DEPARTMENT OF COMPUTER SCIENCE

M.SC., COMPUTER SCIENCE

TANSCHE SYLLABUS 2023 -2024

M.Sc.,

COMPUTER SCIENCE

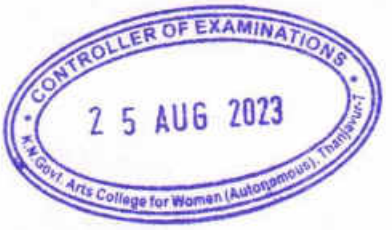
SYLLABUS

FROM THE ACADEMIC YEAR
2023 - 2024

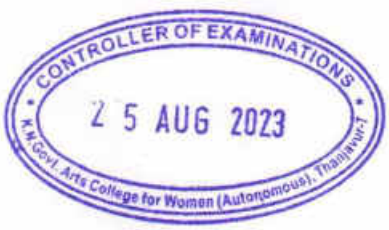
TAMIL NADU STATE COUNCIL FOR HIGHER EDUCATION

CHENNAI – 600 005.

CONTENTS



TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION	
Programme	**M.Sc., Computer Science**
Programme Code	
Duration	**PG - Two Years**
Programme Outcomes (Pos)	**PO1: Problem Solving Skill** Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context. **PO2: Decision Making Skill** Foster analytical and critical thinking abilities for data-based decision-making. **PO3: Ethical Value** Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities. **PO4: Communication Skill** Ability to develop communication, managerial and interpersonal skills. **PO5: Individual and Team Leadership Skill** Capability to lead themselves and the team to achieve organizational goals. **PO6: Employability Skill** Inculcate contemporary business practices to enhance employability skills in the competitive environment. **PO7: Entrepreneurial Skill** Equip with skills and competencies to become an entrepreneur. **PO8: Contribution to Society** Succeed in career endeavors and contribute significantly to society. **PO 9 Multicultural competence** Possess knowledge of the values and beliefs of multiple cultures anda global perspective. **PO 10: Moral and ethical awareness/reasoning** Ability to embrace moral/ethical values in conducting one's life.



Programme Specific Outcomes(PSOs)	**PSO1 – Placement** To prepare the students who will demonstrate respectful engagementwith others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions. **PSO 2 - Entrepreneur** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations. **PSO3 – Research and Development** Design and implement HR systems and practices grounded in researchthat comply with employment laws, leading the organization towards growth and development. **PSO4 – Contribution to Business World** To produce employable, ethical and innovative professionals to sustainin the dynamic business world. **PSO 5 – Contribution to the Society** To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

Credit Distribution for PG Programme

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**

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2023 - 2024 - PG Course Structure

Semester–I	Credit	Hours	Semester-II	Credit	Hours	Semester-III	Credit	Hours	Semester–IV	Credit	Hours
1.1. Core-I	5	7	2.1. Core-IV	5	6	3.1. Core-VII	5	6	4.1. Core-XI	5	6
1.2 Core-II	5	7	2.2 Core-V	5	6	3.2 Core-VIII	5	6	4.2 Core-XII	5	6
1.3 Core – III	4	6	2.3 Core – VI	4	6	3.3 Core – IX	5	6	4.3 Project with viva voce	7	10
1.4 Discipline Centric Elective -I	3	5	2.4 Discipline Centric Elective – III	3	4	3.4 Core – X	4	6	4.4Elective - VI (Industry / Entrepreneurship) 20% Theory 80% Practical	3	4
1.5 Generic Elective-II:	3	5	2.5 Generic Elective -IV:	3	4	3.5 Discipline Centric Elective - V	3	3	4.5 Skill Enhancement course III / Professional Competency Skill	2	4
			2.6 Skill Enhancement Course I	2	4	3.6 Skill Enhancement Course II	2	3	4.6 Extension Activity	1	
			ECC 1: Self Study / Mooc	3	-	3.7 Internship/ Industrial Activity	2	-			
			ECC 2: Add on course	4	-	ECC 3: Self Study / Mooc	3	-			
	20	**30**		**22**	**30**		**26**	**30**		**23**	**30**
Total - 91 Credit + Extra Credit Maximum 10											

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Component wise Credit Distribution

Credits	SemI	SemII	SemIII	SemIV	Total
Part A	18	18	18	18	72
Part B (i)Discipline– Centric/Generic Skill	2	2	2	2	8
(ii)Soft Skill	2	2	2	2	10
(iii)Summer internship/Industrial Training			2		
Part C				1	1
Total	22	22	24	23	91

METHODS OF EVALUATION		
Internal Evaluation	Continuous Internal Assessment Test	**25 Marks**
	Assignments / Snap Test / Quiz	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	**75 Marks**
Total		**100 Marks**

METHODS OF ASSESSMENT	
Remembering (K1)	• The lowest level of questions require student store call information from the course content • Knowledge questions usually require students to identify information in the textbook.
Understanding (K2)	• Understanding of facts and ideas by comprehending organizing, comparing, translating, interpolating and interpreting in their own words. • The questions go beyond simpler call and require students to combine data together
Applicantion (K3)	• Students have to solve problems by using/ applying a concept learned in the classroom. • Students must use their knowledge to determine a exact response.
Analyze(K4)	• Analyzing the question is one that asks the students to break down some thin gin to its component parts. • Analyzing requires students to identify reasons causes or motives and reach conclusions or generalizations.
Evaluate (K5)	• Evaluation requires an individual to make judgment on something. • Questions to be asked to judge the value of an idea, a character, a work of art, or a solution to a problem. • Students are engaged indecision-making and problem–solving. • Evaluation questions do not have single right answers.
Create(K6)	• The question soft his category challenges students to get engaged in creative and original thinking. • Developing original ideas and problem solving skills

PROGRAMME OUTCOMES (PO) - PROGRAMME SPECIFIC OUTCOMES (PSO) MAPPING

PROGRAMME SPECIFIC OUTCOMES (PSO)					
	PO1	PO2	PO3	PO4	PO5
PSO1	3	3	3	3	3
PSO2	3	3	3	3	3
PSO3	3	3	3	3	3
PSO4	3	3	3	3	3
PSO5	3	3	3	3	3

Level of Correlation between PO's and PSO's
(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)

Assign the value

1 – Low
2 – Medium
3 – High
0 – No Correlation

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KUNTHAVAI NAACCHIYAAR GOVT. ARTS COLLEGE FOR WOMEN

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PG Programme - M.Sc., Computer Science – Course Structure

(applicable to the candidates admitted from the academic year 2023–2024 onwards)

Sem.	Course	Subject Code	Course Title	Ins. Hr/ week	Credit	Exam Hours	Marks		Total
							Int.	Ext.	
I	CCI	23KP1CS01	Analysis & Design of Algorithms	7	5	3	25	75	100
	CCII	23KP1CS02	Object Oriented Analysis and Design &C++	7	5	3	25	75	100
	CCIII	23KP1CS03	Python Programming	6	4	3	25	75	100
	ECI	23KP1CSECCS1:1	Advanced Software Engineering	5	3	3	25	75	100
		23KP1CSECCS1:2	Embedded Systems						
	EC II	23KP1CSECCS2P	Algorithm and OOPS Lab	5	3	3	40	60	100
			TOTAL	**30**	**20**	**15**	**140**	**360**	**500**
II	CC IV	23KP2CS04	Data Mining and Warehousing	6	5	3	25	75	100
	CCV	23KP2CS05	Advanced Operating Systems	6	5	3	25	75	100
	CCVI	23KP2CS06	Advanced Java Programming	6	4	3	25	75	100
	EC III	23KP2CSECCS3:1	Artificial Intelligence & Machine Learning	4	3	3	25	75	100
		23KP2CSECCS3:2	Robotic Process Automation for Business						
	EC IV	23KP2CSECCS4P	Advanced Java Lab	4	3	3	40	60	100
	SEC I	23KP2CSSEC1	Multimedia and its Applications	4	2	3	25	75	100
	ECC I	23KP2CSECC1:1	Cognitive Ability	-	3	3	-	100	100
		23KP2CSECC1:2	MOOC (Value Added)						
	ECC II	23KP2CSECC2	Add-on Course	-	4	-	-	-	-
			TOTAL	**30**	**22**	**21**	**165**	**535**	**600**

