminars–webinars**

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	Cos	K Level	Section A		Section B Either or Choice	Section C Either or Choice
			MCQs			
			No. of. Questions	K - Level		
CI AI	CO1	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO2	K1 – K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
CI AII	CO3	K1 – K5	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO4	K1 – K6	2	K1,K2	2 (K3,K3)	2 (K5,K5)
Question Pattern CIA I & II		No. of Questions to be asked	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	Section A (Multiple Choice Questions)	Section B (Either / Or Choice)	Section C (Either / Or Choice)	Total Marks	% of (Marks without choice)	Consolidate of %
CIA I	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			32	32	57.1	57.1
	Marks	4	20	32	56	100	100
CIA II	K1	2			2	3.6	7.2
	K2	2			2	3.6	
	K3		20		20	35.7	35.7
	K4			16	16	28.57	57.1
	K5			16	16	28.57	
	Marks	4	20	32	56	100	100

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5- Evaluating, Justifying the problems with solutions.

K6- Combining the solutions with applications.

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	**Section A (Multiple Choice Questions)**	**Section B (Either or Choice**	**Section C (Either/ or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**			**5**	**3.57**	**3.57**
K2	**5**			**5**	**3.57**	**3.57**
K3		**50**		**50**	**35.72**	**35.72**
K4			**48**	**48**	**34.28**	**34.28**
K5			**16**	**16**	**11.43**	**11.43**
K6			**16**	**16**	**11.43**	**11.43**
Marks	**10**	**50**	**80**	**140**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions			**PART – A**		**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K3**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K5**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K5**	
20. a)	**Unit - V**	**CO5**	**K6**	
		OR		
20. b)	**Unit - V**	**CO5**	**K6**	

Course Name	ADVANCED JAVA PROGRAMMING			
Course Code	23PCSCC23	**L**	**P**	**C**
Category	CORE	6	-	5

COURSE OBJECTIVES:

The main objectives of this course are to:

- Enable the students to learn the basic functions, principles and concepts of advanced java programming.
- Provide knowledge on concepts needed for distributed Application Architecture.
- Learn JDBC, Servlet packages, JQuery, Java Server Pages and JAR file format

UNIT - I BASICS OF JAVA **15 hours**

Java Basics Review: Components and event handling–Threading concepts–Networking features – Media techniques

UNIT - II REMOTE METHOD INVOCATION **15 hours**

Remote Method Invocation-Distributed Application Architecture- Creating stubs and skeletons-Defining Remote objects- Remote Object Activation-Object Serialization-Java Spaces

UNIT - III DATABASE **15 hours**

JavainDatabases-JDBCprinciples–databaseaccess-Interacting-databasesearch–Creating multimedia databases – Database support in web applications

UNIT - IV SERVLETS **13 hours**

Java Servlets: Java Servlet and CGI programming- A simple java Servlet-Anatomy of a java Servlet-Readingdata from a client-Reading http request header-sending data to a client and writing the http response header-working with cookies

Java Server Pages: JSP Overview-Installation-JSP tags-Components of a JSP page-Expressions-Scriptlets-Directives-Declarations-A complete example

UNIT - V ADVANCED TECHNIQUES **15 hours**

JAR file format creation–Internationalization–Swing Programming–Advanced java Techniques

UNIT – VI CONTEMPORARY ISSUES **2 hours**

Expert lectures, online seminars –webinars

Total Lecture Hours **60 hours**

BOOKS FOR STUDY:

- JamieJaworski,"Java Unleashed",SAMSTechmedia Publications,1999.
- Campione, Walrath and Huml,"The Java Tutorial",Addison Wesley,1999.

BOOKS FOR REFERENCES:

- Deitel and Deitel, "Java How to Program",Third Edition, PHI/Pearson Education Asia.

WEB RESOURCES:

- **https://www.tutorialspoint.com/java/index.htm**
- **https://www.tutorialspoint.com/java/index.htm**
- **https://onlinecourses.nptel.ac.in/noc19_cs84/preview**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**50 %**	No Changes Made		New Course			

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the advanced concepts of Java Programming	**K1,K2**
CO2	Understand JDBC and RMI concepts	**K2,K3**
CO3	Apply and analyze Java in Database	**K3,K4**
CO4	Handle different event in java using the delegation event model, event listenerand class	**K5**
CO5	Design interactive applications using Java Servlet, JSP and JDBC	**K5,K6**

K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	M	M	M	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**3**	**3**	**2**
CO 3	**3**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**2**	**3**	**3**	**3**
WEITAGE	**15**	**14**	**14**	**15**	**14**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100**	**93.3**	**100**	**100**	**93.3**

LESSON PLAN:

UNIT	ADVANCED JAVA PROGRAMMING	HRS	PEDAGOGY
I	Java Basics Review: Components and event handling–Threading concepts–Networking features – Mediatechniques	**18**	**LCD, CHALK & TALK**
II	Remote Method Invocation-Distributed Application Architecture- Creating stubs and skeletons-Defining Remote objects- Remote Object Activation-Object Serialization-Java Spaces	**18**	**LCD, CHALK & TALK**
III	JavainDatabases-JDBCprinciples–databaseaccess-Interacting-databasesearch–Creating multimedia databases – Database support in web applications	**18**	**LCD, CHALK & TALK**
IV	Java Servlets: Java Servlet and CGI programming- A simple java Servlet-Anatomy of a java Servlet-Reading data from a client-Reading http request header-sending data to a client and writingthe http response header-working with cookies Java Server Pages: JSP Overview-Installation-JSP tags-Components of a JSP page-Expressions- Scriptlets-Directives-Declarations-A complete example	**16**	**LCD, CHALK & TALK**
V	JAR file format creation–Internationalization–Swing Programming–Advanced java Techniques	**18**	**LCD, CHALK & TALK**
VI	Expert lectures, online seminars –webinars	**2**	**Expert lectures, online seminars – webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO2	**K1 – K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
CI AII	**CO3**	**K1 – K5**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO4	**K1 – K6**	2	K1,K2	2 (K3,K3)	2 (K5,K5)
Question Pattern CIA I & II		**No. of Questions to be asked**	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**2**			**2**	**3.6**	**7.2**
	K2	**2**			**2**	**3.6**	
	K3		**20**		**20**	**35.7**	**35.7**
	K4			**32**	**32**	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	**2**			**2**	**3.6**	**7.2**
	K2	**2**			**2**	**3.6**	
	K3		**20**		**20**	**35.7**	**35.7**
	K4			**16**	**16**	**28.57**	**57.1**
	K5			**16**	**16**	**28.57**	
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5- Evaluating, Justifying the problems with solutions.

K6- Combining the solutions with applications.

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			48	48	34.28	34.28
K5			16	16	11.43	11.43
K6			16	16	11.43	11.43
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K3**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K5**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K5**	
20. a)	**Unit - V**	**CO5**	**K6**	
		OR		
20. b)	**Unit - V**	**CO5**	**K6**	

Course Name	ADVANCED JAVA PROGRAMMING LAB			
Course Code	23PCSCP21	**L**	**P**	**C**
Category	CORE	-	6	4

COURSE OBJECTIVES:

The main objectives of this course are to:

- To enable the students to implement the simple programs using JSP,JAR
- To provide knowledge on using Servlets, Applets
- To introduce JDBC and navigation of records
- To understand RMI& its implementation
- To introduce to Socket programming.

LIST OF PROGRAMS **90**

1. Display a welcome message using Servlet.
2. Design a Purchase Order for musing Html for mand Servlet.
3. Develop a program for calculating the percentage of marks of a student using JSP.
4. Design a Purchase Order for musing Html form and JSP.
5. Prepare a Employee pays lip using JSP.
6. Write a program using JDBC for creating a table, Inserting, Deleting records and list out the records.
7. Write a program using Java servlet to handle form data.
8. Write a simple Servlet program to create able of all the header sit receives along with their associated values.
9. Write a program in JSP by using session object.
10. Write a program to build as imple Client Server application using RMI.
11. Create an applet for a calculator application.
12. Program to send a text message to another system and receive the text message from the system (usesocket programming).

Total Lecture Hours **90**

BOOKS FOR STUDY:

- Jamie Jaworski,"Java Unleashed",SAMSTechmedia Publications,1999.
- Campione, Walrath and Huml,"The Java Tutorial",Addison Wesley,1999.

BOOKS FOR REFERENCES:

- Jim Keogh, "The Complete Reference J2EE",Tata Mc Graw Hill Publishing Company Ltd,2010.
- David Sawyer McFarland,"Java Script And JQuery-The Missing Manual",Oreilly Publications,3rd Edition,2011.

WEB RESOURCES:

- **https://www.javatpoint.com/servlet-tutorial**
- **https://www.tutorialspoint.com/java/index.htm**
- **https://onlinecourses.nptel.ac.in/noc19_cs84/preview**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**60%**	No Changes Made	-	New Course	-		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand to the implement concepts of Java using HTML forms, JSP&JAR	**K1,K2**
CO2	Must be capable of implementing JDBC and RMI concepts	**K3,K4**
CO3	Able to write Applets with Event handling mechanism	**K4,K5**
CO4	To Create interactive web based applications using servlets and jsp	**K5,K6**

K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**2**	**3**	**3**	**3**
CO 2	**3**	**3**	**2**	**3**	**3**
CO 3	**3**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**3**
WEITAGE	**15**	**14**	**14**	**15**	**15**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100%**	**93%**	**93%**	**100%**	**100%**

LESSON PLAN:

UNIT	ADVANCED JAVA PROGRAMMING LAB	HRS	PEDAGOGY
	1. Display a welcome message using Servlet. **2.** Design a Purchase Order for musing Html for mand Servlet. **3.** Develop a program for calculating the percentage of marks of a student using JSP. **4.** Design a Purchase Order for musing Html form and JSP. **5.** Prepare a Employee pays lip using JSP. **6.** Write a program using JDBC for creating a table, Inserting, Deleting records and list out the records. **7.** Write a program using Java servlet to handle form data. **8.** Write a simple Servlet program to create able of all the header sit receives along with their associated values. **9.** Write a program in JSP by using session object. **10.** Write a program to build as imply Client Server application using RMI. **11.** Create an applet for a calculator application. **12.** Program to send a text message to another system and receive the text message from the system (use socket programming).	**90**	**LCD, HANDS ON TRAINING**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
CIA	**CO1**	**K1**	5				
	CO2	**K3**		5			
	CO3	**K4**			5		
	CO4	**K5, K6**				5	
	CO5	**K2**					5
Question Pattern CIA		**No. of Questions to be asked**	2	2	2	2	2
		No. of Questions to be answered	2	2	2	2	2
		Marks for each question	2.5	2.5	2.5	2.5	2.5
		Total Marks for each section	5	5	5	5	5

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	2					**2**	**8**	**8**
	K2		3				**3**	**12**	**12**
	K3			5			5	20	20
	K4				5		5	20	20
	K5					**5**	**5**	**20**	**20**
	K6					**5**	**5**	**20**	**20**
	Marks	**2**	**3**	**5**	**5**	**10**	**25**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5-Evaluating, Justifying the problems with solutions

K6-Creating solutions for applications

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
S. No.	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
1	**CO1**	**K1**	**6**				
2	**CO2**	**K3**		**15**			
3	**CO3**	**K4**			**15**		
4	**CO4**	**K5, K6**				**15**	
5	**CO5**	**K2**					**9**
No. of Questions to be Asked			**2**	**2**	**2**	**2**	**2**
No. of Questions to be answered			**2**	**2**	**2**	**2**	**2**
Marks for each question			**3**	**7.5**	**7.5**	**7.5**	**4.5**
Total Marks for each section			**15**	**15**	**15**	**15**	**15**

Distribution of Marks with K Level								
K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	6					**6**	**8**	**8**
K2		9				**9**	**12**	**12**
K3			15			15	20	20
K4				15		15	20	20
K5					15	6	20	20
K6					15	9	20	20
Marks	**6**	**9**	**15**	**15**	**30**	**75**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

Course Name	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING			
Course Code	23PCSEC21	**L**	**P**	**C**
Category	ELECTIVE	4	-	3

COURSE OBJECTIVES:

The main objectives of this course are to:

- Enable the students to learn the basic functions of AI, Heuristic Search Techniques.
- Provide knowledge on concepts of Representations and Mappings and Predicate Logic.
- Introduce Machine Learning with respect Data Mining, Big Data and Cloud.
- Study about Applications & Impact of ML.

UNIT - I INTRODUCTION **12 Hours**

Introduction: AI Problems - Al techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics - Issues in design of Search

UNIT - II SEARCH TECHNIQUES **12 Hours**

Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings - Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.

UNIT - III PREDICATE LOGIC **12 Hours**

Using Predicate logic: Representing simple facts in logic - Representing Instance and Isa relationships - Computable functions and predicates - Resolution - Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge- Logic programming -Forward Vs Backward reasoning - Matching-Control knowledge.

UNIT - IV MACHINE LEARNING **10 Hours**

Understanding Machine Learning:What Is Machine Learning?-Defining Big Data-Big Data in Context with Machine Learning-The Importance of the Hybrid Cloud-Leveraging the Power of Machine Learning-The Roles of Statistics and Data Mining with Machine Learning-Putting Machine Learning in Context-Approaches to Machine Learning.

UNIT - V APPLICATIONS OF MACHINE LEARNING **12Hours**

Looking Inside Machine Learning: The Impact of Machine Learning on Applications-Data Preparation-The Machine Learning Cycle.

UNIT – VI Contemporary **2 Hours**

Expert lectures, on line seminars –webinars

Total Lecture Hours **60 hours**

BOOKS FOR STUDY:

- Elaine Richand Kevin Knight,"Artificial Intelligence",Tata Mc GrawHill Publishers company Pvt Ltd, Second Edition, 1991.
- GeorgeFLuger,"ArtificialIntelligence",4thEdition, Pearson Education Publ,2002.

