

K.L.N. COLLEGE OF ENGINEERING

Pottapalayam-630612, Sivagangai District

(An Autonomous Institution, Affiliated to Anna University, Chennai)



Estd: 1994

CURRICULUM & SYLLABI

I to IV Semesters

REGULATIONS 2024

For Post Graduate Program

M.C.A – MASTER OF COMPUTER APPLICATIONS

CHOICE BASED CREDIT SYSTEM

(For the students admitted from the academic year 2024 - 2025 onwards)

Director, MCA
Department of Computer Applicatic
K.L.N. College of Engineering.
Pottapalayam-630 611.



K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM
(An Autonomous Institution, Affiliated to Anna University, Chennai)



VISION OF THE INSTITUTION

To become a Centre of Excellence in technical education and research in producing competent and ethical professionals to the society

MISSION OF THE INSTITUTION

To impart Value and Need based curriculum to the students with enriched skill development in the field of Engineering, Technology, Management and Entrepreneurship and to nurture their character with social concern and to pursue their career in the areas of Research and Industry.

VISION OF THE DEPARTMENT

To create innovative pedagogy with the source of knowledge in the successive development of Computer Technology in current trends.

MISSION OF THE DEPARTMENT

To produce technically skillful, competent, employable, software professionals and researchers with social responsibilities and ethical values.



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PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: Enables a student to implement a high performing system by selecting appropriate Data model, Architecture and Platform

PSO 2: Enable the students to design and develop application software for real time systems By integrating various system-based components

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates will be able to

PEO1: Apply their computing skills to analyze, design and develop innovative software products to meet the industry needs and excel as software professionals.

PEO2: Pursue lifelong learning and do research in the computing field based on solid technical foundations.

PEO3: Communicate and function effectively in teams in multi disciplinary fields with in the global, societal and environmental context.

PEO4: Exhibit professional integrity, ethics and an understanding of responsibility to contribute technical solutions for the sustainable development of society.



PROGRAM OUTCOMES (Pos)

The Graduate Attributes for MCA programme are as follows:

- PO1:** An ability to independently carry out research / investigation and development work to solve practical problems.
- PO2:** An ability to write and present a substantial technical report/document
- PO3:** Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program
- PO4:** Able to select suitable data models, appropriate architecture, and platform to implement a system with good performance.
- PO5:** Able to design and integrate various system – based components to provide user interactive solutions for various challenges.
- PO6:** Able to develop applications for real time environments using existing and upcoming technologies.

PEO / PO Mapping

PEO	Pos					
	PO1	PO2	PO3	PO4	PO5	PO6
I.	3	1	3	3	3	3
II.	2	1	3	3	3	3
III.	3	3	2	3	2	2
IV.	2	1	2	1	1	2

(3-High, 2-Medium, 1-Low)



REGULATIONS 2024
For Post Graduate Program
Master of Computer Applications
CHOICE BASED CREDIT SYSTEM

CATEGORY OF COURSES

- I. **FOUNDATION COURSES (FC)** may include Mathematics or other basic courses.
- II. **PROFESSIONAL CORE COURSES (PCC)** include the core courses relevant to the chosen specialization/ branch.
- III. **PROFESSIONAL ELECTIVES COURSES (PE)** Include the elective courses relevant to the chosen specialization/branch.
- IV. **Research Methodology and IPR Course (RMC)** covers topics on the process of research and patenting.
- V. **EMPLOYABILITY ENHANCEMENT COURSES (EEC)** Include Project Work and/or Internship, Seminar, Professional Practices, Summer Project, Case Study and Industrial / Practical Training.
- VI. **Open Elective Courses (OEC)** Include the courses offered by MCA.
- VII. **AUDIT COURSES (AC)** Include the courses such as Constitution of India, Value Education etc.



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REGULATIONS 2024
CHOICE BASED CREDIT SYSTEM
MASTER OF COMPUTER APPLICATIONS (FULL TIME)
CURRICULUM AND SYLLABUS
SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	24FC101	Probability and Statistics	FC	4	4	0	0	4
2	24MC102	Advanced Database Technology	PCC	3	3	0	0	3
3	24MC103	Python Programming	PCC	3	3	0	0	3
4	24MC104	Object Oriented Software Engineering	PCC	3	3	0	0	3
5	24MC105	Modern Operating Systems	PCC	3	3	0	0	3
6	24RM101	Research Methodology and IPR	RMC	3	3	0	0	3
7		Audit Course – 1#	AC	2#	2#	0	0	0
PRACTICALS								
8	24MC1L1	Python Programming Laboratory	PCC	3	0	0	3	1.5
9	24MC1L2	Advanced Database Technology Laboratory	PCC	3	0	0	3	1.5
10	24MC1L3	Communication Skills Laboratory– I	EEC	2	0	0	2	1
			TOTAL	27	19	0	8	23