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III	CCVII	23KP3CS07	Digital Image Processing	6	5	3	25	75	100
	CCVIII	23KP3CS08	Cloud Computing	6	5	3	25	75	100
	CC IX	23KP3CS09	Network Security and Cryptography	6	5	3	25	75	100
	CCX	23KP3CS10	Data Science & Analytics	6	4	3	25	75	100
	EC V	23KP3CSECCS5P	Digital Image Processing Lab	3	3	3	40	60	100
	SEC II	23KP3CSSEC2	Mobile Computing	3	2	3	25	75	100
		23KP3I	Internship Industrial Activity	-	2	-			
	ECC III	23KP3CSECC3:1	Core Competence	-	3	3	-	100	100
		23KP3CSECC3:2	MOOC (Value Added)						
			TOTAL	**30**	**26**	**21**	**165**	**535**	**600**
IV	CCXI	23KP4CS11P	Python Programming Lab	6	5	3	40	60	100
	CCXII	23KP4CS12P	Web Application development & hosting Lab	6	5	3	40	60	100
	CCXIII	23KP4CSPW	Project work and Viva-Voce	10	7	3	-	-	100
	EC VI	23KP4CSECCS6:1	Internet of Things	4	3	3	25	75	100
		23KP4CSECCS6:2	Block Chain Technology						
	SEC III	23KP4CSSEC3	Skill Enhancement Course - Professional Competency Skill	4	2	3	25	75	100
		23KP4EA	Extension Activity	-	1				
			TOTAL	**30**	**23**	**15**	**130**	**270**	**500**
			GRANDTOTAL	**120**	**91**				**2200**

Note:

[1] Credit provided for successfully completed SYAYAM / MOOCs Courses.

[2] Credit provided for successfully completed Add on Course offered by varies departments.

[3] Internship / Industrial Activities shall be done after the end of the second semester (Summer Vacation) and the credits will be provided in the third semester.

[4] 20% theory and 80% practical.

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I – SEMESTER

Course code	23KP1CS01	ANALYSIS & DESIGN OF ALGORITHMS	L	T	P	C
Core/Elective/Supportive		Core		7		5
Pre-requisite		Basic Data Structures & Algorithms				

Course Objectives:

The main objectives of this course are to:

1. Enable the students to learn the Elementary Data Structures and algorithms.
2. Presents an introduction to the algorithms, their analysis and design
3. Discuss various methods like Basic Traversal And Search Techniques, divide and conquer method, Dynamic programming, backtracking
4. Understood the various design and analysis of the algorithms.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Get knowledge about algorithms and determines their time complexity. Demonstrate specific search and sort algorithms using divide and conquer technique.	K1,K2
2	Gain good understanding of Greedy method and its algorithm.	K2,K3
3	Able to describe about graphs using dynamic programming technique.	K3,K4
4	Demonstrate the concept of backtracking & branch and bound technique.	K5,K6
5	Explore the traversal and searching technique and apply it for trees and graphs.	K6

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

Unit:1	INTRODUCTION	15hours

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:2	TRAVERSALANDSEARCHTECHNIQUES	15hours

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

Unit:3	GREEDY METHOD	15hours

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

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Unit:4	DYNAMICPROGRAMMING	15hours
Dynamic Programming – General Method – Multistage Graphs – All Pair Shortest Path – Optimal Binary Search Trees – 0/1 Knapsacks – Traveling Salesman Problem – Flow Shop Scheduling.		
Unit:5	**BACKTRACKING**	**13hours**
Backtracking:- General Method – 8-Queens Problem –Sum Of Subsets – Graph Coloring – HamiltonianCycles – Branch and Bound: - The Method – Traveling Salesperson.		
Unit:6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75hours**

Text Books	
1	Ellis Horowitz, "Computer Algorithms", Galgotia Publications.
2	Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms".
Reference Books	
1	Goodrich, "Data Structures & Algorithms in Java", Wiley 3rd edition.
2	Skiena, " The Algorithm Design Manual", Second Edition, Springer, 2008
3	Anany Levith, "Introduction to the Design and Analysis of algorithm", Pearson Education Asia, 2003.
4	Robert Sedgewick, Phillipe Flajolet, "An Introduction to the Analysis of Algorithms", Addison - Wesley Publishing Company, 1996.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106/106/106106131/
2	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
3	https://www.javatpoint.com/daa-tutorial

Mapping with Programming Outcomes										
Cos	**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

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I – SEMESTER

Course code	23KP1CS02	OBJECT ORIENTED ANALYSIS AND DESIGN & C++	L	T	P	C
Core/Elective/Supportive		Core		7		5
Pre-requisite		Basics of C++ and Object Oriented Concepts				

Course Objectives:

The main objectives of this course are to:

1. Present the object model, classes and objects, object orientation, machine view and model management view.
2. Enables the students to learn the basic functions, principles and concepts of object oriented analysis and design.
3. Enable the students to understand C++ language with respect to OOAD

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the concept of Object – Oriented development and modeling techniques	K1,K2
2	Gain knowledge about the various steps performed during object design	K2,K3
3	Abstract object-based views for generic software systems	K3
4	Link OOAD with C++ language	K4,K5
5	Apply the basic concept of OOPs and familiarize to write C++ program	K5,K6

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

Unit:1	OBJECT MODEL	15hours

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

Unit:2	CLASSES AND OBJECTS	15hours

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:3	C++ INTRODUCTION	15hours

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

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Unit:4	INHERITANCE AND OVERLOADING	13hours
Classes and Objects – Constructors and Destructors – operators overloading – Type Conversion -Inheritance – Pointers and Arrays.		
Unit:5	**POLYMORPHISM AND FILES**	**15hours**
Memory Management Operators – Polymorphism – Virtual functions –Files – Exception Handling –String Handling -Templates.		
Unit:6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75hours**

Text Books	
1	"Object Oriented Analysis and Design with Applications", Grady Booch, Second Edition, Pearson Education.
2	"Object-Oriented Programming with ANSI & Turbo C++", Ashok N. Kamthane, First Indian Print -2003, Pearson Education.
Reference Books	
1	Balagurusamy "Object Oriented Programming with C++", TMH, Second Edition, 2003.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://onlinecourses.nptel.ac.in/noc19_cs48/preview
2	https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/
3	https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.htm

Mapping with Programming Outcomes

Cos	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

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I – SEMESTER

Course code	23KP1CS03	PYTHON PROGRAMMING	L	T	P	C
Core/Elective/Supportive		Core		6		4
Pre-requisite		Basics of any OOProgramming Language				

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basic concepts of Python Programming	K1,K2
2	Understand File operations, Classes and Objects	K2,K3
3	Acquire Object Oriented Skills in Python	K3,K4
4	Develop web applications using Python	K5
5	Develop Client Server Networking applications	K5,K6

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

Unit:1	INTRODUCTION	15 hours

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

Unit:2	CODE STRUCTURES	15 hours

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

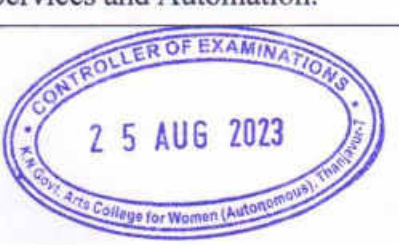
Unit:3	MODULES, PACKAGES AND CLASSES	15 hours

Modules, Packages, and Programs: Stand alone 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–Inself Defense –Get and Set Attribute Values with Properties –Name Mangling for Privacy –Method Types – Duck Typing – Special Methods – Composition.