BOOKS FOR REFERENCES:

- Machine Learning for Dummies®, IBM Limited Edition by Judith Hurwitz, Daniel Kirsch.

WEB RESOURCES:

- **https://www.ibm.com/downloads/cas/GB8ZMQZ3**
- **https://www.javatpoint.com/artificial-intelligence-tutorial**
- **https://nptel.ac.in/courses/106/105/106105077/**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**100 %**	No Changes Made		New Course	✓		
*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**								

COURSE OUTCOMES:		**K LEVEL**
On the successful completion of the course, student will be able to:		
CO1	Demonstrate AI problems and techniques	**K1,K2**
CO2	Understand machine learning concepts	**K2,K3**
CO3	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning	**K3,K4**
CO4	Analyze the impact of machine learning on applications	**K4,K5**
CO5	Analyze and design are al world problem for implementation and understand the dynamic behavior of a system	**K5,K6**
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create		

Mapping with Programming Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	M	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:					
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	**3**	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**3**	**3**	**3**
CO 3	**2**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**2**
CO 5	**3**	**3**	**3**	**3**	**3**
WEITAGE	**14**	**15**	**15**	**15**	**14**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**93.3**	**100**	**100**	**100**	**93.3**

LESSON PLAN:

UNIT	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	HRS	PEDAGOGY
I	Introduction: AI Problems - Al techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics - Issues in design of Search	**15**	**LCD & CHALK & TALK**
II	Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings - Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.	**15**	**LCD & CHALK & TALK**
III	Understanding Machine Learning:What Is Machine Learning?-Defining Big Data-Big Data in Context with Machine Learning-The Importance of the Hybrid Cloud-Leveraging the Power of Machine Learning-The Roles of Statistics and Data Mining with Machine Learning-Putting Machine Learning in Context-Approaches to Machine Learning.	**13**	**LCD & CHALK & TALK**
IV	Understanding Machine Learning:What Is Machine Learning?-Defining Big Data-Big Data in Context with Machine Learning-The Importance of the Hybrid Cloud-Leveraging the Power of Machine Learning-The Roles of Statistics and Data Mining with Machine Learning-Putting Machine Learning in Context-Approaches to Machine Learning.	**15**	**LCD & CHALK & TALK**
V	Looking Inside Machine Learning :The Impact of Machine Learning on Applications-Data Preparation-The Machine Learning Cycle	**12**	**LCD & CHALK & TALK**
VI	Contemporary Issues	**2**	**Expert lectures, on line seminars – webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO2	**K1 – K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
CI AII	**CO3**	**K1 – K5**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
	CO4	**K1 – K6**	2	K1,K2	2 (K3,K3)	2 (K5,K5)
Question Pattern CIA I & II		**No. of Questions to be asked**	4		4	4
		No. of Questions to be answered	4		2	2
		Marks for each question	1		5	8
		Total Marks for each section	4		10	16

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**2**			**2**	**3.6**	**7.2**
	K2	**2**			**2**	**3.6**	
	K3		**20**		**20**	**35.7**	**35.7**
	K4			**32**	**32**	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	**2**			**2**	**3.6**	**7.2**
	K2	**2**			**2**	**3.6**	
	K3		**20**		**20**	**35.7**	**35.7**
	K4			**16**	**16**	**28.57**	**57.1**
	K5			**16**	**16**	**28.57**	
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5- Evaluating, Justifying the problems with solutions.

K6- Combining the solutions with applications.

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	**COs**	**K - Level**	**Section A (MCQs)**		**Section B (Either / or Choice) With K - LEVEL**	**Section C (Either / or Choice) With K - LEVEL**
			No. of Questions	**K – Level**		
1	**CO1**	**K1-K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	**CO2**	**K1-K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	**CO3**	**K1-K4**	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	**CO4**	**K1-K5**	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	**CO5**	**K1-K6**	2	K1,K2	2 (K3,K3)	2 (K6,K6)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	**Section A (Multiple Choice Questions)**	**Section B (Either or Choice**	**Section C (Either/ or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**			**5**	**3.57**	**3.57**
K2	**5**			**5**	**3.57**	**3.57**
K3		**50**		**50**	**35.72**	**35.72**
K4			**48**	**48**	**34.28**	**34.28**
K5			**16**	**16**	**11.43**	**11.43**
K6			**16**	**16**	**11.43**	**11.43**
Marks	**10**	**50**	**80**	**140**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K3**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K5**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K5**	
20. a)	**Unit - V**	**CO5**	**K6**	
		OR		
20. b)	**Unit - V**	**CO5**	**K6**	

Course Name	DATA MINING LAB USING R			
Course Code	23PCSSP21	**L**	**P**	**C**
Category	SKILL	-	2	2

COURSE OBJECTIVES:

The main objectives of this course are to:

- To enable the students to learn the concepts of Data Mining algorithms namely classification, clustering, regression….
- To understand & write programs using the DM algorithms
- To apply statistical interpretations for the solutions
- Able to use visualizations techniques for interpretations

LIST OF PROGRAMS **30hours**

1. Implement Apriori algorithm to extract association rule of data mining.
2. Implement k-means clustering technique.
3. Implement any one Hierarchal Clustering.
4. Implement Classification algorithm.
5. Implement Decision Tree.
6. Linear Regression.
7. Data Visualization.

Total Lecture Hours **30 hours**

BOOKS FOR STUDY:

- MargaretH.Dunham,"Data Mining:Introductory and Advanced Topics",Pearson education,2003
- C.S.R. Prabhu, "Data Warehousing Concepts,Techniques, Productsand Applications", PHI,Second Edition

BOOKS FOR REFERENCES:

- ArunK.Pujari,"Data Mining Techniques",Universities Press(India)Pvt. Ltd.,2003
- Alex Berson, Stephen J.Smith, "Data Warehousing, Data Mining and OLAP",TMCH, 2001

WEB RESOURCES:

- **https://www.javatpoint.com/data-warehouse**
- **https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/**
- **https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html**

Nature of Course	EMPLOYABILITY			SKILL ORIENTED			ENTREPRENEURSHIP		✓			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL			GLOBAL				
Changes Made in the Course	Percentage of Change	**100 %**		No Changes Made			New Course		✓			
*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**												

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Able to write programs using R for Association rules, Clustering techniques	**K1,K2**
CO2	To implement data mining techniques like classification, prediction	**K2,K3**
CO3	Able to use different visualizations techniques using R	**K4,K5**
CO4	To apply different data mining algorithms to solve real world applications	**K5,K6**
CO5	Able to write programs using R for Association rules, Clustering techniques	**K1,K2**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	3	3
CO 2	2	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	2	3	3	3
CO 5	3	3	3	3	3
WEITAGE	14	14	13	15	15
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	93%	93%	93%	100%	100%

LESSON PLAN:			
S. No.	**DATA MINING LAB USING R**	**HRS**	**PEDAGOGY**
1 **2** **3** **4** **5** **6** **7**	Implement Apriori algorithm to extract association rule of data mining. Implement k-means clustering technique. Implement any one Hierarchal Clustering. Implement Classification algorithm. Implement Decision Tree. Linear Regression. Data Visualization.	**30**	**Hands on Training**

Learning Outcome Based Education & Assessment (LOBE) **Formative Examination - Blue Print** **Articulation Mapping – K Levels with Course Outcomes (COs)**							
Internal	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
CIA	**CO1**	**K1**	5				
	CO2	**K3**		5			
	CO3	**K4**			5		
	CO4	**K5, K6**				5	
	CO5	**K2**					5
Question Pattern CIA		**No. of Questions to be asked**	2	2	2	2	2
		No. of Questions to be answered	2	2	2	2	2
		Marks for each question	2.5	2.5	2.5	2.5	2.5
		Total Marks for each section	5	5	5	5	5

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	2					**2**	**8**	**8**
	K2		3				**3**	**12**	**12**
	K3			5			5	20	20
	K4				5		5	20	20
	K5					**5**	**5**	**20**	**20**
	K6					**5**	**5**	**20**	**20**
	Marks	**2**	**3**	**5**	**5**	**10**	**25**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5-Evaluating, Justifying the problems with solutions

K6-Creating solutions for applications

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
S. No.	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
1	CO1	**K1**	**6**				
2	CO2	**K3**		**15**			
3	CO3	**K4**			**15**		
4	CO4	**K5, K6**				**15**	
5	CO5	**K2**					**9**
No. of Questions to be Asked			**2**	**2**	**2**	**2**	**2**
No. of Questions to be answered			**2**	**2**	**2**	**2**	**2**
Marks for each question			**3**	**7.5**	**7.5**	**7.5**	**4.5**
Total Marks for each section			**15**	**15**	**15**	**15**	**15**

Distribution of Marks with K Level								
K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**6**					**6**	**8**	**8**
K2		**9**				**9**	**12**	**12**
K3			**15**			**15**	**20**	**20**
K4				**15**		**15**	**20**	**20**
K5					**15**	**6**	**20**	**20**
K6					**15**	**9**	**20**	**20**
Marks	**6**	**9**	**15**	**15**	**30**	**75**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.								

M.Sc., COMPUTER SCIENCE

Syllabus

Program Code: PCS

2023 - Onwards

MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with "A" Grade by NAAC

PASUMALAI, MADURAI – 625 004

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS), MADURAI – 625 004

M. SC COMPUTER SCIENCE CURRICULUM

(For the students admitted from the academic year 2023-2024 onwards)

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
FIRST SEMESTER						
Part – III	**Core courses**					
23PCSCC11	ANALYSIS AND DESIGN OF ALGORITHMS	6	5	25	75	100
23PCSCC12	OBJECT ORIENTED ANALYSIS AND DESIGN & C++	6	5	25	75	100
23PCSCC13	PYTHON PROGRAMMING	6	5	25	75	100
23PCSCP11	ALGORITHM AND OOPS LAB	4	3	25	75	100
23PCSCP12	PYTHON PROGRAMMING LAB	4	3	25	75	100
Part – III	**Elective course**					
23PCSEC11	ADVANCED SOFTWARE ENGINEERING	4	3	25	75	100
	Total	30	24	150	450	600
SECOND SEMESTER						
Part – III	**Core courses**					
23PCSCC21	DATA MINING AND WAREHOUSING	6	5	25	75	100
23PCSCC22	ADVANCED OPERATING SYSTEMS	6	5	25	75	100
23PCSCC23	ADVANCED JAVA PROGRAMMING	6	5	25	75	100
23PCSCP21	ADVANCED JAVA PROGRAMMING LAB	6	4	25	75	100
Part – III	**Elective course**					
23PCSEC21	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	4	3	25	75	100
Part – IV	**Skill Enhancement course**					
23PCSSP21	DATA MINING LAB USING R	2	2	25	75	100
	Total	30	24	150	450	600

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
THIRD SEMESTER						
Part – III	**Core courses**					
23PCSCC31	DIGITAL IMAGE PROCESSING	6	4	25	75	100
23PCSCC32	CLOUD COMPUTING	6	4	25	75	100
23PCSCC33	NETWORK SECURITY AND CRYPTOGRAPHY	6	4	25	75	100
23PCSCP31	DIGITAL IMAGE PROCESSING LAB	4	3	25	75	100
23PCSCP32	NETWORK SECURITY AND CRYPTOGRAPHY LAB	4	3	25	75	100
Part - IV	**Non Major Elective course**					
23PCSNM31	MULTIMEDIA AND ITS APPLICATIONS	4	3	25	75	100
23PCSINT1	INTERNSHIP INDUSTRIAL ACTIVITY	-	2	40	60	100
	Total	30	23	190	510	700
FOURTH SEMESTER						
Part – III	**Core courses**					
23PCSCC41	DATA SCIENCE & ANALYTICS	6	4	25	75	100
23PCSCP41	WEB APPLICATION DEVELOPMENT AND HOSTING LAB	6	3	25	75	100
23PCSCP42	CLOUD COMPUTING LAB	6	3	25	75	100
23PCSPRJ1	PROJECT AND VIVA VOCE	6	4	40	60	100
Part – III	**Elective courses**					
23PCSEC41	INTERNET OF THINGS	4	3	25	75	100
23PCSEC42	MOBILE COMPUTING					
23PCSEC43	BLOCK CHAIN TECHNOLOGY					
Part – IV	**Skill Enhancement course**					
23PCSSP41	DATA VISUALIZATION LAB	2	2	25	75	100
Part - V	**Extension Activities**					
23PEXTG41	EXTENSION ACTIVITY	-	1	40	60	100
	Total	30	20	205	495	700
	Grand Total	120	91	695	1905	2600


THIRD SEMESTER

Course Name	DIGITAL IMAGE PROCESSING			
Course Code	23PCSCC31	**L**	**P**	**C**
Category	CORE	6	-	4

COURSE OBJECTIVES:

- Learn basic image processing techniques for solving real problems.
- To know the concepts of Image enhancement in various domain
- Gain knowledge in image transformation and Image restoration methods.
- Learn Image compression techniques.
- To explore Segmentation procedures.

UNIT - I INTRODUCTION **18**

Introduction: What is Digital image processing – the origin of DIP – Examples of fields that use DIP – Fundamentals steps in DIP – Components of an image processing system. Digital Image Fundamentals: Elements of Visual perception – Light and the electromagnetic spectrum – Image sensing and acquisition – Image sampling and Quantization – Some Basic relationship between Pixels – Linear & Nonlinear operations

UNIT - II IMAGE ENHANCEMENT **18**

Image Enhancement in the spatial domain:- Background – some basic Gray level Transformations – Histogram Processing – Enhancement using Arithmetic / Logic operations – Basics of spatial filtering – Smoothing spatial filters – Sharpening spatial filters – Combining spatial enhancement methods.

UNIT - III IMAGE RESTORATION **18**

Image Restoration: A model of the Image Degradation / Restoration Process – Noise models – Restoration is the process of noise only – Spatial Filtering – Periodic Noise reduction by frequency- domain filtering Linear, Portion – Invariant Degradations – Estimating the degradation function – Inverse filtering – Minimum mean square Error Filtering – Constrained least squares filtering – Geometric mean filter – Geometric Transformations.