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	24MC201	Internet of Things	PCC	3	3	0	0	3
2	24MC202	Data Structures and Algorithms	PCC	4	4	0	0	4
3	24MC203	Machine Learning	PCC	3	3	0	0	3
4	24MC204	Advanced JAVA	PCC	4	4	0	0	4
5		Professional Elective – I	PEC	3	3	0	0	3
6		Professional Elective – II	PEC	3	3	0	0	3
7		Audit Course – 2 #	AC	2 #	2 #	0	0	0
PRACTICALS								
8	24MC2L1	Data Structures and Algorithms Laboratory	PCC	4	0	0	4	2
9	24MC2L2	Advanced JAVA Laboratory	PCC	4	0	0	4	2
10	24MC2L3	Machine Learning Laboratory	PCC	4	0	0	4	2
11	24MC2L4	Communication Skills Laboratory– II	EEC	2	0	0	2	1
			TOTAL	34	20	0	14	27

- Audit Courses 1 and 2 – Optional – Conducted on Saturdays

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	24MC301	Artificial Intelligence	PCC	3	3	0	0	3
2	24MC302	Cloud Computing	PCC	3	3	0	0	3
3	24MC303	Foundations of Data Science	PCC	3	3	0	0	3
4	24MC304	Security in Computing	PCC	3	3	0	0	3
5		Professional Elective – III	PEC	3	3	0	0	3
6		Open Elective – I	OEC	3	3	0	0	3
PRACTICALS								
7	24MC3L1	Full Stack Development Laboratory	PCC	4	0	0	4	2
8	24MC3L2	Cloud Computing Laboratory	PCC	4	0	0	4	2
9	24MC3L3	Mini Project	EEC	2	0	0	2	1
			TOTAL	28	18	0	10	23

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
PRACTICAL								
1	24MC4L1	Project Work	EEC	24	0	0	24	12
			TOTAL	24	0	0	24	12

TOTAL NO. OF CREDITS: 85

BRIDGE COURSES**(For the M.C.A students admitted under non-computer – science back ground category)**

SL. NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C
Classes are to be conducted and completed before the start of the class of first semester, Examinations will be conducted along with first semester							
1.	24MCBC1	Database Management Systems	3	3	0	0	3
2.	24MCBC2	Programming in 'C'	3	3	0	0	3
3.	24MCBC3	Mathematical Foundations for Computer Applications	3	3	0	0	3
Classes are to be conducted and completed before the start of the class of second semester, Examinations will be conducted along with second semester							
4.	24MCBC4	Basics of Computer Networks	3	3	0	0	3
5.	24MCBC5	Object Oriented Programming	3	3	0	0	3
6.	24MCBC6	Computer Graphics And Multimedia Systems	3	3	0	0	3

FOUNDATION COURSES (FC)

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	24FC101	Probability and Statistics	FC	4	4	0	0	4

PROFESSIONAL CORE (PC)

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	24MC102	Advanced Database Technology	PCC	3	3	0	0	3
2.	24MC103	Python Programming	PCC	3	3	0	0	3
3.	24MC104	Object Oriented Software Engineering	PCC	3	3	0	0	3
4.	24MC105	Modern Operating Systems	PCC	3	3	0	0	3
5.	24MC1L1	Python Programming Laboratory	PCC	3	0	0	3	1.5
6.	24MC1L2	Advanced Database Technology Laboratory	PCC	3	0	0	3	1.5
7.	24MC201	Internet of Things	PCC	3	3	0	0	3
8.	24MC202	Data Structures and Algorithms	PCC	4	4	0	0	4
9.	24MC203	Machine Learning	PCC	3	3	0	0	3
10.	24MC204	Advanced JAVA	PCC	4	4	0	0	4
11.	24MC2L1	Data Structures and Algorithms Laboratory	PCC	4	0	0	4	2
12.	24MC2L2	Advanced JAVA Laboratory	PCC	4	0	0	4	2
13.	24MC2L3	Machine Learning Laboratory	PCC	4	0	0	4	2
14.	24MC301	Artificial Intelligence	PCC	3	3	0	0	3
15.	24MC302	Cloud Computing	PCC	3	3	0	0	3
16.	24MC303	Foundations of Data Science	PCC	3	3	0	0	3
17.	24MC304	Security in Computing	PCC	3	3	0	0	3
18.	24MC3L1	Full Stack Development Laboratory	PCC	4	0	0	4	2
19.	24MC3L2	Cloud Computing Laboratory	PCC	4	0	0	4	2

Research Methodologies and IPR Courses (RMC)

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24RM101	Research Methodology and IPR	RMC	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24MC1L3	Communication Skills Laboratory – I	EEC	2	0	0	2	1
2	24MC2L4	Communication Skills Laboratory – II	EEC	2	0	0	2	1
3	24MC3L3	Mini Project	EEC	2	0	0	2	1
4	24MC4L1	Project Work	EEC	24	0	0	24	12