Unit:4	DATA TYPES AND WEB	13hours

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

Web: Web Clients –Web Servers – Web Services and Automation.



Unit:5	SYSTEMSANDNETWORKS	15 hours
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 – ZeroMQ –Internet Services – Web Services and APIs – Remote Processing – Big Fat Data and Map Reduce – Working in the Clouds.		
Unit:6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Books	
1	Bill Lubanovic, "Introducing Python", O'Reilly, First Edition – Second Release, 2014.
2	Mark Lutz, "Learning Python", O'Reilly, Fifth Edition, 2013.
Reference Books	
1	David M. Beazley, Python Essential Reference", Developer's Library, Fourth Edition, 2009.
2	Sheetal neja, Naveen Kumar, "Python Programming-A Modular Approach", Pearson Publications.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.programiz.com/python-programming/
2	https://www.tutorialspoint.com/python/index.htm
3	https://onlinecourses.swayam2.ac.in/aic20_sp33/preview

Mapping with Programming Outcomes										
Cos	**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

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I – SEMESTER

Elective Course	23KP1CSECCS1:1	ADVANCED SOFTWARE ENGINEERING	L	T	P	C
Core/Elective/Supportive		Core		5		3
Pre-requisite		Basics of Software Engineering & SPM				

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand about Software Engineering process	K1,K2
2	Understand about Software project management skills, design and quality management	K2,K3
3	Analyze on Software Requirements and Specification	K3,K4
4	Analyze on Software Testing, Maintenance and Software Re-Engineering	K4,K5
5	Design and conduct various types and levels of software quality for a software project	K5,K6

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

Unit:1	INTRODUCTION	15 hours

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:2	SOFTWARE REQUIREMENTS	15 hours

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.

Unit:3	PROJECT MANAGEMENT	15 hours

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:4	SOFTWARE DESIGN	15 hours

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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:5	**SOFTWARE TESTING**	**13 hours**
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:6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars –webinars		
	Total Lecture hours	**75 hours**

Text Books	
1	An Integrated Approach to Software Engineering–Pankaj Jalote, Narosa Publishing House, Delhi, 3rd Edition.
2	Fundamentals of Software Engineering – RajibMall, PHI Publication, 3rd Edition.
Reference Books	
1	Software Engineering–K.K.Aggarwal and Yogesh Singh, New Age International Publishers, 3rd Edition.
2	A Practitioners Approach- Software Engineering, - R. S. Pressman, McGraw Hill.
3	Fundamentals of Software Engineering – Carlo Ghezzi, M.Jarayeri, D. Manodrioli, PHI Publication.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.javatpoint.com/software-engineering-tutorial
2	https://onlinecourses.swayam2.ac.in/cec20_cs07/preview
3	https://onlinecourses.nptel.ac.in/noc19_cs69/preview

Mapping with Programming Outcomes

Cos	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

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Elective Course	23KP1CSECCS1:2	EMBEDDED SYSTEMS	L	T	P	C
Core/Elective/Supportive		Elective		5		3
Pre-requisite		Basics of Micro Controller				

Course Objectives:

The main objectives of this course are to:

1. Present the introduction to 8051 Microcontroller Instruction Set, concepts on RTOS & Software tools.
2. Gain the knowledge about the embedded software development.
3. Learn about Microcontroller and software tools in the embedded systems.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the concept of 8051microcontroller	K1,K2
2	Understand the Instruction Set and Programming	K2,K3
3	Analyze the concepts of RTOS	K3,K4
4	Analyze and design various real time embedded systems using RTOS	K5
5	Debug the mal functioning system using various debugging techniques	K5,K6

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

Unit:1	8051 MICROCONTROLLER	12 Hours

8051Microcontroller:Introduction- 8051Architecture- Input / Output Pins, Ports and Circuits-ExternalMemory - Counters / Timers - Serial Data Input / Output –Interrupts.

Unit:2	PROGRAMMING BASICS	12 Hours

Instruction Set and Programming Moving Data-Addressing Modes-Logical operations- Arithmetic Operation-Jump and Call Instructions-Simple Program. Applications: Keyboard Interface- Display Interface-Pulse Measurements-DIA and AID Conversions-Multiple Interrupts.

Unit:3	CONCEPTS ON RTOS	12 Hours

CONCEPTS ON RTOS: Introduction to RTOS-Selecting an RTOS-Task and Task states - Tasks and data- Semaphores and shared data. MORE operating systems services: Interrupt Process communication - Message Queues, Mailboxes and pipes- Timer Functions-Events - Memory Management-Interrupt Routines in an RTOS Environment.

Unit:4	DESIGN USING RTOS	10 Hours

Basic Design using a RTOS: Principles - Encapsulating semaphores and Queues-Hard real time scheduling considerations-Saving memory space and power- introductions to RTL &QNX.

Unit:5	SOFTWARE TOOLS	12 Hours

SOFTWARE TOOLS: Embedded software Development Tools: Hosts and Target Machines-

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Linker/Locators for Embedded software - getting Embedded software into the Target systems. Debugging Techniques: Testing on your Host machine -Instruction set simulators- The assert macro- using laboratory tools.		
Unit:6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars –webinars		
	Total Lecture hours	**60 Hours**

Text Books	
1	David E. Simon, "An Embedded Software primer" Pearson Education Asia, 2003.
2	Kenneth J Ayala, "The8051Microcontroller and Architecture programming and application", Second Edition, Penram International.
Reference Books	
1	Raj Kamal, "Embedded Systems –Architecture, programming and design", Tata McGraw – Hill, 2003.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://onlinecourses.nptel.ac.in/noc20_cs14/preview
2	https://www.javatpoint.com/embedded-system-tutorial
3	https://www.tutorialspoint.com/embedded_systems/index.htm

Mapping with Programming Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	S	M	S	S	M	M	S
CO2	M	M	S	S	M	S	M	S	S	S
CO3	M	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

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I – SEMESTER

Elective Course	23KP1CSECCS2P	ALGORITHM AND OOPS LAB	L	T	P	C
Core/Elective/Supportive		Core			5	3
Pre-requisite		Basic Programming of C++ Language				

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the concepts of object oriented with respect to C++	K1,K2
2	Able to understand and implement OOPS concepts	K3,K4
3	Implementation of data structures like Stack, Queue, Tree, List using C++	K4,K5
4	Application of the data structures for Sorting, Searching using different Techniques.	K5,K6

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

LIST OF PROGRAMS — **75 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 operations 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 queens on an 8X8 matrix so 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 : 75 hours

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Text Books	
1	Goodrich, "Data Structures & Algorithms in Java", Wiley 3rd edition.
2	Skiena, "The Algorithm Design Manual" , Second Edition, Springer, 2008
Reference Books	
1	Anany Levith, "Introduction to the Design and Analysis of algorithm", Pearson Education Asia, 2003.
2	Robert Sedgewick, Phillipe Flajolet,"An Introduction to the Analysis of Algorithms", Addison -Wesley Publishing Company, 1996.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://onlinecourses.nptel.ac.in/noc19_cs48/preview
2	https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/
3	https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.htm

Mapping with Programming Outcomes										
COs	**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

*S-Strong; M-Medium; L-Low

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II - SEMESTER

Course code	23KP2CS04	DATA MINING AND WAREHOUSING	L	T	P	C
Core/Elective/Supportive		Core		6		5
Pre-requisite		Basics of RDBMS & Algorithms				

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basic data mining techniques and algorithms	K1,K2
2	Understand the Association rules, Clustering techniques and Data ware housing contents	K2,K3
3	Compare and evaluate different data mining techniques like classification, prediction, Clustering and association rule mining	K4,K5
4	Design data ware house with dimensional modeling and apply OLAP operations	K5,K6
5	Identify appropriate data mining algorithms to solve real world problems	K6

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

Unit:1	BASICS AND TECHNIQUES	12 hours

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 – similarity measures – decision trees – neural networks – genetic algorithms.