UNIT - IV IMAGE COMPRESSION **16**

Image Compression : Fundamentals–Image compression models–Elements of Information Theory – Error Free compression – Lossy compression – Image compression standards.

UNIT - V IMAGE SEGMENTATION **18**

Image Segmentation: Detection and Discontinuities – Edge Linking and Boundary deduction – Thresholding – Region-Based segmentation – Segmentation by Morphological watersheds – The use of motion in segmentation.

UNIT - VI CONTEMPORARY ISSUES **2**

Expert lectures, online seminars –webinars

Total Lecture Hours	**90**

BOOKS FOR STUDY:

- RafaelC.Gonzalez,RichardE.Woods,"DigitalImageProcessing",SecondEdition,PHI/Pearson Education.
- B.Chanda,D.Dutta Majumder,"Digital Image Processing and Analysis",PHI, 2003.

BOOKS FOR REFERENCES:

- Nick Efford,"Digital Image Processing a practical introducing using Java", Pearson Education, 2004.

WEB RESOURCES:

- https://nptel.ac.in/courses/117/105/117105135/
- https://www.tutorialspoint.com/dip/index.htm
- https://www.javatpoint.com/digital-image-processing-tutorial

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED			ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		✓	GLOBAL		
Changes Made in the Course	Percentage of Change			No Changes Made			New Course		✓	

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the fundamentals of Digital Image Processing	**K1,K2**
CO2	Understandthemathematicalfoundationsfordigitalimagerepresentation, image acquisition, image transformation, and image enhancement	**K2,K3**
CO3	Apply, Design and Implement and get solutions for digital image processing problems	**K3,K4**
CO4	Apply the concepts of filtering and segmentation for digital image retrieval	**K4, K5**
CO5	Explore the concepts of Multi-resolution process and recognize the objects in an efficient manner	**K5, K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	**S**	**M**	**S**	**S**	**S**	**M**	**M**	**M**	**S**	**S**
CO2	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**M**	**S**	**S**
CO3	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**S**
CO4	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**S**
CO5	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**S**

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	3	3	3	3	3	3
CO 2	3	3	3	2	3	3
CO 3	2	3	2	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	14	15	14	14	15	15
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	93%	100%	93%	93%	100%	100%

LESSON PLAN:

UNIT	DIGITAL IMAGE PROCESSING	HRS	PEDAGOGY
I	Introduction: What is Digital image processing – the origin of DIP – Examples of fields that use DIP – Fundamentals steps in DIP – Components of an image processing system. Digital Image Fundamentals: Elements of Visual perception – Light and the electromagnetic spectrum – Image sensing and acquisition – Image sampling and Quantization – Some Basic relationship between Pixels – Linear & Nonlinear operations.	18	**LCD, CHALK & TALK**
II	Image Enhancement in the spatial domain:- Background – some basic Gray level Transformations – Histogram Processing – Enhancement using Arithmetic / Logic operations – Basics of spatial filtering – Smoothing spatial filters – Sharpening spatial filters – Combining spatial enhancement methods.	18	**LCD, CHALK & TALK**
III	Image Restoration: A model of the Image Degradation / Restoration Process – Noise models – Restoration is the process of noise only – Spatial Filtering – Periodic Noise reduction by frequency domain filtering – Linear, Portion – Invariant Degradations – Estimating the degradation function – Inverse filtering – Minimum mean square Error Filtering – Constrained least squares filtering – Geometric mean filter – Geometric Transformations.	18	**LCD, CHALK & TALK**
IV	Image Compression: Fundamentals–Image compression models– Elements of Information Theory – Error Free compression – Lossy compression – Image compression standards.	16	**LCD, CHALK & TALK**
V	Image Segmentation: Detection and Discontinuities – Edge Linking and Boundary deduction – Thresholding – Region-Based segmentation – Segmentation by Morphological watersheds – The use of motion in segmentation.	18	**LCD, CHALK & TALK**

VI	Contemporary Issues	**2**	**Expert lectures, online seminars–webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
	CO2	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
CI AII	**CO3**	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
	CO4	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
Question Pattern CIA I & II		**No. of Questions to be asked**	**4**		**4**	**4**
		No. of Questions to be answered	**4**		**2**	**2**
		Marks for each question	**1**		**5**	**8**
		Total Marks for each section	**4**		**10**	**16**

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
2	CO2	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
3	CO3	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
4	CO4	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
5	CO5	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			80	80	57.14	57.14
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**		
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**		
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K4**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K4**	
20. a)	**Unit - V**	**CO5**	**K4**	
		OR		
20. b)	**Unit - V**	**CO5**	**K4**	

Course Name	CLOUD COMPUTING			
Course Code	23PCSCC32	**L**	**P**	**C**
Category	CORE	6	-	4

COURSE OBJECTIVES:

- Gain knowledge on cloud computing, cloud services, architectures and applications.
- Enable the students to learn the basics of cloud computing with real time usage
- How to store and share, in and from cloud

UNIT - I	**INTRODUCTION**	**18**

Cloud Computing Introduction, From, Collaboration to cloud, Working of cloud computing, pros and cons, benefits, developing cloud computing services, Cloud service development, discovering cloud services

UNIT - II	**CLOUD COMPUTING**	**18**

Centralizing email communications, cloud computing for community, collaborating on schedules, collaborating on group projects and events, cloud computing for corporation, mapping, schedules, managing projects, presenting on road

UNIT - III	**USING CLOUD SERVICES**	**18**

Collaborating on calendars, Schedules and task management, exploring on line scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets, and databases.

UNIT - IV	**OUTSIDE THE CLOUD**	**18**

Evaluating web mail services, Evaluating instant messaging, Evaluating web conference tools, creating groups on social networks, Evaluating on line groupware, collaborating via blogs and wikis.

UNIT - V	**STORING AND SHARING**	**16**

Understanding cloud storage, evaluating on line file storage, exploring on line book marking services, exploring on line photo editing applications, exploring photo sharing communities, controlling it with web based desktops

UNIT - VI	**CONTEMPORARY ISSUES**	**2**

Expert lectures, online seminars –webinars

Total Lecture Hours	**90**

BOOKS FOR STUDY:

- Michael Miller, "Cloud Computing", Pearson Education, New Delhi, 2009.

BOOKS FOR REFERENCES:

- Anthony T. Velte, "Cloud Computing: A Practical Approach", 1st Edition, Tata McGrawHill Education Private Limited, 2009.

WEB RESOURCES:

- **https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/**
- **https://www.tutorialspoint.com/cloud_computing/index.htm**
- **https://www.javatpoint.com/cloud-computing-tutoria**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**80 %**	No Changes Made		New Course			

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the concepts of Cloud and its services	**K1,K2**
CO2	Collaborate Cloud for Event & Project Management	**K3,K4**
CO3	Analyze on cloud in Word Processing, Spread Sheets, Mail, Calendar, Database	**K4,K5**
CO4	Analyze cloud in social networks	**K5,K6**
CO5	Explore cloud storage and sharing	**K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	S	M	S	S	S	M	M	M	S
CO2	M	S	M	S	S	S	M	M	M	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	M	S	S	S	S	S	S	S	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	**3**	**3**	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**2**	**2**	**3**	**2**
CO 3	**3**	**2**	**2**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**2**	**3**
CO 5	**3**	**3**	**3**	**3**	**3**	**3**
WEIGHTAGE	**15**	**14**	**13**	**14**	**14**	**14**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100%**	**93%**	**86%**	**93%**	**93%**	**93%**

LESSON PLAN:

UNIT	CLOUD COMPUTING	HRS	PEDAGOGY
I	INTRODUCTION Cloud Computing Introduction, From, Collaboration to cloud, Working of cloud computing, pros and cons, benefits, developing cloud computing services, Cloud service development, discovering cloud services	**18**	**LCD, BLACK BOARD**
II	CLOUD COMPUTING FOR EVERYONE Centralizing email communications, cloud computing for community, collaborating on schedules, collaborating on group projects and events, cloud computing fo corporation, mapping, schedules, managing projects, presenting on road	**18**	**LCD, BLACK BOARD**
III	USING CLOUD SERVICES Collaborating on calendars, Schedules and task management, exploring on line scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets, and databases.	**18**	**LCD, BLACK BOARD**
IV	OUTSIDE THE CLOUD Evaluating web mail services, Evaluating instant messaging, Evaluating web conference tools, creating groups on social networks, Evaluating on line groupware, collaborating via blogs and wikis.	**18**	**LCD, BLACK BOARD**
V	Understanding cloud storage, evaluating on line file storage, exploring on line book marking services, exploring on line photo editing applications, exploring photo sharing communities, controlling it with web based desktops	**16**	**LCD, BLACK BOARD**
VI	Contemporary Issues	**2**	**Expert lectures, online seminars , webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
	CO2	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
CI AII	**CO3**	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
	CO4	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
Question Pattern CIA I & II		**No. of Questions to be asked**	**4**		**4**	**4**
		No. of Questions to be answered	**4**		**2**	**2**
		Marks for each question	**1**		**5**	**8**
		Total Marks for each section	**4**		**10**	**16**

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
2	CO2	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
3	CO3	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
4	CO4	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
5	CO5	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			80	80	57.14	57.14
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**		
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**		
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K4**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K4**	
20. a)	**Unit - V**	**CO5**	**K4**	
		OR		
20. b)	**Unit - V**	**CO5**	**K4**	

Course Name	NETWORK SECURITY AND CRYPTOGRAPHY			
Course Code	23PCSCC33	**L**	**P**	**C**
Category	CORE	6	-	4

COURSE OBJECTIVES:

- Enable students to learn the Introduction to Cryptography, Web Security and Case studies in Cryptography.
- To gain knowledge on classical encryption techniques and concepts of modular arithmetic and number theory.
- To explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms.
- To explore the design issues and working principles of various authentication Applications
- To Know various secure communication standards including Kerberos, IPsec, and SSL/TLS and emai

UNIT - I	**INTRODUCTION**	**18**

Introduction to Cryptography – Security Attacks – Security Services –Security Algorithm- Stream cipher and Block cipher - Symmetric and Asymmetric-key Cryptosystem Symmetric Key Algorithms: Introduction – DES – Triple DES – AES – IDEA – Blowfish – RC5

UNIT - II	**CRYPTOSYSTEM**	**18**

Public-key Cryptosystem: Introduction to Number Theory - RSA Algorithm – Key Management - Diffie-Hell man Key exchange – Elliptic Curve Cryptography Message Authentication and Hash functions – Hash and Mac Algorithm – Digital Signatures and Authentication Protocol

UNIT - III	**NETWORK SECURITY PRACTICE**	**18**

Network Security Practice: Authentication Applications – Kerberos – X.509 Authentication services and Encryption Techniques. E-mail Security – PGP – S / MIME – IP Security.

UNIT - IV	**Web Security**	**18**

Web Security - Secure Socket Layer – Secure Electronic Transaction. System Security - Intruders and Viruses – Firewalls– Password Security

UNIT - V	**Case Study**	**16**

Case Study: Implementation of Cryptographic Algorithms – RSA – DSA – ECC (C / JAVA Programming). Network Forensic – Security Audit - Other Security Mechanism: Introduction to: Stenography – Quantum Cryptography – Water Marking - DNA Cryptography

UNIT - VI	**CONTEMPORARY ISSUES**	**2**

Expert lectures, online seminars –webinars

Total Lecture Hours	**90**

BOOKS FOR STUDY:

- Course material will be provided by the department.

BOOKS FOR REFERENCES:

- A.Menezes, P Van Oorschot and S.Vanstone, "Hand Book ofApplied Cryptography", CRC Press, 1997
- AnkitFadia,"Network Security", MacMillan.