PROFESSIONAL ELECTIVES (PE)***SEMESTER II****PROFESSIONAL ELECTIVE – I**

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24MC2E1	Fundamentals of Virtual Reality	PEC	3	3	0	0	3
2	24MC2E2	Mobile Computing	PEC	3	3	0	0	3
3	24MC2E3	Accounting and Financial Management	PEC	3	3	0	0	3
4	24MC2E4	Soft Computing	PEC	3	3	0	0	3

SEMESTER II
PROFESSIONAL ELECTIVE – II

SI. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24MC2E5	Computer Organization and Architecture	PEC	3	3	0	0	3
2	24MC2E6	Operations Research	PEC	3	3	0	0	3
3	24MC2E7	Service Oriented Architecture	PEC	3	3	0	0	3
4	24MC2E8	Business Data Analytics	PEC	3	3	0	0	3

SEMESTER III
PROFESSIONAL ELECTIVE – III

SI. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24MC3E1	Software Testing and Quality Assurance	PEC	3	3	0	0	3
2	24MC3E2	Full Stack Development	PEC	3	3	0	0	3
3	24MC3E3	Professional Ethics in IT	PEC	3	3	0	0	3
4	24MC3E4	DevOps and Micro services	PEC	3	3	0	0	3

**SEMESTER III
OPEN ELECTIVE**

SL. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24MCOE1	Software Project Management	OEC	3	3	0	0	3
2	24MCOE2	Crypto Currency and Block Chain Technologies	OEC	3	3	0	0	3
3	24MCOE3	Data Warehousing and Data Mining	OEC	3	3	0	0	3
4	24MCOE4	Big Data Analytics	OEC	3	3	0	0	3

AUDIT COURSES (AC)

SL. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	24AC101	ENGLISH FOR RESEARCH PAPER WRITING	AC	2	2	0	0	0
2.	24AC102	DISASTER MANAGEMENT	AC	2	2	0	0	0
3.	24AC103	SANSKRIT FOR TECHNICAL KNOWLEDGE	AC	2	2	0	0	0
4.	24AC104	VALUE EDUCATION	AC	2	2	0	0	0
5.	24AC105	CONSTITUTION OF INDIA	AC	2	2	0	0	0
6.	24AC106	PEDAGOGY STUDIES	AC	2	2	0	0	0
7.	24AC107	STRESS MANAGEMENT BY YOGA	AC	2	2	0	0	0
8.	24AC108	PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	AC	2	2	0	0	0


SUMMARY

Sl. No	Category	Credits as per Semester				Total Credits	Weightage
		I	II	III	IV		
1	FC	4	-	-	-	4	4.71
2	PCC	15	20	16	-	51	60
3	PEC	-	6	3	-	9	10.58
4	EEC	1	1	1	12	15	17.64
5	OEC	-	-	3	-	3	3.52
6	RMC	3				3	3.52
7	AC	0	0	-	-	0	0
		23	27	23	12	85	

24FC101	PROBABILITY AND STATISTICS	L	T	P	C
		4	0	0	4
OBJECTIVES:					
<ul style="list-style-type: none"> The main objective of this course is to provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science like disease modeling, climate prediction and computer networks etc. To understand the basic concepts of probability, one dimensional random variables and to introduce some standard distributions. To understand the basic concepts of multivariate normal distribution and principal Components analysis. 					
UNIT- I	LINEAR ALGEBRA				12
Vector spaces – norms -- Inner Products – QR factorization – generalized eigenvectors – singular value decomposition and applications – pseudo inverse – least square approximations.					
UNIT– II	PROBABILITY AND DISTRIBUTIONS				12
Probability – Axioms of probability- Conditional probability- Independence of Events- Baye’s Theorem-Discrete random variable- Probability mass function- Continuous random variable-Probability density function- Properties-Mean and Variance –Special distributions: Binomial and normal distributions.					
UNIT- III	CORRELATION AND REGRESSION				12
Correlation – Coefficient of determination-Properties of correlation coefficient – Rank correlation- regression – Estimation of Regression line – Properties of regression coefficient- Method of least squares.					
UNIT- IV	MULTIVARIATE ANALYSIS				12
Random vectors and matrices – Mean vectors and covariance matrices – Multivariate normal density and its properties – Principal components – Population principal components – Principal components from standardized variables.					
UNIT - V	TESTING OF HYPOTHESIS				12
Sampling distributions –Type I and Type II errors- one sample and two sample tests for mean of large samples test, one sample and two sample tests for mean of small samples (T-test), F – test for two sample standard deviations- Chi–square tests for independence of attributes and goodness of fit.					
					TOTAL: 60 PERIODS
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Calculate the different norms using inner products. – UNIT- I-(K3)					
CO2: Apply the concepts of probability to find statistical measures for discrete and continuous random variable – UNIT- II -(K3)					
CO3: Calculate the coefficient of correlation and obtain the line of regression between the random variables. - UNIT - III (K3)					
CO4: Calculate descriptive statistics, testing for multivariate normality using analysis of multivariate data. - UNIT- IV (K3)					
CO5: Apply the concepts of testing of hypothesis for small and large samples. UNIT- V (K3)					