Unit:2	ALGORITHMS	12 hours

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

Unit:3	CLUSTERING AND ASSOCIATION	12 hours

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.

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Unit: 4	DATA WAREHOUSING AND MODEL	11 hours
Data ware housing: Introduction - characteristics of a data ware house – 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:5	APPLICATIONS OF DATA WAREHOUSE	11 hours
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:6	Contemporary Issues	2 hours
Expert lectures , online seminars – webinars		

	Total Lecture hours	60hours

Text Books

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

Reference Books

1	ArunK. Pujari, "Data Mining Techniques", Universities Press (India) Pvt. Ltd., 2003.
2	AlexBerson, Stephen J. Smith, "Data Ware housing, Data Mining and OLAP", TMCH, 2001.
3	Jiawei Han & Micheline Kamber, "Data Mining Concepts &Techniques", 2001, Academic press.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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

Mapping with Programming Outcomes

Cos	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

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II – SEMESTER

Course code	23KP2CS05	ADVANCED OPERATING SYSTEMS	L	T	P	C
Core/Elective/Supportive		Core		6		5
Pre-requisite		Basics of OS & its functioning				

Course Objectives:

The main objectives of this course are to:

1. Enable the students to learn the different types of operating systems and their functioning.
2. Gain knowledge on Distributed Operating Systems
3. Gain insight into the components and management aspects of real time and mobile operating systems.
4. Learn case studies in Linux Operating Systems

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the design issues associated with operating systems	K1,K2
2	Master various process management concepts including scheduling, deadlocks and distributed file systems	K3,K4
3	Prepare Real Time Task Scheduling	K4,K5
4	Analyze Operating Systems for Hand held Systems	K5
5	Analyze Operating Systems like LINUX and iOS	K5,K6

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

Unit:1	BASICS OF OPERATING SYSTEMS	12 hours

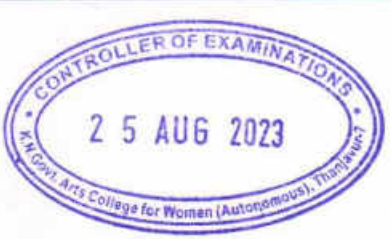
Basics of Operating Systems: What is an Operating System? – Main frame Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments - Process Scheduling – Cooperating Processes – Inter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

Unit:2	DISTRIBUTED OPERATING SYSTEMS	12 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:3	REAL TIME OPERATING SYSTEM	10 hours

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



Unit: 4	HANDHELD SYSTEM	12 hours
Operating Systems for Handheld Systems: Requirements – Technology Overview – Handheld Operating Systems – Palm OS – Symbian Operating System – Android – Architecture of android– Securing handheld systems		
Unit:5	**CASE STUDIES**	**12 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:6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**60 hours**

Text Books

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

Reference Books

1	RajibMall, "Real - Time Systems: Theory and Practice", Pearson Education India, 2006.
2	Pramod Chandra P.Bhatt, An introduction to operating systems, concept and practice, PHI, Third edition, 2010.
3	Daniel. P. Bovet & Marco Cesati, "Understanding the Linux kernel", 3rd edition, O"Reilly, 2005
4	Neil Smyth, "iPhone iOS4 Development Essentials – Xcode", Fourth Edition, Payload media, 2011.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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

Mapping with Programming Outcomes

Cos	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

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II - SEMESTER

Course code	23KP2CS06	ADVANCED JAVA PROGRAMMING	L	T	P	C
Core/Elective/Supportive		Core		6		4
Pre-requisite		Basics of Java & its Usage				

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the advanced concepts of Java Programming	K1,K2
2	Understand JDBC and RMI concepts	K2,K3
3	Apply and analyze Java in Database	K3,K4
4	Handle different event in java using the delegation event model, event listener and class	K5
5	Design interactive applications using Java Servlet, JSP and JDBC	K5,K6

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

Unit:1	BASICS OF JAVA	12hours

Java Basics Review: Components and event handling – Threading concepts – Networking features – Mediatechniques.

Unit:2	REMOTE METHOD INVOCATION	12 hours

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

Unit:3	DATABASE	10hours

Java in Databases – JDBC principles – database access – Interacting – database search – Creating multimediadatabases – Database support in web applications

Unit:4	SERVLETS	12hours

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 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:5	ADVANCED TECHNIQUES	12 hours
JAR file format creation – Internationalization–Swing Programming–Advanced java techniques		
Unit:6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**60 hours**

Text Books

1	JamieJaworski, "Java Unleashed", SAMSTechmediaPublications,1999.
2	Campione, Walrath and Huml, "The Java Tutorial", Addison Wesley, 1999.

Reference Books

1	JimKeogh,"TheCompleteReferenceJ2EE", TataMcGrawHill Publishing.Company Ltd, 2010.
2	DavidSawyer McFarland, "JavaScript.And.JQuery-TheMissingManual", Oreilly Publications, 3rd Edition, 2011.
3	Deitel and Deitel, "Java How to Program", Third Edition, PHI / Pearson Education Asia.

RelatedOnlineContents [MOOC,SWAYAM,NPTEL,Websitesetc.]

1	https://www.javatpoint.com/servlet-tutorial
2	https://www.tutorialspoint.com/java/index.html
3	https://onlinecourses.nptel.ac.in/noc19_cs84/preview

MappingwithProgrammingOutcomes

Cos	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

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Course code	23KP2CSECCS3:1	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	L	T	P	C
Core/Elective/Supportive		Core		4		3
Pre-requisite		Basics of AI & an Introduction about ML				

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Demonstrate AI problems and techniques	K1,K2
2	Understand machine learning concepts	K2,K3
3	Apply basic principles of AI in solutions that require problem solving, inference,perception, knowledge representation, and learning	K3,K4
4	Analyze the impact of machine learning on applications	K4,K5
5	Analyze and design are a 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

Unit:1	INTRODUCTION	12hours

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:2	SEARCH TECHNIQUES	12hours

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:3	PREDICATE LOGIC	12hours

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:4	MACHINELEARNING	12hours

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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:5	**APPLICATIONS OF MACHINE LEARNING**	**10 hours**
Looking Inside Machine Learning: The Impact of Machine Learning on Applications - Data Preparation -The Machine Learning Cycle.		
Unit:6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**60 hours**

Text Books	
1	Elaine Rich and Kevin Knight," Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991.
2	George FLuger, "Artificial Intelligence", 4th Edition, Pearson Education Publication, 2002.
Reference Books	
1	Machine Learning For Dummies ®, IBM Limited Edition by Judith Hurwitz, Daniel Kirsch.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.ibm.com/downloads/cas/GB8ZMQZ3
2	https://www.javatpoint.com/artificial-intelligence-tutorial
3	https://nptel.ac.in/courses/106/105/106105077/

Mapping with Programming Outcomes

COs	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

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Course code	23KP2CSECCS3:2	ROBOTIC PROCESS AUTOMATION FOR BUSINESS	L	T	P	C
Core/Elective/Supportive		Elective		4		3
Pre-requisite		Basics of Robots & its Applications				

Course Objectives:

The main objectives of this course are to:

1. Learn the concepts of RPA, its benefits, types and models.
2. Gain the knowledge in application of RPA in Business Scenarios.
3. Identify measures and skills required for RPA

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Demonstrate the benefits and ethics of RPA	K1,K2
2	Understand the Automation cycle and its techniques	K2
3	Draw inferences and information processing of RPA	K3,K4
4	Implement & Apply RPA in Business Scenarios	K5
5	Analyze on Robots & lever aging automation	K5,K6

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

Unit:1	INTRODUCTION	12 hours

Introduction to RPA – Overview of RPA – Benefits of RPA in a business environment - Industries & domains fit for RPA - Identification of process for automation - Types of Robots - Ethics of RPA & Best Practices - Automation and RPA Concepts - Different business models for implementing RPA – Centre of Excellence – Types and their applications – Building an RPA team – Approach for implementing RPA initiatives.