WEB RESOURCES:

- https://nptel.ac.in/courses/106/105/106105031/
- http://www.nptelvideos.in/2012/11/cryptography-and-network-security.htm
- https://www.tutorialspoint.com/cryptography/index.htm

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the process of the cryptographic algorithms	**K1,K2**
CO2	Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication	**K2,K3**
CO3	Apply and analyze appropriate security techniques to solve network security problem	**K3,K4**
CO4	Explore suitable cryptographic algorithms	**K4, K5**
CO5	Analyze different digital signature algorithms to achieve authentication and design secure applications	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	L	S	M	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	2	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	2	3	3	3
WEIGHTAGE	15	15	14	15	14	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100	93.3	93.3	100	100	100

LESSON PLAN:

UNIT	Network Security and Cryptography	HRS	PEDAGOGY
I	Introduction to Cryptography – Security Attacks – Security Services – Security Algorithm- Stream cipher and Block cipher - Symmetric and Asymmetric-key Cryptosystem Symmetric Key Algorithms: Introduction – DES – Triple DES – AES – IDEA – Blowfish – RC5.	18	**LCD, CHALK & TALK**
II	Public-key Cryptosystem: Introduction to Number Theory - RSA Algorithm – Key Management - Diffie-Hell man Key exchange – Elliptic Curve Cryptography Message Authentication and Hash functions – Hash and Mac Algorithm – Digital Signatures and Authentication Protocol.	18	**LCD, CHALK & TALK**
III	Network Security Practice: Authentication Applications – Kerberos – X.509 Authentication services and Encryption Techniques. E-mail Security – PGP – S / MIME – IP Security.	18	**LCD, CHALK & TALK**
IV	Web Security - Secure Socket Layer – Secure Electronic Transaction. System Security - Intruders and Viruses – Firewalls– Password Security.	18	**LCD, CHALK & TALK**
V	Case Study: Implementation of Cryptographic Algorithms – RSA DSA – ECC (C / JAVA Programming). Network Forensic – Security Audit - Other Security Mechanism: Introduction to: Stenography – Quantum Cryptography – Water Marking - DNA Cryptography.	16	**LCD, CHALK & TALK**
VI	Contemporary Issues	2	**Expert lectures, online seminars – webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
	CO2	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
CI AII	**CO3**	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
	CO4	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
Question Pattern CIA I & II		**No. of Questions to be asked**	**4**		**4**	**4**
		No. of Questions to be answered	**4**		**2**	**2**
		Marks for each question	**1**		**5**	**8**
		Total Marks for each section	**4**		**10**	**16**

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
2	CO2	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
3	CO3	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
4	CO4	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
5	CO5	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			80	80	57.14	57.14
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**		
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**		
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K4**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K4**	
20. a)	**Unit - V**	**CO5**	**K4**	
		OR		
20. b)	**Unit - V**	**CO5**	**K4**	

Course Name	DIGITAL IMAGE PROCESSING LAB			
Course Code	23PCSCP31	L	P	C
Category	CORE	-	4	3

COURSE OBJECTIVES:

- To know the basics of Digital Image Processing
- To understand the image enhancement and image restoration techniques
- To enable the students to learn the fundamentals of image compression and segmentation
- To understand Image Restoration
- To learn the Filtering Techniques

LIST OF PROGRAMS	60
16) Implement Image enhancement Technique.	
17) Histogram Equalization	
18) Image Restoration.	
19) Implement Image Filtering.	
20) Edge detection using Operators (Roberts, Prewitts and Sobelsoperators)	
21) Implement image compression.	
22) Image Subtraction	
23) Boundary Extraction using morphology.	
24) Image Segmentation	
Expert lectures, online seminars –webinars	
Total Lecture Hours	**60**

BOOKS FOR STUDY:

- Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Second Edition, PHI/Pearson Education.
- B. Chanda, D. Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2003

BOOKS FOR REFERENCES:

- Nick Efford, "Digital Image Processing a practical introducing using Java", Pearson Education, 2004

WEB RESOURCES:

- https://nptel.ac.in/courses/117/105/117105135/
- https://www.tutorialspoint.com/dip/index.htm
- https://www.javatpoint.com/digital-image-processing-tutorial

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change		No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	To write programs for image processing using the techniques	**K1,K2**
CO2	To able to implement Image Enhancements & Restoration techniques	**K2,K3**
CO3	Capable of using Compression techniques in an Image	**K3,K4**
CO4	Must be able to manipulate the image and Segment it	**K4,K5**
CO5	Code, debug and test the programs with appropriate test cases	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	M	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	**3**	**3**	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**2**	**3**	**3**	**3**
CO 3	**3**	**3**	**3**	**2**	**3**	**2**
CO 4	**3**	**2**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**3**	**3**
WEIGHTAGE	**15**	**14**	**13**	**13**	**15**	**13**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100%**	**93%**	**93%**	**93%**	**100%**	**93%**

LESSON PLAN:

S. No.	DIGITAL IMAGE PROCESSING LAB	HRS	PEDAGOGY
1. 2. 3. 4. 5. 6. 7. 8.	Implement Image enhancement Technique. Histogram Equalization Image Restoration. Implement Image Filtering.Edge detection using Operators (Roberts, Prewitts and Sobelsoperators) Implement image compression. Image Subtraction Boundary Extraction using morphology. Image Segmentation	**60**	**LCD, HANDS ON TRAINING**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding & Implementation**	**Debugging & Outpu**
CIA	**CO1**	**K1**	**5**				
	CO2	**K2**		**5**			
	CO3	**K3**			**5**		
	CO4	**K4**				**5**	
	CO5	**K4**					**5**
Question Pattern CIA		**No. of Questions to be asked**	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
		Total Marks for each section	**5**	**5**	**5**	**5**	**5**

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	5					**5**	**20**	**20**
	K2		5				**5**	**20**	**20**
	K3			5			5	20	20
	K4				5	5	10	40	40
	Marks						**25**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
S. No	**Cos**	**K - Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
1	**CO1**	**K1**	**15**				
2	**CO2**	**K2**		**15**			
3	**CO3**	**K3**			**15**		
4	**CO4**	**K4**				**15**	
5	**CO5**	**K4**					**15**
No. of Questions to be Asked			**2**	**2**	**2**	**2**	**2**
No. of Questions to be answered			**2**	**2**	**2**	**2**	**2**
Marks for each question			**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
Total Marks for each section			**15**	**15**	**15**	**15**	**15**
(Figures in parenthesis denotes, questions should be asked with the given K level)							

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	15					**15**	**20**	**20**
	K2		15				**15**	**20**	**20**
	K3			15			15	20	20
	K4				15	1 5	30	40	40
	Marks						**75**	**100**	**100**

Course Name	NETWORK SECURITY AND CRYPTOGRAPHY LAB			
Course Code	23PCSCP32	**L**	**P**	**C**
Category	CORE	-	4	3

COURSE OBJECTIVES:

- To develop in classical encryption techniques and advanced encryption standards.
- To acquire programming skills in Implement various cryptographic algorithms including secret key cryptography.
- To develop hashes, message digests and public key algorithms.
- Implement different encryption and decryption techniques.
- To comprehend related to confidentiality and authentication techniques.

LIST OF PROGRAMS **60**

1. The program should XOR each character in the string with 0 and display the result.
2. Write a program to perform encryption and decryption using the Ceaser Cipher.
3. Write a program to perform encryption and decryption using the Hill Cipher.
4. Write a program to perform encryption and decryption using the Substitution Cipher.
5. Write a program to perform encryption and decryption using the DES algorithm.
6. Connect to switch with a computer and enable the port security.
7. Defeating malware using Building Trojans and Rootkit hunter.
8. Implement signature scheme – Digital Signature Standard.
9. Identify and capture the username and password in a same network using wire shark.
10. Implement Man-in-the-middle attack and Session hijacking.

Total Lecture Hours	**60**

BOOKS FOR STUDY:

- William Stallings, "Cryptography and Network Security", PHI/Pearson Education.
- Bruce Schneir, "Applied Cryptography", CRC Press.

BOOKS FOR REFERENCES:

- A. Menezes, P Van Oorschot and S. Vanstone, "Handbook of Applied Cryptography", CRC Press, 1997

WEB RESOURCES:

- https://nptel.ac.in/courses/106/105/106105031/
- http://www.nptelvideos.in/2012/11/cryptography-and-network-security.html
- https://www.tutorialspoint.com/cryptography/index.htm

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP					
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL			
Changes Made in the Course	Percentage of Change		No Changes Made		New Course	✓				

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Comprehend the programming skills in classical encryption techniques and to develop advanced encryption standards.	**K1,K2**
CO2	Understand and implement the various cryptographic algorithms including secret key cryptography, hashes, and message digests.	**K2,K3**
CO3	Evaluate the use of different encryption and decryption techniques	**K3 , K4**
CO4	Design to Solve related confidentiality and authentication problems	**K4 ,K5**
CO5	Create public key algorithms	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	2	3
CO 3	3	3	2	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	15	15	14	14	15	14
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	100%	93%	100%	93%	100%

LESSON PLAN:

S.No.	NETWORK SECURITY AND CRYPTOGRAPHY LAB	HRS	PEDAGOGY
1.	The program should XOR each character in the string with 0 and display the result.	60	LCD & HANDS ON TRAINING
2.	Write a program to perform encryption and decryption using the Ceaser Cipher.		
3.	Write a program to perform encryption and decryption using the Hill Cipher.		
4.	Write a program to perform encryption and decryption using the Substitution Cipher.		
5.	Write a program to perform encryption and decryption using the DES algorithm.		
6.	Connect to switch with a computer and enable the port security.		
7.	Defeating malware using Building Trojans and Rootkit hunter.		
8.	Implement signature scheme – Digital Signature Standard.		
9.	Identify and capture the username and password in a same network using wire shark.		
10.	Implement Man-in-the-middle attack and Session hijacking.		

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding & Implementation**	**Debugging & Outpu**
CIA	**CO1**	**K1**	**5**				
	CO2	**K2**		**5**			
	CO3	**K3**			**5**		
	CO4	**K4**				**5**	
	CO5	**K4**					**5**
Question Pattern CIA		**No. of Questions to be asked**	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
		Total Marks for each section	**5**	**5**	**5**	**5**	**5**

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	5					**5**	**20**	**20**
	K2		5				**5**	**20**	**20**
	K3			5			5	20	20
	K4				5	5	10	40	40
	Marks						**25**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
S. No	**Cos**	**K - Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
1	**CO1**	**K1**	**15**				
2	**CO2**	**K2**		**15**			
3	**CO3**	**K3**			**15**		
4	**CO4**	**K4**				**15**	
5	**CO5**	**K4**					**15**
No. of Questions to be Asked			**2**	**2**	**2**	**2**	**2**
No. of Questions to be answered			**2**	**2**	**2**	**2**	**2**
Marks for each question			**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
Total Marks for each section			**15**	**15**	**15**	**15**	**15**
(Figures in parenthesis denotes, questions should be asked with the given K level)							

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	15					**15**	**20**	**20**
	K2		15				**15**	**20**	**20**
	K3			15			15	20	20
	K4				15	1 5	30	40	40
	Marks						**75**	**100**	**100**

Course Name	MULTIMEDIA AND ITS APPLICATIONS			
Course Code	23PCSNM31	**L**	**P**	**C**
Category	NME	4	-	3

COURSE OBJECTIVES:

- To introduce the students the concepts of Multimedia, Images & Animation.
- To introduce Multimedia authoring tools
- To understand the role of Multimedia in Internet
- To know about High Definition Television and Desktop Computing
- To understand Knowledge based Multimedia systems

UNIT - I INTRODUCTION	**12**
What is Multimedia? – Introduction to making Multimedia – Macintosh and Windows Production platforms – Basic Software tools.	
UNIT - II MULTIMEDIA TOOLS	**12**
Making Instant Multimedia – Multimedia authoring tools – Multimedia building blocks – Text – Sound.	
UNIT - III ANIMATION	**12**
Images – Animation – Video.	
UNIT - IV INTERNET	**12**
Multimedia and the Internet – The Internet and how it works – Tools for World Wide Web – Designing for the World Wide Web.	
UNIT - V MULTIMEDIA SYSTEMS	**10**
High Definition Television and Desktop Computing – Knowledge based Multimedia systems.	
UNIT - VI Contemporary Issues	**2**
Total Lecture Hours	**60**

BOOKS FOR STUDY:

- Tay Vaughan, "Multimedia making it work", Fifth Edition, Tata McGrawHill.
- John F. Koegel Bufford, "Multimedia Systems", Pearson Education.

BOOKS FOR REFERENCES:

- Judith Jeffloate, "Multimedia in Practice (Technology and Applications)", PHI,2003.

WEB RESOURCES:

- **https://www.tutorialspoint.com/multimedia/index.htm**
- **https://www.tutorialspoint.com/basics_of_computer_science/basics_of_computer_science_m ultimedia.htm**
- **https://nptel.ac.in/courses/117/105/117105083/**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED		ENTREPRENEURSHIP	✓		
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the basic concepts of Multimedia	**K1,K2**
CO2	Demonstrate Multimedia authoring tools	**K2,K3**
CO3	Analyze the concepts of Sound, Images, Video & Animation	**K3,K4**
CO4	Apply and Analyze the role of Multimedia in Internet and real time applications	**K4,K5**
CO5	Analyze multimedia applications using HDTV	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	M	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	**3**	**3**	**3**	**3**	**3**	**3**
CO 2	**2**	**3**	**3**	**3**	**3**	**3**
CO 3	**3**	**2**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**2**	**2**
WEIGHTAGE	**15**	**14**	**14**	**15**	**15**	**15**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**93%**	**93%**	**100%**	**100%**	**93%**	**93%**

LESSON PLAN:

UNIT	MULTIMEDIA AND ITS APPLICATIONS	HRS	PEDAGOGY
I	What is Multimedia? – Introduction to making Multimedia – Macintosh and Windows Production platforms – Basic Software tools.	**12**	**LCD, CHALK & TALK**
II	Making Instant Multimedia – Multimedia authoring tools – Multimedia building blocks – Text – Sound.	**12**	**LCD, CHALK & TALK**
III	Images – Animation – Video.	**12**	**LCD, CHALK & TALK**
IV	Multimedia and the Internet – The Internet and how it works – Tools for World Wide Web – Designing for the World Wide Web.	**12**	**LCD, CHALK & TALK**
V	High Definition Television and Desktop Computing – Knowledge based Multimedia systems.	**10**	**LCD, CHALK & TALK**
VI	Contemporary Issues	**2**	**Expert lectures, online seminars webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
	CO2	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
CI AII	**CO3**	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
	CO4	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
Question Pattern CIA I & II		**No. of Questions to be asked**	**4**		**4**	**4**
		No. of Questions to be answered	**4**		**2**	**2**
		Marks for each question	**1**		**5**	**8**
		Total Marks for each section	**4**		**10**	**16**

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
2	CO2	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
3	CO3	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
4	CO4	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
5	CO5	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			80	80	57.14	57.14
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**		
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**		
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K4**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K4**	
20. a)	**Unit - V**	**CO5**	**K4**	
		OR		
20. b)	**Unit - V**	**CO5**	**K4**	

Course Name	Internship Industrial Activity			
Course Code	23PCSINT1	**L**	**P**	**C**
Category	SKILL	-	-	2

COURSE OBJECTIVES:

- Introduce the Working Ambience, Attitude, Adaptability, Problem Solving Ability,
- Ability to work with Supervisor, Ability to take Directions, etc.,
- Expose on the different phases of Developing a Computer Solution with Team Spirit.
- Learn about Problem Solving Skills and Soft Skills
- To learn the working Skills required for the Industry.