REFERENCES:

1. Bronson, R., "Matrix Operation" Schaum's outline series, Tata McGraw Hill, New York, 2011.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
3. Devore, J. L., "Probability and Statistics for Engineering and the Sciences", 8th Edition, Cengage Learning, 2015.
4. Gupta S.C. and Kapoor V.K., "Fundamentals of Mathematical Statistic", Sultan and Sons, New Delhi, 2001.
5. Richard A. Johnson and Dean W. Wichern, "Applied Multivariate Statistical Analysis", 6th Edition, Pearson Education, Asia, 2007.

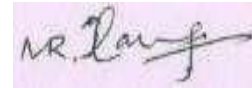


DIRECTOR / MCA

24MC102	ADVANCED DATABASE TECHNOLOGY	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To understand the working principles and query processing of distributed databases. To understand the basics of spatial, temporal and mobile databases and their applications. To distinguish the different types of No SQL databases. To understand the basics of XML and create well-formed and valid XML documents. To gain knowledge about information retrieval and web search. 					
UNIT - I	DISTRIBUTED DATABASES				9
Distributed Systems – Introduction – Architecture – Distributed Database Concepts – Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing					
UNIT - II	SPATIAL AND TEMPORAL DATABASES				9
Active Databases Model – Design and Implementation Issues – Temporal Databases – Temporal Querying - Spatial Databases: Spatial Data Types, Spatial Operators and Queries – Applications-Mobile Databases: Mobile Transaction Models, Deductive Databases and Multimedia Databases					
UNIT - III	NOSQL DATABASES				9
NoSQL – CAP Theorem – Sharding - Document based – Mongo DB Operation: Insert, Update, Delete, Query, Indexing, Application, Replication, Sharding – Cassandra: Data Model, Key Space, Table Operations, CRUD Operations, CQL Types – HIVE: Data types, Database Operations, Partitioning – HiveQL – OrientDB Graph database – OrientDB Features					
UNIT - IV	XML DATABASES				9
Structured, Semi structured, and Unstructured Data – XML Hierarchical Data Model – XML Documents – Document Type Definition – XML Schema – XML Documents and Databases					
UNIT - V	INFORMATION RETRIEVAL AND WEB SEARCH				9
IR concepts – Retrieval Models – Queries in IR system – Text Preprocessing – Inverted Indexing – Evaluation Measures – Web Search and Analytics – Current trends.					
TOTAL: 45 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Demonstrate a distributed database system and execute distributed queries.- UNIT – I (K3)					
CO2: Apply Spatial and Temporal Database systems and implementing Corresponding applications. UNIT – II (K3)					
CO3: Use No SQL database systems and manipulate the data associated with it.- UNIT – III (K3)					
CO4: Demonstrate XML database systems and validate with XML schema.- UNIT – IV – (K3)					
CO5: Apply knowledge of information retrieval concepts on web databases. - UNIT – V – (K3)					

REFERENCES:

1. Abraham Silberschatz, Henry F Korth, S.Sudharshan, "Database System Concepts", Seventh Edition, McGraw Hill,2019.
2. R.Elmasri, S.B.Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education / Addison Wesley, 2017.
3. Guy Harrison, "Next Generation Databases, NoSQL, New SQL and Big Data", First Edition, A press publishers,2015
4. JiaweiHan, Micheline Kamber, JianPei, "DataMining: Concepts and Techniques", Third Edition, Morgan Kaufmann, 2012.
5. Brad Dayley, "Teach Yourself NoSQL with MongoDB in 24 Hours", Sams Publishing, First Edition, 2014.
6. C.J.Date, A.Kannan, S.Swaminathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education,2006
7. Data Base Management Systems" - Alexis Leon, Mathews Leon