Unit:2	AUTOMATION	12 hours

Role of a Business Manager in Automation initiatives – Skills required by a Business Manager for successful automation - The importance of a Business Manager in automation - Analyzing different business processes - Process Mapping frameworks - Role of a Business Manager in successful implementation – Part 1 - Understanding the Automation cycle – First 3 automation stages and activities performed by different people.

Unit:3	AUTOMATION IMPLEMENTATION	12 hours

Evaluating the Automation Implementation Detailed description of last 3 stages and activities performed by different people - Role of a Business Manager in successful completion – Part 2 - Activities to be performed post - implementation - Guidelines for tracking the implementation success - Metrics/Parameters to be considered for gauging success - Choosing the right licensing option - Sending emails - Publishing and Running Workflows.

Unit:4	ROBOT	12hours

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Ability to process information through scopes/systems - Understand the skill of information processing and its use in business - Leveraging automation - Creating a Robot - New Processes. Establish causality by variable behavior - Understand the skill of drawing inference or establishing causality by tracking the behavior of a variable as it varies across time/referenced variable - Leveraging automation for this skill - Robot & new process creation.		
Unit:5	**ROBOT SKILL**	**10 hours**
Inference from snapshots of curated terms – Omni-source data curation - Multisource trend tracking - Understand the skill of drawing inference from the behavior of curated terms by taking snapshots across systems in reference to time/variable(s) - Leveraging automation for this skill – Robot creation and new process creation for this skill.		
Unit:6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**60 hours**

Text Books	
1	Alok Mani Tripathi "Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool" Packet Publishing Limited March 2018.
2	Tom Taulli "The Robotic Process Automation Hand book" A press, February 2020.
Reference Books	
1	Steve Kaelble "Robotic Process Automation" John Wiley & Sons, Ltd., 2018
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialspoint.com/uipath/uipath_robotic_process_automation_introduction.htm
2	https://www.javatpoint.com/rpa
3	https://onlinecourses.nptel.ac.in/noc19_me74/preview
Course Designed By:	

Mapping with Programming Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	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

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Course code	23KP2CSECCS4P	ADVANCED JAVA LAB	L	T	P	C
Core/Elective/Supportive		Core			4	3
Pre-requisite		Basics in Java Programming				

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand to the implement concepts of Java using HTML forms, JSP & JAR	K1,K2
2	Must be capable of implementing JDBC and RMI concepts	K3,K4
3	Able to write Applets with Event handling mechanism	K4,K5
4	To Create interactive web based applications using servlets and jsp	K5,K6

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

LIST OF PROGRAMS — **75 hours**

1. Display a welcome message using Servlet.
2. Design a Purchase Order form using Html form and Servlet.
3. Develop a program for calculating the percentage of marks of a student using JSP.
4. Design a Purchase Order form using Html form and JSP.
5. Prepare an Employee pay slip 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 a table of all the headers it receives along with their associated values.
9. Write a program in JSP by using session object.
10. Write a program to build a simple 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).

Expert lectures, online seminars – webinars

Total Lecture hours — **75 hours**

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Text Books	
1	JamieJaworski, "JavaUnleashed", SAMS Techmedia Publications, 1999.
2	Campione, Walrath and Huml, "TheJavaTutorial", Addison Wesley, 1999.
Reference Books	
1	Jim Keogh, "The Complete Reference J2EE", Tata McGraw Hill Publishing Company Ltd, 2010.
2	David Sawyer McFarland, "Java Script And JQuery – The Missing Manual", Oreilly Publications, 3rd Edition, 2011.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.javatpoint.com/servlet-tutorial
2	https://www.tutorialspoint.com/java/index.htm
3	https://onlinecourses.nptel.ac.in/noc19_cs84/preview

MappingwithProgrammingOutcomes										
COs	**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

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Course code	23KP2CSSEC1	MULTIMEDIA AND ITS APPLICATIONS	L	T	P	C
Core/Elective/Supportive		Elective		4		2
Pre-requisite		Basics of Multimedia				

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the basic concepts of Multimedia	K1,K2
2	Demonstrate Multimedia authoring tools	K2,K3
3	Analyze the concepts of Sound, Images, Video & Animation	K4
4	Apply and Analyze the role of Multimedia in Internet and real time applications	K4,K5
5	Analyze multimedia applications using HDTV	K5,K6

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

Unit:1	INTRODUCTION	12 hours

What is Multimedia? – Introduction to making Multimedia – Macintosh and Windows Production platforms – Basic Software tools.

Unit:2	MULTIMEDIA TOOLS	12 hours

Making Instant Multimedia – Multimedia authoring tools – Multimedia building blocks –Text – Sound.

Unit:3	ANIMATION	10 hours

Images – Animation – Video.

Unit:4	INTERNET	12 hours

Multimedia and the Internet – The Internet and how it works – Tools for World Wide Web – Designing for theWorld Wide Web.

Unit:5	MULTIMEDIA SYSTEMS	12 hours

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High Definition Television and Desktop Computing – Knowledge based Multimedia systems.		
Unit:6	**ContemporaryIssues**	**2 hours**
Expert lectures, online seminars - webinars		
	Total Lecture hours	**60 hours**

Text Books	
1	Tay Vaughan, "Multimedia making it work", Fifth Edition, Tata McGraw Hill.
2	John F.Koegel Bufford, "Multimedia Systems", Pearson Education.
Reference Books	
1	JudithJeffloate,"MultimediainPractice(TechnologyandApplications)",PHI,2003.
Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialspoint.com/multimedia/index.htm
2	https://www.tutorialspoint.com/basics_of_computer_science/basics_of_computer_science_multimedia.htm
3	https://nptel.ac.in/courses/117/105/117105083/

Mapping with Programming Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	M	S	M	M	M	S
CO2	S	S	S	S	M	S	M	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

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III SEMESTER

Course code	23KP3CS07	DIGITAL IMAGE PROCESSING	L	T	P	C
Core/Elective/Supportive		Core		6		5
Pre-requisite		Basics of Image Processing				

Course Objectives:

The main objectives of this course are to:

1. Learn basic image processing techniques for solving real problems.
2. Gain knowledge in image transformation and Image enhancement techniques.
3. Learn Image compression and Segmentation procedures.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the fundamentals of Digital Image Processing	K1,K2
2	Understand the mathematical foundations for digital image representation, image acquisition, image transformation, and image enhancement	K2,K3
3	Apply, Design and Implement and get solutions for digital image Processing problems	K3,K4
4	Apply the concepts of filtering and segmentation for digital image retrieval	K4,K5
5	Explore the concepts of Multi-resolution process and recognize the objects inan efficient manner	K5,K6

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

Unit:1	INTRODUCTION	12 hours

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:2	IMAGE ENHANCEMENT	12 hours

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:3	IMAGERESTORATION	12 hours

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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:4	**IMAGE COMPRESSION**	**11 hours**
Image Compression: Fundamentals – Image compression models – Elements of Information Theory –Error Free compression – Lossy compression – Image compression standards.		
Unit:5	**IMAGE SEGMENTATION**	**11 hours**
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:6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars –webinars		
	Total Lecture hours	**60 hours**

Text Books	
1	Rafael C.Gonzalez, Richard E.Woods, "Digital Image Processing", Second Edition, PHI/Pearson Education.
2	B.Chanda, D.Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2003.
Reference Books	
1	Nick Efford, "Digital Image Processing apractical introducing using Java", Pearson Education,2004.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websitesetc.]	
1	https://nptel.ac.in/courses/117/105/117105135/
2	https://www.tutorialspoint.com/dip/index.htm
3	https://www.javatpoint.com/digital-image-processing-tutorial

Mapping with Programming Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	M	S	M	M	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

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Course code	23KP3CS08	CLOUD COMPUTING	L	T	P	C
Core/Elective/Supportive		Core		6		5
Pre-requisite		Basics of Cloud &its Applications				

Course Objectives:

The main objectives of this course are to:

1. Gain knowledge on cloud computing, cloud services, architectures and applications.
2. Enable the students to learn the basics of cloud computing with realtime usage
3. How to store and share, in and from cloud?