REGULATIONS

.The Candidates have to undergo a Minimum of 30 Hours of Internship Programme in the Industry during the holidays of the Second Semester of the Course of Study.
2. The Candidates need to get a Project, Analyze, learn the various stages of Developing a solution, Test, Validate and carryout the other related requirements.
3. During the course of Third Semester, the Candidates need to refine the work carried out during the Internship at the Industry, progress towards developing a better Solution as per the standards of the Industry and by carrying out the constructive comments received from the Industry and / or Institution during the Reviews.
4. Then the Candidates have to prepare and submit the manuscript of the Internship experience as a Report as per the requirements of the Institution / Department for Evaluation.
5. The submission of the Internship Report will be done at the end of the Third Semester for Presentation and Viva-Voce during the Practical Examinations of the Semester
6. A Faculty Member from the Department will act as a Guide to Supervise and Monitor the progress of the Candidates during the course of Internship.
7. The Faculty Member will act as the Internal Examiner during the course of Internship as well as at the time of conducting the Viva-Voce Examination.
8. The Internal Marks for the Internship will be awarded by the concerned Guide / Internal Examiner.
9. The Internal and External Examiners shall both evaluate the Internship Report, Presentation and conduct the Viva-Voce Examination

Total Lecture Hours	**30**

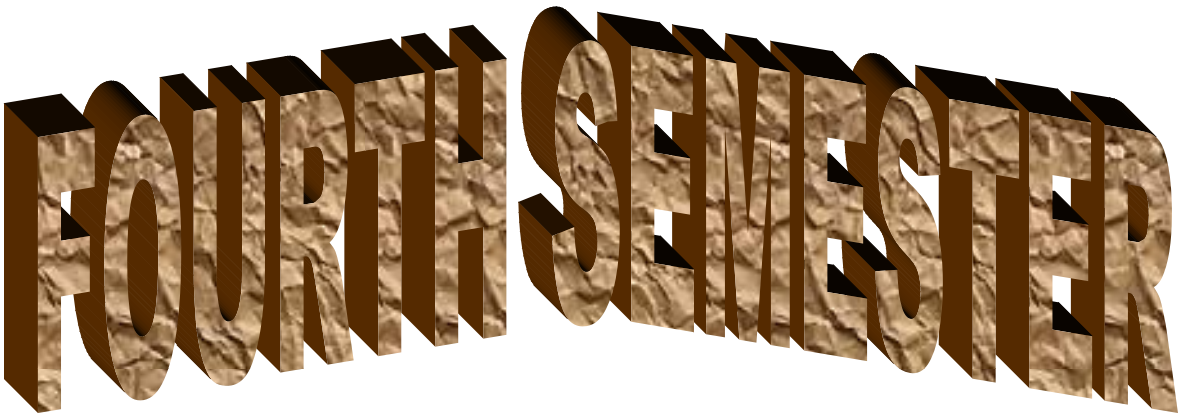
INTERNAL MARKS AWARDED FOR THE INTERNSHIP – 40 Marks
1. Learning the Work Culture leading towards Performance, Organizations Skills and Relationship with Tean Members – 10 Marks 2. Internship Review 1 (During the beginning of the Semester) – 10 Marks 3. Internship Review 2 (During the end of the Semester) – 10 Marks 4. Progress of the Internship by the Candidate's active Participation – 10 Marks
EXTERNAL MARKS AWARDED FOR THE INTERNSHIP – 60 Marks
1. Evaluation of the Internship Report - **20 Marks** 2. Presentation – **20 Marks** 3. Viva-Voce Examination – **20 Marks**
Total – 100 Marks

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change		No Changes Made		New Course	✓		
*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**								

COURSE OUTCOMES:		K LEVEL
After studying this course, the students will be able to:		
CO1	Find the specific areas of interest, refine their skills and abilities	**K1,**
CO2	Show a greater sense of self-awareness and appreciation for others	**K2**
CO3	Develop work habits and attitudes that are essential to succeed in the workplace	**K3**
CO4	Discover the importance of communication, interpersonal and other critical skills	**K4**
CO5	Choose and prioritize employment contacts leading directly to a full-time job immediately after the post graduation from the college.	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:										
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	**S**	**S**	**M**	**S**	**S**	**S**	**M**	**M**	**S**	**M**
CO2	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**S**
CO3	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
CO4	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
CO5	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
S- STRONG				**M – MEDIUM**				**L - LOW**		

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	**3**	**2**	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**2**	**3**	**3**	**2**
CO 3	**3**	**3**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**3**	**3**
WEIGHTAGE	**15**	**14**	**14**	**15**	**15**	**14**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100%**	**93%**	**93%**	**100%**	**100%**	**93%**


FOURTH SEMESTER

Course Name	DATA SCIENCE & ANALYTICS			
Course Code	23PCSCC41	**L**	**P**	**C**
Category	CORE	6	-	4

COURSE OBJECTIVES:

The main objectives of this course are to:

- Learn basic image processing techniques for solving real problems.
- To know the concepts of Image enhancement in various domain
- Gain knowledge in image transformation and Image restoration methods.
- Learn Image compression techniques.
- To explore Segmentation procedures.

UNIT - I INTRODUCTION	**18**
Introduction of Data Science: data science and big data – facets of data-data science process- Ecosystem-The Data Science process – six steps- Machine Learning.	
UNIT - II	**18**
Data Analytics life cycle - review of data analytics - Advanced data Analytics-technology and tools.	
UNIT - III BASICS OF DATA ANALYTICS	**18**
Basic Data Analytics using R : R Graphical User Interfaces – Data Import and Export – Attribute and Data Types –Descriptive Statistics – Exploratory Data Analysis –Visualization Before Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables – Data Exploration Versus Presentation.	
UNIT - IV DATA ANALYTICS USING R	**18**
Overview of Clustering : K-means – Use Cases – Overview of the Method – Perform a K-means Analysis using R –Classification – Decision Trees – Overview of a Decision Tree – Decision Tree Algorithms – Evaluating a Decision Tree – Decision Tree in R – Bayes‟ Theorem – Naïve Bayes Classifier – Smoothing – Naïve Bayes in R.	
UNIT - V ARTIFICIAL INTELLIGENCE	**16**
Artificial intelligence: Machine Learning and deep learning in data science - Clustering, association rules. Linear regression-logistic regression-Additional regression methods	
UNIT - VI CONTEMPORARY ISSUES	**2**
Expert lectures, online seminars –webinars	
Total Lecture Hours	**90**

BOOKS FOR STUDY:

- Introducing-Data-Science-Big-Data-Machine-Learning-and-more-using-Python-tools-2016.
  Data science in big data analytics-Wiley 2015 John Wiley & Sons

BOOKS FOR REFERENCES:

- A simple introduction to Data Science - Lars Nielson 2015AlexBerson,
- Introducing Data Science Davy Cielen, Arno D.B.Meysman, Mohamed Ali 2016 Manning Publicatio
- R Programming for Data Science - Roger D.Peng 2015 Lean Publication
  Data Science & Big Data Analytics: Discovering, Analyzing , Visualizing and Presenting Data

WEB RESOURCES:

- **https://www.tutorialspoint.com/python_data_science/index.htm**
- **https://www.javatpoint.com/data-science**
- **https://nptel.ac.in/courses/106/106/106106179/**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the concept of data science and its techniques	**K1,K2**
CO2	Review data analytics	**K2,K3**
CO3	Apply and determine appropriate Data Mining techniques using R to real time applications	**K3,K4**
CO4	Analyze on clustering algorithms	**K4,K5**
CO5	Analyze on regression methods in AI	**K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	S	S	M	M	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	**3**	**3**	**3**	**3**	**3**	**3**
CO 2	**2**	**3**	**3**	**3**	**2**	**3**
CO 3	**3**	**3**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**2**	**3**	**3**
WEIGHTAGE	**14**	**15**	**14**	**14**	**14**	**15**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**93%**	**100%**	**100%**	**93%**	**93%**	**100%**

LESSON PLAN:

UNIT	DATA SCIENCE & ANALYTICS	HRS	PEDAGOGY
I	Introduction of Data Science: data science and big data – facets of data- data science process- Ecosystem- The Data Science process – six steps- Machine Learning.	**18**	**LCD CHALK & TALK**
II	Data Analytics life cycle - review of data analytics - Advanced data Analytics-technology and tools.	**18**	**LCD CHALK & TALK**
III	Basic Data Analytics using R : R Graphical User Interfaces – Data Import and Export – Attribute and Data Types –Descriptive Statistics – Exploratory Data Analysis –Visualization Before Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables – Data Exploration Versus Presentation	**18**	**LCD CHALK & TALK**
IV	Overview of Clustering : K-means – Use Cases – Overview of the Method – Perform a K-means Analysis using R –Classification – Decision Trees – Overview of a Decision Tree – Decision Tree Algorithms – Evaluating a Decision Tree – Decision Tree in R – Bayes‟ Theorem – Naïve Bayes Classifier – Smoothing – Naïve Bayes in R.	**18**	**LCD CHALK & TALK**
V	Artificial intelligence: Machine Learning and deep learning in data science - Clustering, association rules. Linear regression-logistic regression-Additional regression methods.	**16**	**LCD CHALK & TALK**
VI	Contemporary Issues	**2**	**Expert lectures, online seminars – webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
	CO2	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
CI AII	**CO3**	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
	CO4	**K1 – K4**	**2**	**K1,K2**	**2(K3,K3)**	**2(K4,K4)**
Question Pattern CIA I & II		**No. of Questions to be asked**	**4**		**4**	**4**
		No. of Questions to be answered	**4**		**2**	**2**
		Marks for each question	**1**		**5**	**8**
		Total Marks for each section	**4**		**10**	**16**

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	Cos	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
2	CO2	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
3	CO3	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
4	CO4	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
5	CO5	K1 – K4	2	K1,K2	2 (K3)	2 (K4)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			80	80	57.14	57.14
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**		
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**		
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K4**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K4**	
20. a)	**Unit - V**	**CO5**	**K4**	
		OR		
20. b)	**Unit - V**	**CO5**	**K4**	

Course Name	WEB APPLICATION DEVELOPMENT AND HOSTING LAB			
Course Code	23PCSCP41	L	P	C
Category	CORE	-	6	4

COURSE OBJECTIVES:

- To understand RMI& its implementation
- Able to design a web page using HTML tags
- To enable the students to use Framesets, hyper links and different formatting features of HTML tags
- Enable the students to use Forms & other controls in a web page
- To create interactive applications using PHP

LIST OF PROGRAMS **90**

1. Develop a website for your college using advanced tags of HTML.
2. Write names of several countries in a paragraph and store it as an HTML document, world.html. Each country name must be a hot text. When you click India (for example), it must open india.html and it should provide a brief introduction about India.
3. Develop a HTML document to i)display Text with Bullets / Numbers - Using Lists ii) to display the Table Format Data
4. Develop a Complete Web Page using Frames and Framesets which gives the Information about a Hospital using HTML.
5. Write a HTML document to print your Bio-Data in a neat format using several components.
6. Develop a HTML document to display a Registration Form for an inter-collegiate function.
7. Using HTML form accept Customer details like Name, City, Pin code, Phone number and Email address and validate the data and display appropriate messages for violations using PHP
8. Write a program to accept two numbers n1 and n2 using HTML form and display the Prime numbers between n1 and n2 using PHP.

Total Lecture Hours **90**

BOOKS FOR STUDY:

- Ivan Bayross, "Web Enabled Commercial Applications Development Using HTML, JavaScript, DHTML and PHP", BPB Publications, 4th Revised Edition, 2010.
- Campione, Walrath and Huml,"The Java Tutorial",Addison Wesley,1999.

BOOKS FOR REFERENCES:

- A.K.Saini and SumintTuli, "Mastering XML", First Edition, New Delhi, 2002

WEB RESOURCES:

- https://www.tutorialspoint.com/xml/index.htm
- https://www.tutorialspoint.com/internet_technologies/websites_development.htm
- https://www.youtube.com/watch?v=PlxWf493en4

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand to the implement concepts of Java using HTML forms, JSP&JAR	**K1,K2**
CO2	Able to write applications with linking	**K2,K3**
CO3	Able to write Applets with Event handling mechanism	**K3,K4**
CO4	To Create interactive web based applications using servlets and jsp	**K4,K5**
CO5	Must be capable of implementing JDBC and RMI concepts	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	M
CO2	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S

CO5	S	S	S	S	S	S	S	M	S	S

S- STRONG M – MEDIUM L - LOW

CO / PO MAPPING:

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	2	3	3	3	3
CO 2	3	3	2	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	15	14	14	15	15	15
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	93%	93%	100%	100%	100%

LESSON PLAN:

S.No.	WEB APPLICATION DEVELOPMENT AND HOSTING LAB	HRS	PEDAGOGY
	1. Develop a website for your college using advanced tags of HTML. 2. Write names of several countries in a paragraph and store it as an HTML document, world.html. Each country name must be a hot text. When you click India (for example), it must open india.html and it should provide a brief introduction about India. 3. Develop a HTML document to i)display Text with Bullets / Numbers - Using Lists ii) to display the Table Format Data 4. Develop a Complete Web Page using Frames and Framesets which gives the Information about a Hospital using HTML. 5. Write a HTML document to print your Bio-Data in a neat format using several components. 6. Develop a HTML document to display a Registration Form for an inter-collegiate function. 7. Using HTML form accept Customer details like Name, City, Pin code, Phone number and Email address and validate the data and display appropriate messages for violations using PHP 8. Write a program to accept two numbers n1 and n2 using HTML form and display the Prime numbers between n1 and n2 using PHP.	90	LCD, HANDS ON TRAINING

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding & Implementation**	**Debugging & Outpu**
CIA	**CO1**	**K1**	**5**				
	CO2	**K2**		**5**			
	CO3	**K3**			**5**		
	CO4	**K4**				**5**	
	CO5	**K4**					**5**
Question Pattern CIA		**No. of Questions to be asked**	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
		Total Marks for each section	**5**	**5**	**5**	**5**	**5**

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	5					**5**	**20**	**20**
	K2		5				**5**	**20**	**20**
	K3			5			5	20	20
	K4				5	5	10	40	40
	Marks						**25**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
S. No	**Cos**	**K - Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
1	**CO1**	**K1**	**15**				
2	**CO2**	**K2**		**15**			
3	**CO3**	**K3**			**15**		
4	**CO4**	**K4**				**15**	
5	**CO5**	**K4**					**15**
No. of Questions to be Asked			**2**	**2**	**2**	**2**	**2**
No. of Questions to be answered			**2**	**2**	**2**	**2**	**2**
Marks for each question			**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
Total Marks for each section			**15**	**15**	**15**	**15**	**15**
(Figures in parenthesis denotes, questions should be asked with the given K level)							

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	15					**15**	**20**	**20**
	K2		15				**15**	**20**	**20**
	K3			15			15	20	20
	K4				15	1 5	30	40	40
	Marks						**75**	**100**	**100**

Course Name	CLOUD COMPUTING LAB			
Course Code	23PCSCP42	L	P	C
Category	CORE	-	6	3

COURSE OBJECTIVES:

- To provide suitable cloud platform for application
- To create Prototype common centralised services on cloud
- Undertake studies on security and scalability in cloud
- Provide training on virtualisation and cloud computing
- To Develop and Host Virtual Labs

LIST OF PROGRAMS	**90**

1. Working with Google Drive to make spreadsheet and notes.
2. Launch a Linux Virtual Machine.
3. To host a static website
4. Exploring Google cloud for the following a) Storage b) Sharing of data c) manage your calendar, to-do lists, d) a document editing tool
5. Working and installation of Google App Engine
6. Working and installation of Microsoft Azure
7. To Connect Amazon Redshift with S3 bucket
8. To Create and Query a NoSQL Table

Total Lecture Hours	**90**

BOOKS FOR STUDY:

- Michael Miller, "Cloud Computing", Pearson Education, New Delhi, 2009

BOOKS FOR REFERENCES:

- Anthony T. Velte, "Cloud Computing: A Practical Approach", 1st Edition, Tata McGraw Hill Education Private Limited, 2009.