DIRECTOR / MCA

24MC103	PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To understand new Programming features in Python To provide skills on implementation of Data Structures in Python To enhance knowledge on Object Oriented Techniques in Python To improve skills on various Special Functions in Python To provide knowledge on Web Page Development 					
UNIT - I	BASICS OF PYTHON				9
Introduction - Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions- Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if – elif - else); Strings: string slices, immutability, string functions and methods, string module					
UNIT – II	DATA STRUCTURES IN PYTHON				9
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Sets - Tuples: tuple assignment, tuple as return value-Sets vs Tuples- Dictionaries: operations and methods; Arrays using NumPy					
UNIT – III	OBJECT ORIENTED PROGRAMMING AND FRAMEWORK				9
Introduction to Python Classes- Creating a Class, Creating the constructor in python, Dunder Functions, Python Decorator, Python Property Decorator, Inner Classes, Operator Overloading, Different forms of Inheritance, Method Over riding, MRO, Frameworks - Django					
UNIT – IV	FILE HANDLING AND EXCEPTION HANDLING				9
Functions-Types of functions, File operations, File Modes, File Prototypes, Argument types, Files and Exception - Exception handling, catching exceptions, try –finally					
UNIT – V	DATABASE CONNECTIVITY				9
Database Connectivity- SQLite, SQLite Module APIs, Connect to Database- create table, Insert, Select, update, delete; Tkinter – Events, Event driven programming- Key press events, Mouse events, Automatic events from a timer					
					TOTAL : 45 PERIODS
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Demonstrate string function in Python - UNIT – I – (K3)					
CO2: Apply various Data Structure concepts in Python - UNIT – II – (K3)					
CO3: Use OOPs concepts in Python - UNIT – III – (K3)					
CO4: Apply Modules, Files in Python - UNIT – IV – (K3)					
CO5: Apply Database connectivity with Python - UNIT – V – (K3)					

REFERENCES:

1. Martin C. Brown - Python: The Complete Reference - McGraw Hill Education
2. John V Guttag, —Introduction to Computation and Programming Using Python “, Revised And expanded Edition, MIT Press, 2013
3. E. Balagurusamy, Chairman - McGraw Hill Education India Private Limited, EBG Foundation, Coimbatore. - Introduction to Computing and Problem-Solving Using Python
4. Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Science using Python 3ll, Second edition, Pragmatic Programmers, LLC, 2013.

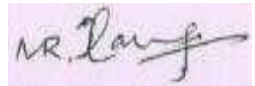


DIRECTOR / MCA

24MC104	OBJECT ORIENTED SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To understand the phases in object – oriented software development To gain fundamental concepts of requirements engineering and analysis. To know about the different approach for object - oriented design and its methods To learn about how to perform object – oriented testing and how to maintain software To provide various software quality and metrics. 					
UNIT – I	SOFTWARE DEVELOPMENT AND PROCESS MODELS				9
Introduction to Software Development – Challenges - Software Development Process - Iterative Development Process - Object Oriented Life Cycle Models —Prescriptive Process Models: The Waterfall Model, Incremental Models (Incremental and RAD) – Evolutionary Process Models (Prototyping, Spiral and Concurrent Development) – Agile Process Models.					
UNIT - II	OBJECT ORIENTED ANALYSIS				9
Object Oriented Analysis – Requirements Engineering Tasks - Requirement Elicitation Process- Software Requirement Specification (SRS) Document – OOA - Identification of Classes and Relationships – Identifying State and Behavior – OOA - Use Case Modeling – Class Modeling – Dynamic Modeling - Analysis Object Models – Dynamic and Static					
UNIT – III	OBJECT ORIENTED DESIGN				9
Designing Concepts – Abstraction – Modularity – Cohesion – Coupling - Design Principles – Hierarchical Object - Oriented Design - Object Modeling Technique - Object Oriented Design - Interaction Diagrams- Sequence Diagrams-					
UNIT - IV	OBJECT ORIENTED TESTING				9
Object Oriented Testing – Object Oriented Testing Methods -Software Testing - Software Verification Techniques – Functional Testing- Structural Testing - Class Testing – Mutation Testing - Regression Testing - Software Testing Techniques – Static and Dynamic – Software Testing Tools					
UNIT – V	SOFTWARE QUALITYAND OBJECT-ORIENTED METRICS				9
Measuring Software Quality- Objectives of quality measurement - Classification of software quality metrics – Product Metrics, Process Metrics, Project Metrics, Object Oriented Metrics- Limitations of Software Metrics.					
TOTAL: 45 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Describe object - oriented software using appropriate process models. – UNIT – I – (K2)					
CO2: Demonstrate Object Oriented Analysis concepts for software project. - UNIT – II – (K3)					
CO3: Develop Object Oriented Design Techniques for software project. UNIT – III – (K3)					
CO4: Conduct testing methods and compare different testing tools for software process. UNIT – IV-(K3)					
CO5: Analyze Object Oriented Software quality for software engineering processes. - UNIT –V – (K4)					

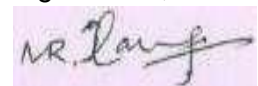
REFERENCES:

1. Yogesh Singh, Ruchika Malhotra, "Object – Oriented Software Engineering", PHI Learning Private Limited, Firstedition,2012
2. IvarJacobson. Magnus Christerson, Patrik Jonsson, Gunnar Overgaard, "Object Oriented Software Engineering, A Use Case Driven Approach", Pearson Education, Seventh Impression, 2009
3. Craig Larman, "Applying UML and Patterns, an Introduction to Object-Oriented Analysis and Design and Iterative Development", PearsonEducation,ThirdEdition,2008
4. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Jim Connellan, Kelli A.Houston, "Object Oriented Analysis & Design with Applications, Third Edition, Pearson Education,2010
5. Roger S.Pressman, "Software Engineering: A Practitioner's Approach, Tata Mc Graw –Hill Education, 8th Edition,2015
6. Bernd Bruegge, Allen H. Dutoit, "Object Oriented Software Engineering "Second Edition, Pearson Education, 2013
7. Daniel Galin, "Software Quality Assurance", Pearson Education, 2012



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24MC105	MODERN OPERATING SYSTEMS	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> • To provide basic knowledge about operating systems, their services, process concept and process synchronization • To explore CPU scheduling concepts and Deadlocks • To know about Memory Management concepts • To know about disk structure and disk scheduling algorithms • To provide knowledge about files and directories 					
UNIT - I	INTRODUCTION				9
Introduction – Computer systems structures: computer system operation – I/O structure – storage structure – storage hierarchy – Hardware protection – operating system structures: system components – operating system services – system calls – Processes: process concept – process scheduling – operations on processes – cooperating processes – Inter process communication					
UNIT - II	SCHEDULING AND DEADLOCK				9
CPU Scheduling: Basic concepts – scheduling criteria – scheduling algorithms – Deadlocks: system model – Deadlock characterization – methods for handling deadlocks – deadlock prevention- deadlock avoidance – deadlock detection – Recovery from deadlock					
UNIT - III	MEMORY MANAGEMENT				9
Memory management: Swapping – contiguous memory allocation – Paging – Segmentation – Segmentation with paging – Virtual memory: Demand paging – Process creation – Page replacement – Allocation of frames – thrashing					
UNIT - IV	MASS STORAGE STRUCTURE				9
Mass storage structure – Disk structure – Disk scheduling – Disk management – Swap space management – RAID structure					
UNIT - V	FILE SYSTEM				9
File system interface: File concept – Access methods – Directory structure- File system mounting – file Protection.					
TOTAL : 45 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Apply the concept of OS services, process concepts and process synchronization. UNIT 1 (K3)					
CO2: Illustrate the CPU scheduling algorithms and Deadlock concepts. UNIT 2 (K3)					
CO3: Apply memory management concepts and techniques in OS. UNIT 3 (K3)					
CO4: Demonstrate the disk scheduling algorithms. -UNIT 4 (K3)					
CO5: Apply the concepts of file and directories for OS. UNIT 5 (K3)					
REFERENCES:					
<ol style="list-style-type: none"> 1. Abraham Silber Schatz Peter Galvin, Gagne, —OPERATING SYSTEMCONCEPTSII, Willey India Edition, Eighth Edition, 2010 2. Andrew Tanenbaum, —Modern operating systemsII, Third Edition, PHI Learning Pvt.Ltd.,2008. 					



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24RM101	RESEARCH METHODOLOGY AND IPR	L	T	P	C
		3	0	0	3
OBJECTIVES: <ul style="list-style-type: none"> To give an overview of the research methodology and explain the technique of defining a research problem. To explain the functions of the literature review in research. To this course can explain the art of interpretation and the art of writing research reports. To explains various forms of the intellectual property its relevance To business impact in the changing global business environment. 					
PRE-REQUISITE: NIL					
UNIT - I	RESEARCH METHODOLOGY				9
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting are search problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations. Effective literature studies, approaches, analysis, Plagiarism, Research ethics.					
UNIT-II	EFFECTIVE TECHNICAL WRITING				9
How to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and Assessment by are view committee					
UNIT - III	INTELLECTUAL PROPERTY AND INTERNATIONAL SCENARIO				9
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International co-operation on Intellectual Property Procedure for grants of patents, Patenting under PCT.					
UNIT – IV	PATENT RIGHTS				9
Scope of Patent Rights, Licensing and transfer of technology, Patent information and databases, Geographical Indications					
UNIT – V	NEW DEVELOPMENTS IN IPR				9
Administration of Patent System, New developments in IPR, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.					
TOTAL : 45 PERIODS					

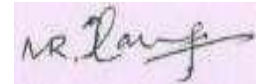
OUTCOMES: Upon Completion of the Course, the Students will be able to: CO1: Explain the scope and objectives of research problem – UNIT – I- (K2) CO2: Develop effective technical writing for research proposal UNIT – II- (K3) CO3: Classify the Intellectual property in IPR - UNIT –III- (K3) CO4: Illustrate patent rights, indications - UNIT – IV- (K3) CO5: Predict the new development in IPR - UNIT –V- (K3)
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TEXT BOOKS:

1. Debora J. Halbert, "Resisting Intellectual Property (RIPE Series in Global Political Economy)", Taylor & Francis Ltd.,2006.
2. W.H.Mayall, "Industrial Design for Engineers", London Iliffe Books Ltd. 1967.
3. Benjamin W. Niebel, "Product Design and Process Engineering", McGraw- HillInc.,US,1974.
4. Morris Asimow, "An Introduction To Design", Prentice-Hall, Inc. First Edition,1962.
5. Robert P. Merges, Peter S. Menell and Mark A. Lemley, "Intellectual Property in New Technological Age", AspenLaw & Business,2012.
6. T.R amappa, "Intellectual Property Rights Under WTO: Tasks Before India", AH Wheeler PublishingCo.Ltd.,2002.

REFERENCES:

1. S. Melville and W.Goddard, "Research Methodology: An Introduction for Science and Engineering Students", Juta &Co. Ltd., 1996.
2. Ranjit Kumar, "Research Methodology: A Step-by-Step Guide for Beginners", Third Edition, SAGE Publications Ltd.,2010



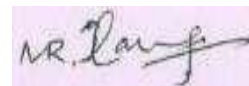
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24MC1L1	PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	3	1.5
OBJECTIVES: <ul style="list-style-type: none"> To understand the basic functionalities techniques in python To apply the various function techniques To implement the Object-oriented Techniques To create simple files and databases To create Windows and Events oriented programming concepts 					
LIST OF EXPERIMENTS: <ol style="list-style-type: none"> Basic Programs using Python. Implement Linear and Binary Search Implement Selection and Merge Sorts Create Classes and Objects Create Modules and Packages Construct a linked list. Prompt the user for input. Remove any duplicate numbers from the linked list using NumPy Read a file content and copy only the contents at even lines into a new file. Create a table in SQLite and apply SQL queries Create GUI components using Tkinter Create Mouse Events using Tkinter 					
TOTAL : 45 PERIODS					
SOFTWARE REQUIREMENTS <ol style="list-style-type: none"> Python 3.6 / 3.7 					
OUTCOMES: Upon Completion of the Course, the Students will be able to: <p>CO1: Apply the concept of Basic Programs in python – (K3)</p> <p>CO2: Apply any compound data structures - (K3)</p> <p>CO3: Build Files and Databases in Python - (K3)</p> <p>CO4: Develop window-based applications - (K3)</p> <p>CO5: Develop mouse events using Tkinter-(K3)</p>					



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24MC1L2	ADVANCED DATABASE TECHNOLOGY LABORATORY	L 0	T 0	P 3	C 1.5
<p>OBJECTIVES:</p> <ul style="list-style-type: none"> To understand the process of distributing tables across multiple systems To understand the process of storing, retrieving spatial and temporal data To understand the process of storing, retrieving objects in a database To understand the process of storing and retrieving data from an XML Database To use the open-source database for building a mobile application 					
<p>LIST OF EXPERIMENTS:</p> <ol style="list-style-type: none"> NOSQL Exercises <ol style="list-style-type: none"> MongoDB – CRUD operations, Indexing, Sharding Cassandra: Table Operations, CRUD Operations, CQL Types HIVE: Data types, Database Operations, Partitioning – HiveQL MySQL Database Creation, Table Creation, Query MySQL Replication–Distributed Databases Spatial data storage and retrieval in MySQL Temporal data storage and retrieval in MySQL Object storage and retrieval in MySQL XML Databases, XML table creation, XQuery FLWOR expression Mobile Database Query Processing using open-source DB(MongoDB / MySQL etc) 					
<p>TOTAL : 45 PERIODS</p>					
<p>SOFTWARE REQUIREMENTS</p> <ol style="list-style-type: none"> Java/Python /R/ Scala SQL SERVER, MySQL, MongoDB, Casandra, Hive / NetBeans 					
<p>OUTCOMES: Upon Completion of the Course, the Students will be able to: CO1: Construct and implement advanced databases.- (K3) CO2: Use big data frameworks and tools. - (K3) CO3: Use SQL solve complex queries - (K3) CO4: Develop an XML document and perform XQuery .- (K3) CO5: Develop mobile databases in query processing by using open-source tools - (K3)</p>					