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the concepts of Cloud and its services	K1,K2
2	Collaborate Cloud for Event & Project Management	K3,K4
3	Analyze on cloud in – Word Processing, SpreadSheets, Mail, Calendar, Database	K4,K5
4	Analyze cloud in social networks	K5,K6
5	Explore cloud storage and sharing	K6

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

Unit:1	INTRODUCTION	12 hours

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.

Unit:2	CLOUD COMPUTING	12 hours

CLOUD COMPUTING FOR EVERYONE 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:3	CLOUD SERVICES	12 hours

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.

Unit:4	OUTSIDE THE CLOUD	12 hours

OUTSIDE THE CLOUD Evaluating web mail services, Evaluating instant messaging,Evaluating web conference tools, creating groups on social networks, Evaluating online

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Group ware, collaborating via blogs and wikis.		
Unit: 5	**STORING AND SHARING**	**10 hours**
STORING AND SHARING 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: 6	**Contemporary Issues**	**2 ours**
Expert lectures, online seminars –webinars		
	Total Lecture hours	**60 hours**

Text Books	
1	Michael Miller, "Cloud Computing", Pearson Education, NewDelhi, 2009.
Reference Books	
1	Anthony T. Velte, "Cloud Computing: A Practical Approach", 1st Edition, Tata McGraw Hill Education Private Limited, 2009.
Related Online Contents [MOOC,SWAYAM,NPTEL,Websitesetc.]	
1	https://nptel.ac.in/courses/106/105/106105167/
2	https://www.tutorialspoint.com/cloud_computing/index.htm
3	https://www.javatpoint.com/cloud-computing-tutorial

Mapping with Programming Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	S	M	S	M	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

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Course code	23KP3CS09	NETWORK SECURITY AND CRYPTOGRAPHY	L	T	P	C
Core/Elective/Supportive		Core		6		5
Pre-requisite		Basics of Networks &its Security				

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the process of the cryptographic algorithms	K1, K2
2	Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication	K2, K3
3	Apply and analyze appropriate security techniques to solve network security problem	K3, K4
4	Explore suitable cryptographic algorithms	K4, K5
5	Analyze different digital signature algorithms to achieve authentication and designsecure applications	K5,K6

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

Unit: 1	INTRODUCTION	12 hours

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: 2	CRYPTO SYSTEM	12 hours

Public – key Crypto system: Introduction to Number Theory – RSA Algorithm – Key Management -Diffie – Hellman Key exchange – Elliptic Curve Cryptography Message Authentication and Hash functions – Hash and Mac Algorithm – Digital Signatures and Authentication Protocol.

Unit: 3	NETWORK SECURITY	12hours

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

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Unit: 4	WEB SECURITY	10hours
Web Security – Secure Socket Layer – Secure Electronic Transaction. System Security - Intruders andViruses – Firewalls – Password Security.		
Unit: 5	**CASE STUDY**	**12hours**
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: 6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**60 hours**

Text Books	
1	William Stallings, "Cryptography and Network Security", PHI/Pearson Education.
2	Bruce Schneir, "Applied Cryptography ", CRC Press.
Reference Books	
1	A.Menezes, P Van Oorschot and S.Vanstone, "Hand Book of Applied Cryptography", CRCPress, 1997
2	Ankit Fadia,"NetworkSecurity", Mac Millan.
Related Online Contents[MOOC, SWAYAM, NPTEL, Websitesetc.]	
1	https://nptel.ac.in/courses/106/105/106105031/
2	http://www.nptelvideos.in/2012/11/cryptography-and-network-security.html
3	https://www.tutorialspoint.com/cryptography/index.htm

Mapping with Programming Outcomes										
Cos	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

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Course code	23KP3CS10	DATA SCIENCE & ANALYTICS	L	T	P	C
Core/Elective/Supportive		Core		6		4
Pre-requisite		Basics of Data Science & its Applications				

Course Objectives:

The main objectives of this course are to:

1. Introduce the student to data science, big data & its ecosystem.
2. Learn data analytics &its life cycle.
3. To explore the programming language R, with respect to the data mining algorithms.
4. Relate the relationship between artificial intelligence, machine learning and data science.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the concept of data science and its techniques	K1,K2
2	Review data analytics	K2,K3
3	Apply and determine appropriate Data Mining techniques using R to real time applications	K3,K4
4	Analyze on clustering algorithms	K4,K5
5	Analyze on regression methods in AI	K6

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

Unit: 1	INTRODUCTION	12 hours

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: 2	BASICS OF DATA ANALYTICS	12 hours

Data Analytics lifecycle – review of data analytics – Advanced data Analytics – technology and tools.

Unit: 3	DATA ANALYTICS USING R	12 hours

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: 4	CLUSTERING	12 hours

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.

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Unit: 5	ARTIFICIAL INTELLIGENCE	10 hours
Artificial intelligence: Machine Learning and deeplearning in datascience - Clustering, association rules.Linear regression - logistic regression - Additional regression methods.		

Unit: 6	Contemporary Issues	2 hours
Expert lectures, online seminars – webinars		

	Total Lecture hours	60 hours

Text Books

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

Reference Books

1	A simple introduction to Data Science –Lars Nielson 2015
2	Introducing Data Science Davy Cielen, Arno D.B.Meysman, Mohamed Ali 2016 Manning Publication
3	R Programming for Data Science – RogerD . Peng 2015 Lean Publication
4	Data Science & Big Data Analytics : Discovering, Analyzing, Visualizing and Presenting Data

Related Online Contents [MOOC, SWAYAM, NPTEL, Websitesetc.]

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

Mapping with Programming Outcomes

Cos	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

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23/8/23

Head, Dept. of Computer Science
Kunthavai Naachiaar Govt. Arts College (W)
THANJAVUR-7.

Course code	23KP3CSECCS5P	DIGITAL IMAGE PROCESSING	L	T	P	C
Core/Elective/Supportive		Core			3	3
Pre-requisite		Basic Programming of Image Processing & anintro to MATLAB				

Course Objectives:

The main objectives of this course are to:

1. To understand the basics of Digital Image Processing fundamentals, image enhancement and image restoration techniques
2. To enable the students to learn the fundamentals of image compression and segmentation
3. To understand Image Restoration & Filtering Techniques
4. Implementation of the above using MATLAB

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	To write programs in MATLAB for image processing using the techniques	K1,K2
2	To able to implement Image Enhancements & Restoration techniques	K2,K3
3	Capable of using Compression techniques in an Image	K3,K4
4	Must be able to manipulate the image and Segment it	K5,K6

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

LIST OF PROGRAMS	60 hours

1. Implement Image enhancement Technique.
2. Histogram Equalization
3. Image Restoration.
4. Implement Image Filtering.
5. Edge detection using Operators (Roberts, Prewitts and Sobels operators)
6. Implement image compression.
7. Image Subtraction
8. Boundary Extraction using morphology.
9. Image Segmentation

Total Lecture hours	60 hours

Text Books

1	Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Second Edition,

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	PHI/Pearson Education.
2	B.Chanda, D.DuttaMajumder, "Digital Image Processing and Analysis", PHI, 2003.
Reference Books	
1	Nick Efford, "Digital Image Processing a practical introducing using Java", Pearson Education, 2004.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websitesetc.]	
1	https://nptel.ac.in/courses/117/105/117105135/
2	https://www.tutorialspoint.com/dip/index.htm
3	https://www.javatpoint.com/digital-image-processing-tutorial

Mapping with Programming Outcomes										
COs	**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

*S-Strong; M-Medium; L-Low

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M.V.M. Govt. Arts College for Women (Autonomous), Thanjavur-1

23/8/23

Head, Dept. of Computer Science
Kunthavai Naachiaar Govt. Arts College (W)
THANJAVUR-7.