WEB RESOURCES:

- **https://nptel.ac.in/courses/106/105/106105167/**
- **https://www.tutorialspoint.com/cloud_computing/index.htm**
- **https://www.javatpoint.com/cloud-computing-tutorial**

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Configure various virtualization tools such as Virtual Box, VMware workstation	**K1,K2**
CO2	Design and deploy a web application in a PaaS environment	**K3,**
CO3	Learn how to simulate a cloud environment to implement new schedulers	**K3,K4**
CO4	Install and use a generic cloud environment that can be used as a private cloud.	**K4,K5**
CO5	Manipulate large data sets in a parallel environment	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	**3**	**2**	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**2**	**3**	**3**	**3**
CO 3	**3**	**3**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**3**	**3**
WEIGHTAGE	**15**	**14**	**14**	**15**	**15**	**14**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100%**	**93%**	**93%**	**100%**	**100%**	**100%**

LESSON PLAN:

S.No.	CLOUD COMPUTING LAB	HRS	PEDAGOGY
1.	Working with Google Drive to make spreadsheet and notes.	90	LCD, HANDS ON TRAINING
2.	Launch a Linux Virtual Machine. To host a static website		
3.	Exploring Google cloud for the following a) Storage b) Sharing of data c) manage your calendar, to-do lists, d) a document editing tool		
4.	Working and installation of Google App Engine		
5.	Working and installation of Microsoft Azure		
6.	To Connect Amazon Redshift with S3 bucket		
7.	To Create and Query a NoSQL Table		

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding & Implementation**	**Debugging & Outpu**
CIA	**CO1**	**K1**	**5**				
	CO2	**K2**		**5**			
	CO3	**K3**			**5**		
	CO4	**K4**				**5**	
	CO5	**K4**					**5**
Question Pattern CIA		**No. of Questions to be asked**	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
		Total Marks for each section	**5**	**5**	**5**	**5**	**5**

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	5					**5**	**20**	**20**
	K2		5				**5**	**20**	**20**
	K3			5			5	20	20
	K4				5	5	10	40	40
	Marks						**25**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
S. No	**Cos**	**K - Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
1	**CO1**	**K1**	**15**				
2	**CO2**	**K2**		**15**			
3	**CO3**	**K3**			**15**		
4	**CO4**	**K4**				**15**	
5	**CO5**	**K4**					**15**
No. of Questions to be Asked			**2**	**2**	**2**	**2**	**2**
No. of Questions to be answered			**2**	**2**	**2**	**2**	**2**
Marks for each question			**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
Total Marks for each section			**15**	**15**	**15**	**15**	**15**
(Figures in parenthesis denotes, questions should be asked with the given K level)							

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	15					**15**	**20**	**20**
	K2		15				**15**	**20**	**20**
	K3			15			15	20	20
	K4				15	1 5	30	40	40
	Marks						**75**	**100**	**100**

Course Name	PROJECT AND VIVA VOCE			
Course Code	23PCSPRJ1	**L**	**P**	**C**
Category	CORE	-	6	4

COURSE OBJECTIVES:

- Expose to the various phases of Software Development Life Cycle.
- Learn to apply the Skills and Knowledge in Design, Coding and Testing with appropriate
- Technological Tools and Procedures.
- Learn to Develop Applications with Personal, Societal and Professional Ethical Standards.

REGULATIONS

1.The Candidates have to undergo a Minimum of 150 Hours of Project Work during the Course of Study either in an IT Industry / Public or Private Sector Organization / Research Institutes / Institution itself.
2. The Candidates need to identify and analyze real world problems on the selected projectdomain.
3. During the course of study, the Candidates need to Develop, Design, Test, etc., the Applications as per the directions by the Guide.
4. Then the Candidates have to prepare and submit the manuscript of the Project Work as a Report as per the requirements of the Institution / Department for Evaluation.
5. The submission of the Project Report will be done at the end of the Semester for Presentation and Viva-Voce during the Practical Examinations of the Semester.
6. The Passing Minimum for Project Work is 50%.
7. If the Candidate fails to score 50% in the Project Work, the Candidate has to improve it during the next attempt.
8. A Faculty Member from the Department will act as a Guide to Supervise and Monitor the progress of the Candidates during the course of Project Work.
9. The Faculty Member will act as the Internal Examiner during the course of Project Work as well as at the time of conducting the Viva-Voce Examination.
10. The Internal Marks for the Project Work will be awarded by the concerned Guide / Internal Examiner.
11. The Internal and External Examiners shall both evaluate the Project Report, Presentation and conduct the Viva-Voce Examination.

Total Lecture Hours	**90**

INTERNAL MARKS AWARDED FOR THE PROJECT WORK – 40 Marks
1. Plan of the Project – **5 Marks**
2. Execution of the Plan –5 **Marks**
3. Individual Initiative – 10 **Marks**
4. Review 1 – **10Marks**
5. Review 2 – **10Marks**
EXTERNAL MARKS AWARDED FOR THE PROJECT WORK – 60 Marks
1. Evaluation of the Project Report -20 **Marks**
2. Presentation – **20 Marks**
3. Viva-Voce Examination – **20 Marks**
Total – 100 Marks

Nature of Course	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL	✓	GLOBAL	
Changes Made in the Course	Percentage of Change	**20%**	No Changes Made		New Course			

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Show Leadership Skills and Learn Time Management	**K1,**
CO2	Identify various Tools to be applied to a specific Problem	**K2**
CO3	Evaluate the Reports	**K3**
CO4	Involve in the Team and Manage it to deliver the excellent Outcomes	**K4**
CO5	Assess and Develop the Individual Skills to Present and Organize the Projects	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	**3**	**2**	**3**	**3**	**3**	**3**
CO 2	**3**	**3**	**2**	**3**	**3**	**2**
CO 3	**3**	**3**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**3**	**3**
WEIGHTAGE	**15**	**14**	**14**	**15**	**15**	**14**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**100%**	**93%**	**93%**	**100%**	**100%**	**93%**

Distribution of Marks with COs &K Level for Correction of CIA					
	COs	**K - Level**	**Distribution of the work of the experiment**	**K - Level**	**MARKS**
CIA	**CO1**	**K1 to K5**	Introduction	**K1**	**5.0**
	CO2	**K1 to K5**	Problem Analysis	**K2**	**5.0**
	CO3	**K1 to K5**	Problem Design and Development	**K3**	**10.0**
	CO4	**K1 to K5**	Implementation	**K4**	**15.0**
	CO5	**K1 to K5**	Testing	**K5**	**5.0**
	Total Marks				**40**

Distribution of Marks with K Level CIA					
	K Level	**Distribution of the work of the experiment**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA	K1	Introduction	5	12.5	-
	K2	Problem Analysis	5	12.5	
	K3	Problem Design and Development	10	25.0	**25.0**
	K4	Implementation	15	37.5	**50.0**
	K5	Testing	5	12.5	**87.5**
	Marks		**40**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluating, interpreting and concluding the results with accurate measurements**.**

Distribution of Marks with COs &K Level for Correction of the Summative Exam				
COs	**K - Level**	**Distribution of the work of the experiment**	**K - Level**	**MARKS**
CO1	**K1 to K5**	Introduction	**K1**	**5**
CO2	**K1 to K5**	Problem Analysis	**K2**	**10**
CO3	**K1 to K5**	Problem Design and Development	**K3**	**10**
CO4	**K1 to K5**	Implementation	**K4**	**15**
CO5	**K1 to K5**	Testing	**K5**	**20**
Total Marks				**60**

Distribution of Marks with K Level				
K Level	**Parameters for K-Level**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	Introduction	**5**	**8.33**	**8.3**
K2	Problem Analysis	**10**	**16.67**	**16.7**
K3	Problem Design and Development	**10**	**16.67**	**16.7**
K4	Implementation	**15**	**25.0**	**25**
K5	Testing	**20**	**33.33**	**33.3**
Marks		**60**	**100**	**100**

Course Name	INTERNET OF THINGS			
Course Code	23PCSEC41	**L**	**P**	**C**
Category	ELECTIVE	4	-	3

COURSE OBJECTIVES:

- About Internet of Things where various communicating entities are controlled and managed for decision making in the application domain.
- Enable students to learn the Architecture of IoT and
- To learn the IoT Technologies
- Developing IoT applications and Security in IoT, Basic Electronics for IoT,
- To implement Arduino IDE, Sensors and Actuators Programming NODEMCU using Arduino IDE

UNIT - I	**INTRODUCTION**	**12**

Introduction to IoT: Evolution of IoT – Definition & Characteristics of IoT - Architecture of IoT – Technologies for IoT – Developing IoT Applications – Applications of IoT – Industrial IoT – Security in IoT

UNIT - II	**BASIC ELECTRONICS FOR IoT**	**12**

Basic Electronics for IoT: Electric Charge, Resistance, Current and Voltage – Binary Calculations – Logic Chips – Microcontrollers – Multipurpose Computers – Electronic Signals – A/D and D/A Conversion – Pulse Width Modulation

UNIT - III	**PROGRAMMING USING ARDUINO**	**12**

Programming Fundamentals with C using Arduino IDE: Installing and Setting up the Arduino IDE – Basic Syntax – Data Types/ Variables/ Constant – Operators – Conditional Statements and Loops – Using Arduino C Library Functions for Serial, delay and other invoking Functions – Strings and Mathematics Library Functions

UNIT - IV	**SENSORS AND ACTUATORS**	**10**

Sensors and Actuators: Analog and Digital Sensors – Interfacing temperature sensor, ultrasound sensor and infrared (IR) sensor with Arduino – Interfacing LED and Buzzer with Arduino

UNIT - V	**SENSOR DATA IN INTERNET**	**12**

Sending Sensor Data Over Internet: Introduction to ESP8266 NODEMCU WiFi Module – Programming NODEMCU using Arduino IDE – Using WiFi and NODEMCU to transmit data from temperature sensor to Open Source IoT cloud platform (ThingSpeak).

UNIT - VI	**CONTEMPORARY ISSUES**	**2**

Expert lectures, online seminars –webinars

Total Lecture Hours	**60**

BOOKS FOR STUDY:

- Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-On Approach", 2014. ISBN: 978-0996025515
- Boris Adryan, Dominik Obermaier, Paul Fremantle, "The Technical Foundations of IoT", Artech Houser Publishers, 2017.

BOOKS FOR REFERENCES:

- Michael Margolis, "Arduino Cookbook", O"Reilly, 2011
- Marco Schwartz, "Internet of Things with ESP8266", Packt Publishing, 2016.
- Dhivya Bala, "ESP8266: Step by Step Tutorial for ESP8266 IoT, Arduino NODEMCU Dev. Kit", 2018.