Course code	23KP3CSSEC2	MOBILE COMPUTING	L	T	P	C
Core/Elective/Supportive		Elective	4			4
Pre - requisite		Basics of Mobile Communication				

Course Objectives:

The main objectives of this course are to:

1. Present the overview of Mobile computing, Applications and Architectures.
2. Describe the futuristic computing challenges.
3. Enable the students to learn the concept of mobile computing.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the need and requirements of mobile communication	K1, K2
2	Focus on mobile computing applications and techniques	K2, K3
3	Demonstrate satellite communication in mobile computing	K4
4	Analyze about wireless local loop architecture	K5, K6
5	Analyze various mobile communication technologies	K6

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

Unit: 1	INTRODUCTION	12 hours

Introduction: Advantages of Digital Information - Introduction to Telephone Systems –Mobile communication: Need for Mobile Communication – Requirements of Mobile Communication – History of Mobile Communication.

Unit: 2	MOBILE COMMUNICATION	12 hours

Introduction to Cellular Mobile Communication – Mobile Communication Standards –Mobility Management – Frequency Management – Cordless Mobile Communication Systems.

Unit: 3	MOBILE COMPUTING	12 hours

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: 4	MOBILE COMMUNICATION SYSTEM	11 hours

Important Parameters of Mobile Communication System – Mobile Internet: Working of Mobile IP – Wireless Network Security – Wireless Local Loop Architecture: Components in WLL – Problemsin WLL – Modern Wireless Local Loop – Local Multipoint Distribution Service – Wireless Application Protocol.

Unit: 5	COMMUNICATION TECHNOLOGY	11 hours

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WCDMA Technology and Fiber Optic Microcellular Mobile Communication – Ad hoc Network and Bluetooth technology – Intelligent Mobile Communication system – Fourth Generation Mobile Communication systems.		
Unit: 6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**60 hours**

Text Books	
1	T.G. Palanivelu, R. Nakkeeran, "Wireless and Mobile Communication", PHI Limited, 2009.
2	Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2007.
Reference Books	
1	Asoke K Talukder, Hasan Ahmed,Roopa Yavagal,"Mobile Computing",TMH,2010.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialspoint.com/mobile_computing/index.htm
2	https://www.javatpoint.com/mobile-computing
3	https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs13/

Mapping with Programming Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	M	L	L	M	S	M	M	M	M
CO2	S	S	S	M	M	S	M	S	S	S
CO3	S	S	S	S	M	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

Head, Dept. of Computer Science
Kunthavai Naachiaar Govt. Arts College (W)
THANJAVUR. 7.

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(K.N.Govt. Arts College for Women (Autonomous), Thanjavur-7)

IV SEMESTER

Course code	23KP4CS11P	PYTHON PROGRAMMING LAB	L	T	P	C
Core/Elective/Supportive		Core			6	5
Pre - requisite		Basics of any OOP Programming Language				

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Able to write programs in Python using OOPS concepts	K1, K2
2	To understand the concepts of File operations and Modules in Python	K2, K3
3	Implementation of lists, dictionaries, sets and tuples as programs	K3, K4
4	To develop web applications using Python	K5, K6

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

LIST OF PROGRAMS	75 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 webpages using forms.

Total Lecture hours	75 hours

Text Books

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

Reference Books

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1	David M. Beazley, "Python Essential Reference", Developer's Library, Fourth Edition,2009.
2	Sheetal Taneja , Naveen Kumar, "Python Programming-A Modular Approach", Pearson Publications.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websitesetc.]	
1	https://www.programiz.com/python-programming/
2	https://www.tutorialspoint.com/python/index.htm
3	https://onlinecourses.swayam2.ac.in/aic20_sp33/preview

Mapping with Programming Outcomes										
COs	**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	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

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Head, Dept. of Computer Science
Sivanthavai Naachiaar Govt Arts College (W)
THANJAVUR.

CONTROLLER OF EXAMINATIONS
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H.N. Govt. Arts College for Women (Autonomous), Thanjavur-1

Course code	23KP4CS12P	WEB APPLICATION DEVELOPMENT AND HOSTING	L	T	P	C
Core/Elective/Supportive		Core			6	5
Pre-requisite		Basic Programming using HTML tags				

Course Objectives:

The main objectives of this course are to:

1. Able to design a webpage using HTML tags
2. To enable the students to use Framesets, hyperlinks and different formatting features of HTML tags
3. Enable the students to use Forms & other controls in a webpage
4. To create interactive applications using PHP

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand &implement the basic HTML tags to create static webpages	K1,K2
2	Capable of using hyperlinks, frames, images, tables,.... in a webpage	K2,K3
3	Able to write dynamic web applications using HTML forms	K4,K5
4	Must be able to write dynamic web applications in PHP & HTML tags using XAMPP.	K5,K6

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

LIST OF PROGRAMS	30 hours

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

(Eg. Name is Mandatory field ; Pin code must be6digits, etc.).

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	30 hours

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Text Books	
1	IvanBayross," Web Enabled Commercial Applications Development Using HTML, JavaScript,DHTML and PHP ", BPB Publications, 4th Revised Edition, 2010.
Reference Books	
2	A .K .Saini and SumintTuli,"Mastering XML",First Edition,New Delhi, 2002.
Related Online Contents[MOOC, SWAYAM, NPTEL, Websitesetc.]	
1	https://www.tutorialspoint.com/xml/index.htm
2	https://www.tutorialspoint.com/internet_technologies/websites_development.htm
3	https://www.youtube.com/watch?v=PlxWf493en4

Mapping with Programming Outcomes										
Cos	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

*S-Strong; M-Medium; L-Low

23/8/23

Head, Dept. of Computer Science
Kunthavai Naachiaar Govt. Arts College (W)
THANJAVUR-7.

Course code	23KP4CSECCS6:1	INTERNET OF THINGS	L	T	P	C
Core/Elective/Supportive		Elective	4			4
Pre-requisite		Basics of Sensors & its Applications				

Course Objectives:

The main objectives of this course are to:

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

Expected Course Outcomes:

On the successful completion of the course ,student will be able to:

1	Understand about IoT ,its Architecture and its Applications	K1,K2
2	Understand basic lectronics used in IoT & its role	K2,K3
3	Develop applications with C using ArduinoIDE	K4
4	Analyze about sensors and actuators	K5,K6
5	Design IoT in real time applications using today's internet &wireless technologies	K6

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

Unit: 1	INTRODUCTION	12 hours

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: 2	BASIC ELECTRONICS FOR IoT	12 hours

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: 3	PROGRAMMING USING ARDUINO	12 hours

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: 4	SENSORS AND ACTUATORS	10 hours

Sensors and Actuators: Analog and Digital Sensors – Interfacing temperature sensor, ultrasound

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Sensor and infrared(IR) sensor with Arduino – Interfacing LED and Buzzer with Arduino.		
Unit: 5	**SENSOR DATA IN INTERNET**	**12 hours**
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 (Thing Speak).		
Unit: 6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars –webinars		
	Total Lecture hours	**60 hours**

Text Books	
1	ArshdeepBahga, VijayMadisetti, "InternetofThings: AHands – OnApproach ",2014. ISBN: 978 - 0996025515
2	Boris Adryan, Dominik Obermaier, Paul Fremantle, "The Technical Foundations of IoT", Artech Houser Publishers, 2017.
Reference Books	
1	Michael Margolis,"ArduinoCookbook",O"Reilly,2011
2	Marco Schwartz, "Internet of Things with ESP8266", PacktPublishing, 2016.
3	Dhivya Bala,"ESP8266:Step by Step Tutorial for ESP8266 IoT, Arduino NODEMCU Dev. Kit",2018.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websitesetc.]	
1	https://onlinecourses.nptel.ac.in/noc20_cs66/preview
2	https://www.javatpoint.com/iot-internet-of-things
3	https://www.tutorialspoint.com/internet_of_things/index.htm

Mapping with Programming Outcomes

COs	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

Head, Dept of Computer Science
Kunthavai Naachiaar Govt Arts College (W)
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H.H. Govt. Arts College for Women (Autonomous), Thanjavur-7

Course code	23KP4CSECCS6:2	BLOCK CHAIN TECHNOLOGY	L	T	P	C
Core/Elective/Supportive		Elective	4			4
Pre-requisite		Basics of Block Chain & Crypto Currency				

Course Objectives:

The main objectives of this course are to:

1. Understand the fundamentals of block chain and crypto currency.
2. Understand the influence and role of block chain in various other fields.
3. Learn security features and its significance.
4. Identify problems & challenges posed by Block Chain.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Demonstrate block chain technology and crypto currency	K1,K2
2	Understand the mining mechanism in block chain	K2
3	Apply and identify security measures, and various types of services that allow people totrade and transact with bit coins	K3,K4
4	Apply and analyze Block chain in health care industry	K4,K5
5	Analyze security, privacy, and efficiency of a given Block chain system	K5,K6

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

Unit: 1	INTRODUCTION	12 hours

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

Unit: 2	NETWORKAND SECURITY	12 hours

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

Unit: 3	CRYPTO CURRENCY	12 hours

Crypto currency - History, Distributed Ledger, Bit coin 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 Block chain

Unit: 4	CRYPTO CURRENCY REGULATION	11 hours

Crypto currency Regulation – Stake holders, Roots of Bit coin, Legal views – exchange of crypto currency-Black Market - Global Economy. Cyrpto economics – assets, supply and demand, inflation and deflation – Regulation.

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Unit: 5	CHALLENGES IN BLOCKCHAIN	11 hours
Opportunities and challenges in Block Chain – Application of block chain: Industry 4.0 –machine to machine communication –Data management in industry4.0 – future prospects. Block chain in Health 4.0 – Block chain properties - Healthcare Costs - Healthcare Quality - Healthcare Value - Challenges for using block chain for healthcare data		
Unit: 6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**60 hours**

	Text Books
1	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bit coin and Crypto currency Technologies: A Comprehensive Introduction", PrincetonUniversity Press (July 19, 2016).
2	Antonopoulos, "Mastering Bitcoin : Unlocking Digital Cryptocurrencies"
	Reference Books
1	Satoshi Nakamoto," Bit coin:A Peer – to - Peer Electronic CashSystem"
2	RodrigodaRosaRighi, Antonio Marcos Alberti, MadhusudanSingh, "Blockchain Technology forIndustry 4.0" Springer 2020.
	Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://www.javatpoint.com/blockchain-tutorial
2	https://www.tutorialspoint.com/blockchain/index.htm
3	https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs01/

Mapping with Programming Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
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

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Head, Dept of Computer Science
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Semester – IV
CCXIII

Hours - 10
Credit - 7

Project Work and Viva - Voce (23KP4CSPW)

Guidelines:

1. The students have to do the project work individually in the organization.
2. Any applications either system oriented or application oriented may be selected.
3. One internal examiner and one External Examiner shall evaluate project work.
4. During the evaluation there should be online demonstration.
5. The final copy of Project Report should be submitted to the Department.

Scheme of valuation

1. Selection of Application & Design	-20 Marks
2. Preparation of Source code	-20 Marks
3. Demonstration /Execution	-20 Marks
4. Documentation	-20 Marks
5. Viva- Voce	-20 Marks

Semester – II
ECC – I

Hours -
Credit - 3

Cognitive Ability (23KP2CSECC1:1)

Objective: To improve skills in UGC NET/SET examinations.

Unit I: Teaching and Research Aptitude : Teaching Nature – Objectives –Characteristics and Basic Requirements – Learners Characteristics – Factors affecting teaching – Method of Teaching and its Aids – Evaluation systems – Research Meaning – Characteristics and types – Steps of research – Methods of research – Research Ethics – Paper – article –Workshop – Seminar – Conference and Symposium – Thesis Writing : Its characteristics and format.

Unit II: Reading Comprehension – Communication: Nature – Characteristics – Types – Barriers and Effective Class Room Communication:

Unit III: Mathematical and Logical Reasoning : Number Series – Letter Series – Codes – Relationships – Classification – Understanding the structure of Arguments – Evaluating and Distinguishing Deductive and Inductive Reasoning. Verbal Analogies: Word Analogy – Applied Analogy. Verbal Classification – Reasoning Logical Diagrams: Simple and Multi – Diagrammatic Relationship. Venn diagram – Analytical Reasoning.

Unit IV: Data Interpretation and ICT: Sources – Acquisition and Interpretation of Data – Quantitative and Qualitative Data – Graphical Representation and Mapping of data. Information and Communication Technology: Meaning – advantages – disadvantages and uses – General abbreviation and terminology – Basics of internet and e-mailing.

Unit V: People and Environment: People and environment interaction – sources of pollution – pollutants and their impact on human life, exploitation of natural and energy resources – Natural hazards and mitigation. Higher Education System : Governance, Polity and Administration – Structure of the institution for higher learning and research in India – Formal and distance education – Professional/Technical and general education – Value Education.

Text:

"UGC NET/SLET Junior Research Fellowship and Eligibility for Lectureship Paper – I" Sakthi's Superior Guide – Sakthi Publishing House.

Reference:

1. "UGC NET/SLET Paper-I Teaching &Research aptitude"- UGC Unique Publishers.

2. www.allquiz.com

3. www.newrecruitments.com

4. www.ugcnetonline.in

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Semester–III **Hours -**
ECC-III **Credit - 3**

Core Competence (23KP3CSECC3:1)

Objective: To improve skills in UGC NET/SET examinations.

Unit I : Discrete Mathematics: Sets – Relations - Function – Inclusion – Exclusion principle. Graph: Definition – Walks-paths – trials – connected graph – regular and bipartite graphs – cycles and circuits – tree and rooted tree – spanning trees –Hamiltonian and Eulerian graphs – planar graphs. Groups: Finite field and Error correcting / detecting codes. Propositional logic - predicate logic – well formed formulae (WFF)-Satisfiability and Tautology. Representation of integers:.

Unit II: System Software and compilers: Assembly language fundamental (8085 based ALP) - Assembler – 2-pass and Single pass – Macros and Macro processors. Loading–Linking - Relocation– Program relocatability – Linkage Editing. Compilation and interpretation – Bootstrap compilers – Phases of compilation process – Lexical analysis. CFG –parsing and parse tree-parse tree derivation - Bottom up parsers - Top down parses: Left recursion and its removal – predictive parser – intermediate Codes: Quadruples –triples-intermediate code generation – code generation and optimization.

Unit III: Operating Systems (with case study of UNIX): UNIX File systems – process management –Bourne Shell – Shell variables – Command Line Programming. Filters and Commands.

Unit IV: Definition :AI approach for solving problem – Automated reasoning with propositional logic and predicate logic - fundamental proof procedure –refutation – resolution – refinements to resolution – state space representation of problems – founding function – BF,DF ,A,A*, AO*,etc., Frames – Scripts – semantic nets- production systems –procedural representation – Prolog programming.

Unit V : Currents trends and Technologies: Parallel computing - Mobile Computing – E – Technologies :Electronic payment systems – EDI –GIS – ERP package – Data Warehousing – Data Mining.

Text:"UGC NET/SLET Junior Research Fellowship and Eligibility for Lectureship Computer Science and Applications" – Sakthi's Superior Guide – Sakthi Publishing House

Reference:

1."UGC NET/SET computer science &application" - Sanjay singha I& Sameen mishra, Danika publishing company - New edition 2011.
2.www.allquiz.com
3.www.newrecruitments.com
4.www.ugcnetonline.in

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