WEB RESOURCES:

- https://onlinecourses.nptel.ac.in/noc20_cs66/preview
- https://www.javatpoint.com/iot-internet-of-things
- https://www.tutorialspoint.com/internet_of_things/index.htm

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change	**100%**	No Changes Made		New Course			

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand about IoT, its Architecture and its Applications	**K1,K2**
CO2	Understand basic electronics used in IoT & its role	**K2,K3**
CO3	Develop applications with C using Arduino IDE	**K4**
CO4	Analyze about sensors and actuators	**K5,K6**
CO5	Design IoT in real time applications using today"s internet & wireless technologies	**K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	M	S	M	S	M	M	S	M
CO2	M	S	M	S	M	S	M	S	S	S
CO3	S	S	S	S	M	S	M	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	**3**	**3**	**3**	**3**	**3**	**3**
CO 2	**2**	**3**	**3**	**3**	**2**	**3**
CO 3	**3**	**3**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**2**	**3**	**3**
WEIGHTAGE	**14**	**15**	**14**	**14**	**14**	**15**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**93%**	**100%**	**100%**	**93%**	**93%**	**100%**

LESSON PLAN:

UNIT	INTERNET OF THINGS	HRS	PEDAGOGY
I	Introduction to IoT: Evolution of IoT – Definition & Characteristics of IoT - Architecture of IoT – Technologies for IoT – Developing IoT Applications – Applications of IoT – Industrial IoT – Security in IoT	**12**	**LCD CHALK & TALK**
II	Basic Electronics for IoT: Electric Charge, Resistance, Current and Voltage – Binary Calculations – Logic Chips – Microcontrollers – Multipurpose Computers – Electronic Signals – A/D and D/A Conversion – Pulse Width Modulation	**12**	**LCD CHALK & TALK**
III	Programming Fundamentals with C using Arduino IDE: Installing and Setting up the Arduino IDE – Basic Syntax – Data Types/ Variables/ Constant – Operators – Conditional Statements and Loops – Using Arduino C Library Functions for Serial, delay and other invoking Functions – Strings and Mathematics Library Functions	**12**	**LCD CHALK & TALK**
IV	Sensors and Actuators: Analog and Digital Sensors – Interfacing temperature sensor, ultrasound sensor and infrared (IR) sensor with Arduino – Interfacing LED and Buzzer with Arduino	**10**	**LCD CHALK & TALK**
V	Sending Sensor Data Over Internet: Introduction to ESP8266 NODEMCU WiFi Module – Programming NODEMCU using Arduino IDE – Using WiFi and NODEMCU to transmit data from temperature sensor to Open Source IoT cloud platform (ThingSpeak).	**12**	**LCD CHALK & TALK**
VI	**Contemporary Issues**	**2**	**Expert lectures, online seminars – webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	**2**	**K1,K2**	**2**	**2**
	CO2	**K1 – K4**	**2**	**K1,K2**	**2**	**2**
CI AII	**CO3**	**K1 – K5**	**2**	**K1,K2**	**2**	**2**
	CO4	**K1 – K6**	**2**	**K1,K2**	**2**	**2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**4**		**4**	**4**
		No. of Questions to be answered	**4**		**2**	**2**
		Marks for each question	**1**		**5**	**8**
		Total Marks for each section	**4**		**10**	**16**

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			16	16	**28.57**	**57.1**
	K5			16	16	**28.57**	
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5-Evaluating,Justifying the problems with solutions.

K6- Combining the solutions with applications.

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			48	48	34.28	34.28
K5			16	16	11.43	11.43
K6			16	16	11.43	11.43
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K3**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K5**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K5**	
20. a)	**Unit - V**	**CO5**	**K6**	
		OR		
20. b)	**Unit - V**	**CO5**	**K6**	

Course Name	MOBILE COMPUTING			
Course Code	23PCSEC42	**L**	**P**	**C**
Category	ELECTIVE	4	-	3

COURSE OBJECTIVES:

- Present the overview of Mobile computing, Applications and Architectures.
- Describe the futuristic computing challenges.
- Enable the students to learn the concept of mobile computing.
- To build an Application Based on the User Requirements
- To know the technologies of Mobile Communication System

UNIT - I INTRODUCTION	**12**
Introduction: Advantages of Digital Information - Introduction to Telephone Systems –Mobile communication: Need for Mobile Communication – Requirements of Mobile Communication – History of Mobile Communication.	
UNIT - II MOBILE COMMUNICATION	**12**
Introduction to Cellular Mobile Communication – Mobile Communication Standards –Mobility Management – Frequency Management – Cordless Mobile Communication Systems.	
UNIT - III MOBILE COMPUTING	**12**
Mobile Computing: History of data networks – Classification of Mobile data networks - CDPD System – Satellites in Mobile Communication: Satellite classification – Global Satellite Communication – Changeover from one satellite to other – Global Mobile Communication – Interferences in Cellular Mobile Communication.	
UNIT - IV MOBILE COMMUNICATION SYSTEM	**11**
Important Parameters of Mobile Communication System – Mobile Internet: Working of Mobile IP – Wireless Network Security – Wireless Local Loop Architecture: Components in WLL – Problems in WLL – Modern Wireless Local Loop – Local Multipoint Distribution Service – Wireless Application Protocol	
UNIT - V COMMUNICATION TECHNOLOGY	**11**
WCDMA Technology and Fiber Optic Microcellular Mobile Communication – Ad hoc Network and Bluetooth technology – Intelligent Mobile Communication system – Fourth Generation Mobile Communication systems	
UNIT - VI CONTEMPORARY ISSUES	**2**
Expert lectures, online seminars –webinars	
Total Lecture Hours	**60**

BOOKS FOR STUDY:

- T.G. Palanivelu, R. Nakkeeran, "Wireless and Mobile Communication", PHI Limited, 2009.
- Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2007

BOOKS FOR REFERENCES:

- Asoke K Talukder, Hasan Ahmed, Roopa Yavagal, "Mobile Computing",TMH, 2010.

WEB RESOURCES:

- **https://www.tutorialspoint.com/mobile_computing/index.htm**
- **https://www.javatpoint.com/mobile-computing**
- **https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs13/**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		No Changes Made		New Course	✓		

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Understand the need and requirements of mobile communication	**K1,K2**
CO2	Focus on mobile computing applications and techniques	**K2,K3**
CO3	Demonstrate satellite communication in mobile computing	**K4**
CO4	Analyze about wireless local loop architecture	**K5,K6**
CO5	Analyze various mobile communication technologies	**K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	S	M	M	M	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	**3**	**3**	**3**	**3**	**3**	**3**
CO 2	**2**	**3**	**3**	**3**	**2**	**3**
CO 3	**3**	**3**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**2**	**3**	**3**
WEIGHTAGE	**14**	**15**	**14**	**14**	**14**	**15**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**93%**	**100%**	**100%**	**93%**	**93%**	**100%**

LESSON PLAN:

UNIT	MOBILE COMPUTING	HRS	PEDAGOGY
I	Introduction: Advantages of Digital Information - Introduction to Telephone Systems –Mobile communication: Need for Mobile Communication – Requirements of Mobile Communication – History of Mobile Communication.	**12**	**LCD CHALK & TALK**
II	Introduction to Cellular Mobile Communication – Mobile Communication Standards –Mobility Management – Frequency Management – Cordless Mobile Communication Systems.	**12**	**LCD CHALK & TALK**
III	Mobile Computing: History of data networks – Classification of Mobile data networks - CDPD System – Satellites in Mobile Communication: Satellite classification – Global Satellite Communication – Changeover from one satellite to other – Global Mobile Communication – Interferences in Cellular Mobile Communication.	**12**	**LCD CHALK & TALK**
IV	Important Parameters of Mobile Communication System – Mobile Internet: Working of Mobile IP – Wireless Network Security – Wireless Local Loop Architecture: Components in WLL – Problems in WLL – Modern Wireless Local Loop – Local Multipoint Distribution Service – Wireless Application Protocol.	**11**	**LCD CHALK & TALK**
V	WCDMA Technology and Fiber Optic Microcellular Mobile Communication – Ad hoc Network and Bluetooth technology – Intelligent Mobile Communication system – Fourth Generation Mobile Communication systems.	**11**	**LCD CHALK & TALK**
VI	Contemporary Issues	**2**	**Expert lectures, online seminars webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	**2**	**K1,K2**	**2**	**2**
	CO2	**K1 – K4**	**2**	**K1,K2**	**2**	**2**
CI AII	**CO3**	**K1 – K5**	**2**	**K1,K2**	**2**	**2**
	CO4	**K1 – K6**	**2**	**K1,K2**	**2**	**2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**4**		**4**	**4**
		No. of Questions to be answered	**4**		**2**	**2**
		Marks for each question	**1**		**5**	**8**
		Total Marks for each section	**4**		**10**	**16**

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			16	16	**28.57**	**57.1**
	K5			16	16	**28.57**	
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5-Evaluating,Justifying the problems with solutions.

K6- Combining the solutions with applications.

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	**COs**	**K - Level**	**Section A (MCQs)**		**Section B (Either / or Choice) With K - LEVEL**	**Section C (Either / or Choice) With K - LEVEL**
			No. of Questions	**K – Level**		
1	CO1	**K1-K4**	**2**	**K1,K2**	**2 (K3,K3)**	**2 (K4,K4)**
2	CO2	**K1-K4**	**2**	**K1,K2**	**2 (K3,K3)**	**2 (K4,K4)**
3	CO3	**K1-K4**	**2**	**K1,K2**	**2 (K3,K3)**	**2 (K4,K4)**
4	CO4	**K1-K5**	**2**	**K1,K2**	**2 (K3,K3)**	**2 (K5,K5)**
5	CO5	**K1-K6**	**2**	**K1,K2**	**2 (K3,K3)**	**2 (K6,K6)**
No. of Questions to be Asked			**10**		**10**	**10**
No. of Questions to be answered			**10**		**5**	**5**
Marks for each question			**1**		**5**	**8**
Total Marks for each section			**10**		**25**	**40**
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	**Section A (Multiple Choice Questions)**	**Section B (Either or Choice**	**Section C (Either/ or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	5			5	**3.57**	**3.57**
K2	5			5	**3.57**	**3.57**
K3		50		50	**35.72**	**35.72**
K4			48	48	**34.28**	**34.28**
K5			16	16	**11.43**	**11.43**
K6			16	16	**11.43**	**11.43**
Marks	**10**	**50**	**80**	**140**	**100**	**100**
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K3**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K5**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K5**	
20. a)	**Unit - V**	**CO5**	**K6**	
		OR		
20. b)	**Unit - V**	**CO5**	**K6**	

Course Name	BLOCK CHAIN TECHNOLOGY			
Course Code	23PCSEC43	**L**	**P**	**C**
Category	ELECTIVE	4	-	3

COURSE OBJECTIVES:

- Understand the fundamentals of block chain and the basics hyperledger
- Understand the influence and role of block chain in cryptocurrency.
- Learn security features and its significance.
- Identify problems &challenges posed by Block Chain.
- To study the application of block chain in various other fields.

UNIT - I	**INTRODUCTION**	**12**

Introduction to Blockchain - The big picture of the industry – size, growth, structure, players. Bitcoin versus Cryptocurrencies versus Blockchain - Distributed Ledger Technology (DLT). Strategic analysis of the space – Blockchain platforms, regulators, application providers. The major application: currency, identity, chain of custody

UNIT - II	**NETWORK AND SECURITY**	**12**

Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Blockchain 1.0, 2.0 and 3.0 – transition, advancements and features. Privacy, Security issues in Blockchain

UNIT - III	**CRYPTOCURRENCY**	**12**

Cryptocurrency - History, Distributed Ledger, Bitcoin protocols -Symmetric-key cryptography - Public-key cryptography - Digital Signatures -High and Low trust societies - Types of Trust model: Peer-to-Peer, Leviathan, and Intermediary. Application of Cryptography to Blockchain

UNIT - IV	**CRYPTOCURRENCY REGULATION**	**12**

Cryptocurrency Regulation - Stakeholders, Roots of Bit coin, Legal views - exchange of cryptocurrency - Black Market - Global Economy. Cyrptoeconomics – assets, supply and demand, inflation and deflation – Regulation

UNIT - V	**CHALLENGES IN BLOCK CHAIN**	**10**

Opportunities and challenges in Block Chain – Application of block chain: Industry 4.0 – machine to machine communication – Data management in industry 4.0 – future prospects. Block chain in Health 4.0 - Blockchain properties - Healthcare Costs - Healthcare Quality - Healthcare Value - Challenges for using blockchain for healthcare data

UNIT - VI	**CONTEMPORARY ISSUES**	**2**

Expert lectures, online seminars –webinars

Total Lecture Hours	**60**

BOOKS FOR STUDY:

- Course material will be provided by the department.

BOOKS FOR REFERENCES:

- Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System"
- Rodrigo da Rosa Righi, Antonio Marcos Alberti, Madhusudan Singh, "Blockchain Technology for Industry 4.0" Springer 2020

WEB RESOURCES:

- **https://www.javatpoint.com/blockchain-tutorial**
- **https:// https://www.javatpoint.com/blockchain-tutorial**
- **www.tutorialspoint.com/blockchain/index.htm**
- **https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs01/**

Nature of Course	EMPLOYABILITY		✓	SKILL ORIENTED			ENTREPRENEURSHIP					
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL			GLOBAL	✓			
Changes Made in the Course	Percentage of Change		**80%**	No Changes Made			New Course					

*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Demonstrate blockchain technology and crypto currency	**K1,K2**
CO2	Understand the mining mechanism in blockchain	**K2**
CO3	Apply and identify security measures, and various types of services that allow people to trade and transact with bitcoins	**K3,K4**
CO4	Apply and analyze Blockchain in health care industry	**K4,K5**
CO5	Analyze security, privacy, and efficiency of a given Blockchain system	**K5,K6**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	S	M	M	M	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO 1	**3**	**3**	**3**	**3**	**3**	**3**
CO 2	**2**	**3**	**3**	**3**	**2**	**3**
CO 3	**3**	**3**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**	**3**
CO 5	**3**	**3**	**3**	**2**	**3**	**3**
WEIGHTAGE	**14**	**15**	**14**	**14**	**14**	**15**
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	**3**	**3**	**3**	**3**	**3**	**100%**

LESSON PLAN:

UNIT	BLOCK CHAIN TECHNOLOGY	HRS	PEDAGOGY
I	Introduction to Blockchain - The big picture of the industry – size, growth, structure, players. Bitcoin versus Cryptocurrencies versus Blockchain - Distributed Ledger Technology (DLT). Strategic analysis of the space – Blockchain platforms, regulators, application providers. The major application: currency, identity, chain of custody.	**12**	**LCD CHALK & TALK**
II	Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Blockchain 1.0, 2.0 and 3.0 – transition, advancements and features. Privacy, Security issues in Blockchain.	**12**	**LCD CHALK & TALK**
III	Cryptocurrency - History, Distributed Ledger, Bitcoin protocols -Symmetric-key cryptography - Public-key cryptography - Digital Signatures -High and Low trust societies - Types of Trust model: Peer-to-Peer, Leviathan, and Intermediary. Application of Cryptography to Blockchain	**12**	**LCD CHALK & TALK**
IV	Cryptocurrency Regulation - Stakeholders, Roots of Bit coin, Legal views - exchange of cryptocurrency - Black Market - Global Economy. Cyrpto economics – assets, supply and demand, inflation and deflation – Regulation.	**12**	**LCD CHALK & TALK**
V	Opportunities and challenges in Block Chain – Application of block chain: Industry 4.0 – machine to machine communication – Data management in industry 4.0 – future prospects. Block chain in Health 4.0 - Blockchain properties - Healthcare Costs - Healthcare Quality - Healthcare Value - Challenges for using blockchain for healthcare data	**10**	**LCD CHALK & TALK**
VI	Contemporary Issues	**2**	**Expert lectures, online seminars – webinars**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)						
Internal	**Cos**	**K Level**	**Section A**		**Section B Either or Choice**	**Section C Either or Choice**
			MCQs			
			No. of. Questions	**K - Level**		
CI AI	**CO1**	**K1 – K4**	**2**	**K1,K2**	**2**	**2**
	CO2	**K1 – K4**	**2**	**K1,K2**	**2**	**2**
CI AII	**CO3**	**K1 – K5**	**2**	**K1,K2**	**2**	**2**
	CO4	**K1 – K6**	**2**	**K1,K2**	**2**	**2**
Question Pattern CIA I & II		**No. of Questions to be asked**	**4**		**4**	**4**
		No. of Questions to be answered	**4**		**2**	**2**
		Marks for each question	**1**		**5**	**8**
		Total Marks for each section	**4**		**10**	**16**

Distribution of Marks with K Level CIA I & CIA II							
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Either / Or Choice)**	**Section C (Either / Or Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			32	32	**57.1**	**57.1**
	Marks	**4**	**20**	**32**	**56**	**100**	**100**
CIA II	**K1**	2			2	**3.6**	**7.2**
	K2	2			2	**3.6**	
	K3		20		20	**35.7**	**35.7**
	K4			16	16	**28.57**	**57.1**
	K5			16	16	**28.57**	
	Marks	**4**	**20**	**32**	**56**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

K5-Evaluating,Justifying the problems with solutions.

K6- Combining the solutions with applications.

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)						
S. No	COs	K - Level	Section A (MCQs)		Section B (Either / or Choice) With K - LEVEL	Section C (Either / or Choice) With K - LEVEL
			No. of Questions	K – Level		
1	CO1	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
2	CO2	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
3	CO3	K1-K4	2	K1,K2	2 (K3,K3)	2 (K4,K4)
4	CO4	K1-K5	2	K1,K2	2 (K3,K3)	2 (K5,K5)
5	CO5	K1-K6	2	K1,K2	2 (K3,K3)	2 (K6,K6)
No. of Questions to be Asked			10		10	10
No. of Questions to be answered			10		5	5
Marks for each question			1		5	8
Total Marks for each section			10		25	40
(Figures in parenthesis denotes, questions should be asked with the given K level)						

Distribution of Marks with K Level						
K Level	Section A (Multiple Choice Questions)	Section B (Either or Choice	Section C (Either/ or Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	5			5	3.57	3.57
K2	5			5	3.57	3.57
K3		50		50	35.72	35.72
K4			48	48	34.28	34.28
K5			16	16	11.43	11.43
K6			16	16	11.43	11.43
Marks	10	50	80	140	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.						

Summative Examinations - Question Paper – Format

Q. No.	Unit	CO	K-level		
Answer **ALL** the questions				**PART – A**	**(10 x 1 = 10 Marks)**
1.	**Unit - I**	**CO1**	**K1**		
				a)	b)
				c)	d)
2.	**Unit - I**	**CO1**	**K2**		
				a)	b)
				c)	d)
3.	**Unit - II**	**CO2**	**K1**		
				a)	b)
				c)	d)
4.	**Unit - II**	**CO2**	**K2**		
				a)	b)
				c)	d)
5.	**Unit - III**	**CO3**	**K1**		
				a)	b)
				c)	d)
6.	**Unit - III**	**CO3**	**K2**		
				a)	b)
				c)	d)
7.	**Unit - IV**	**CO4**	**K1**		
				a)	b)
				c)	d)
8.	**Unit - IV**	**CO4**	**K2**		
				a)	b)
				c)	d)
9.	**Unit - V**	**CO5**	**K1**		
				a)	b)
				c)	d)
10.	**Unit - V**	**CO5**	**K2**		
				a)	b)
				c)	d)

Answer **ALL** the questions		**PART – B**		**(5 x 5 = 25 Marks)**
11. a)	**Unit - I**	**CO1**	**K3**	
		OR		
11. b)	**Unit - I**	**CO1**	**K3**	
12. a)	**Unit - II**	**CO2**	**K3**	
		OR		
12. b)	**Unit - II**	**CO2**	**K3**	
13. a)	**Unit - III**	**CO3**		
		OR		
13. b)	**Unit - III**	**CO3**	**K3**	
14. a)	**Unit - IV**	**CO4**	**K3**	
		OR		
14. b)	**Unit - IV**	**CO4**	**K3**	
15. a)	**Unit - V**	**CO5**	**K3**	
		OR		
15. b)	**Unit - V**	**CO5**	**K3**	

Answer **ALL** the questions		**PART – C**		**(5 x 8 = 40 Marks)**
16. a)	**Unit - I**	**CO1**	**K4**	
		OR		
16. b)	**Unit - I**	**CO1**	**K4**	
17. a)	**Unit - II**	**CO2**	**K4**	
		OR		
17. b)	**Unit - II**	**CO2**	**K4**	
18. a)	**Unit - III**	**CO3**	**K4**	
		OR		
18. b)	**Unit - III**	**CO3**	**K4**	
19. a)	**Unit - IV**	**CO4**	**K5**	
		OR		
19. b)	**Unit - IV**	**CO4**	**K5**	
20. a)	**Unit - V**	**CO5**	**K6**	
		OR		
20. b)	**Unit - V**	**CO5**	**K6**	

Course Name	DATA VISUALIZATION LAB			
Course Code	23PCSSP41	**L**	**P**	**C**
Category	SKILL	-	2	2

COURSE OBJECTIVES:

- To learn the basic functions and operations of Excel and tableau.
- To explore to design, build, and deploy various charts for applications.
- To comprehend, design and deploy the label and heat map.
- To understand and deploy dashboard.
- To understand the functions of tableau for data process.

LIST OF PROGRAMS **30**

IMPLEMENT THE FOLLOWING USING EXCEL

1. Create Pie chart for Sales and Sales % by Country (sorted in descending order).
2. Create Bar chart for Sales by Country by Year (rounded to nearest thousand and sorted by Grand Total).
3. Create Line char for Sales by Ship Mode (First Class, Same Day, Second Class and Standard Class).
4. Create Scatter chart for Sales by Ship Mode by Country (rounded to the nearest dollar and sorted by First Class).
5. Create heat map for Sales by Category by Sub-Category (in thousands and sorted by sales value in descending order).
6. Design and create the label for vendor list.
7. Design and create the dashboard..

IMPLEMENT THE FOLLOWING USING TABLEAU

1. Sales by Ship Mode (First Class, Same Day, Second Class, and Standard Class).
2. Sales by Ship Mode by Country (rounded to the nearest dollar and sorted by First Class).
3. Sales by Category by Sub-Category (in thousands and sorted by sales value in descending order)

Total Lecture Hours **30**

BOOKS FOR STUDY:

- Data visualization with python: create an impact with meaningful data insights using interactive and engaging visuals, Mario Dobler, Tim Grobmann, Packt Publications, 2019
- Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master, Ryan Sleeper, Oreilly Publications, 2018.

BOOKS FOR REFERENCES:

- Data Visualization with R: 111 Examples by Thomas Rahlf, Springer, 2020
- Information Dashboard Design: Displaying Data for At-A-Glance Monitoring .BY Stephen Few 2013

WEB RESOURCES:

- **https://help.tableau.com/current/offline/en-us/tableau_blueprint.pdf**
- **https://howto.mt.gov/_docs/Designing-Efficient-Workbooks.pdf**

Nature of Course	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENEURSHIP			
Curriculum Relevance	LOCAL		REGIONAL		NATIONAL		GLOBAL	✓
Changes Made in the Course	Percentage of Change		No Changes Made		New Course	✓		
*** Treat 20% as each unit (20*5=100%) and calculate the percentage of change for the course.**								

COURSE OUTCOMES:		**K LEVEL**
After studying this course, the students will be able to:		
CO1	Enable to create and apply Spread sheet and Tableau for various data processing	**K1,K2**
CO2	Gains knowledge to create and design various visualization tools in Excel and Tableau.	**K3,K4**
CO3	Comprehend, create and deploy labels and heat map.	**K4,K5**
CO4	Enable to create and apply dashboard for various data processing	**K5,K6**
CO5	Illustrate and apply data visualization tool for any data set	**K4**

MAPPING WITH PROGRAM OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S

S- STRONG **M – MEDIUM** **L - LOW**

CO / PO MAPPING:						
COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	2	3	3	3	3
CO 2	3	3	2	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	3	3	3
WEIGHTAGE	15	14	14	15	15	15
WEIGHTED PERCENTAGE OF COURSE CONTRIBUTION TO POS	100%	93%	93%	100%	100%	100%

LESSON PLAN:

S. No.	DATA VISUALIZATION LAB	HRS	PEDAGOGY
	IMPLEMENT THE FOLLOWING USING EXCEL Create Pie chart for Sales and Sales % by Country (sorted in descending order). Create Bar chart for Sales by Country by Year (rounded to nearest thousand and sorted by Grand Total). Create Line char for Sales by Ship Mode (First Class, Same Day, Second Class and Standard Class). Create Scatter chart for Sales by Ship Mode by Country (rounded to the nearest dollar and sorted by First Class). Create heat map for Sales by Category by Sub-Category (in thousands and sorted by sales value in descending order). Design and create the label for vendor list. Design and create the dashboard.. **IMPLEMENT THE FOLLOWING USING TABLEAU** Sales by Ship Mode (First Class, Same Day, Second Class, and Standard Class). Sales by Ship Mode by Country (rounded to the nearest dollar and sorted by First Class). Sales by Category by Sub-Category (in thousands and sorted by sales value in descending order)	30	LCD, HANDS ON TRAINING

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)							
Internal	**Cos**	**K Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding & Implementation**	**Debugging & Outpu**
CIA	**CO1**	**K1**	**5**				
	CO2	**K2**		**5**			
	CO3	**K3**			**5**		
	CO4	**K4**				**5**	
	CO5	**K4**					**5**
Question Pattern CIA		**No. of Questions to be asked**	**2**	**2**	**2**	**2**	**2**
		No. of Questions to be answered	**2**	**2**	**2**	**2**	**2**
		Marks for each question	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
		Total Marks for each section	**5**	**5**	**5**	**5**	**5**

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	5					**5**	**20**	**20**
	K2		5				**5**	**20**	**20**
	K3			5			5	20	20
	K4				5	5	10	40	40
	Marks						**25**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)							
S. No	**Cos**	**K - Level**	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding& Implementation**	**Debugging & Output**
1	**CO1**	**K1**	**15**				
2	**CO2**	**K2**		**15**			
3	**CO3**	**K3**			**15**		
4	**CO4**	**K4**				**15**	
5	**CO5**	**K4**					**15**
No. of Questions to be Asked			**2**	**2**	**2**	**2**	**2**
No. of Questions to be answered			**2**	**2**	**2**	**2**	**2**
Marks for each question			**7.5**	**7.5**	**7.5**	**7.5**	**7.5**
Total Marks for each section			**15**	**15**	**15**	**15**	**15**
(Figures in parenthesis denotes, questions should be asked with the given K level)							

Distribution of Marks with K Level CIA									
	K Level	**Syntax & Semantics**	**Programming principles**	**Concept Applications**	**Coding**	**Debugging & Output**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
CIA	**K1**	15					**15**	**20**	**20**
	K2		15				**15**	**20**	**20**
	K3			15			15	20	20
	K4				15	1 5	30	40	40
	Marks						**75**	**100**	**100**

Course Name	EXTENSION ACTIVITY			
Course Code	23PEXTG41	**L**	**P**	**C**
Category	SKILL	-	-	1

COURSE OBJECTIVES:

- To develop an awareness and knowledge of social realities to have concern for the well being of the community and engage in creative and constructive social action.
- To provide with rich and meaningful educational experiences to them in order to make their education complete and meaningful.
- To develop skill needed in the exercise of democratic leadership and programme development to help them get self-employed.
- To give them the opportunities for their personality development.
- Understand the community in which they work.

GUIDELINES FOR EXTENSION ACTIVITY

1. All the candidates who have enrolled for Post Graduate course in the affiliated colleges of Thiruvalluvar University must become a Member of any one the Extension Activities that is offered in the Institution / College, namely, National Service Scheme (NSS), Youth Red Cross (YRC), Red Ribbon Club (RRC), Eco Club, Rovers and Rangers, etc., that serves the people of the neighborhood through its various activities.
2. The department must facilitate the Candidates to register any one of the Extension Activity Club / Forum that are functioning in the Institution / College.
3. The Candidates are then expected to actively participate in the various activities organized by the above Clubs / Forum and complete the same within the Stipulated time.
4. The Club / Forum shall declare the Candidates successful at the end of the Semester / Year if they complete the activities and earn 1 credit or certificate from the Club / Forum.
5. The Department shall take necessary efforts to convey the Credit / Certification received from the Successful Candidates of the Club / Forum to the University through the Institution along with a copy of the Certificate issued to the Candidates and ensure that the Candidate's Credit is transferred to the University.
6. In case of the Unsuccessful Candidates in the Certification, the Candidates themselves have to re-register for the same.

Total Lecture Hours	**30**