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24MC1L3	COMMUNICATION SKILLS LABORATORY - I	L	T	P	C
		0	0	2	1
<p>OBJECTIVES:</p> <ul style="list-style-type: none"> To provide opportunities to learners to practice their communicative skills to make them become proficient users of English. To enable learners to fine – tune their linguistic skills (LSRW) with the help of technology to communicate globally. To improve the performance of students' listening, speaking, reading and writing skills and thereby enhance their career opportunities. 					
<p>LIST OF ACTIVITIES:</p> <p>1. Listening:</p> <ul style="list-style-type: none"> Listening and practicing neutral accents Listening to short talks and lectures and completing listening comprehension exercises Listening to TED Talks <p>2. Speaking:</p> <ul style="list-style-type: none"> Giving one minute talks Participating in small Group Discussions Making Presentations <p>3. Reading:</p> <ul style="list-style-type: none"> Reading Comprehension Reading subject specific material Technical Vocabulary <p>4. Writing:</p> <ul style="list-style-type: none"> Formal vs Informal Writing Paragraph Writing Essay Writing Email Writing <p>REFERENCES / MANUALS / SOFTWARE: Open Sources / websites</p>					
TOTAL: 30 PERIODS					
<p>OUTCOMES: Upon Completion of the Course, the Students will be able to:</p> <p>CO1 : Listen and comprehend lectures in English CO2 : Articulate well and give presentations clearly CO3 : Participate in Group Discussions successfully CO4 : Communicate effectively in formal and informal writing CO5 : Write proficient essays and emails</p>					



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24MC201	INTERNET OF THINGS	L	T	P	C
		3	0	0	3
OBJECTIVES: <ul style="list-style-type: none"> To study fundamental concepts of IoT To understand roles of sensors in IoT To Learn different protocols used for IoT design To be familiar with data handling and analytics tools in IoT Appreciate the role of big data, cloud computing and data analytics in a typical IoT system. Understand the role of IoT in various domains of Industry 					
UNIT - I	FUNDAMENTALS OF IoT				9
Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.					
UNIT – II	SENSORS IN IoT				9
Sensors Networks: Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, Raspberry Pi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.					
UNIT-III	IOT PROTOCOLS				9
Wireless Technologies for IoT: WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, BACnet, Modbus. IP Based Protocols for IoT IPv6, 6LowPAN, RPL, REST, AMPQ, CoAP, MQTT. Edge connectivity and protocols					
UNIT-IV	DATA ANALYTICS AND SUPPORTING SERVICES				9
Data Handling & Analytics: Introduction, Big data, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications.					
UNIT-V	IoT APPLICATIONS				9
Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.					
TOTAL: 45 PERIODS					
OUTCOMES: Upon Completion of the Course, the Students will be able to: CO1: Determine the various concepts, terminologies and architecture of IoT systems- UNIT – I – (K2) CO2: Use sensors and actuators for design of IoT. - UNIT –II – (K3) CO3: Apply various protocols for design of IoT systems - UNIT – III – (K3) CO4: Use various techniques of data storage and analytics in IoT - UNIT – IV – (K3) CO5: Demonstrate various applications of IoT - UNIT – V – (K3)					

TEXTBOOK:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, IOT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017
2. Arshdeep Bahga, Vijay Madiseti, Internet of Things – A hands-on approach, Universities Press, 2015

REFERENCES:

1. Olivier Hersent, David Boswarthick, Omar Elloumi, —The Internet of Things – Key applications and Protocols, Wiley, 2012 (for Unit 2).
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle, From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligencell, Elsevier, 2014.
3. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things, Springer, 2011.
4. Michael Margolis, —Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O'Reilly Media, 2011.

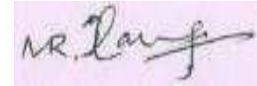


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24MC202	DATA STRUCTURES AND ALGORITHMS	L	T	P	C
		4	0	0	4
OBJECTIVES:					
<ul style="list-style-type: none"> To learn linear data structures-Stack, Queue and Linked List To learn non linear data structures –Tree and Graphs To be exposed to sorting ,searching and hashing techniques To be familiar with the various algorithm design techniques To apply the algorithm design techniques to real world problems and analyze them 					
UNIT - I	LINEAR DATA STRUCTURES				12
Introduction - Abstract Data Types (ADT) – Stack ADT – Operations on Stack - Applications of stack – Infix to postfix conversion – evaluation of expression - Queue ADT – Operations on Queue - Circular Queue - Applications of Queue. List ADT - Singly Linked Lists – Doubly Linked Lists - Applications of linked list – Polynomial Addition					
UNIT - II	NON-LINEAR DATA STRUCTURES				12
Trees and its representation - Binary Tree – Expression trees – Binary tree traversals – Applications of trees – Binary search tree - Balanced Trees - AVL Tree- Heap- Heap operations Graph and its representation - Graph Traversals - Depth-first traversal – Breadth - first traversal - Applications of graphs – shortest - path algorithms – Minimum spanning tree – Prim's and Kruskal's algorithms.					
UNIT - III	SORTING, SEARCHING AND HASH TECHNIQUES				12
Sorting algorithms: Insertion sort - Bubble sort - Quick sort - Searching: Linear search –Binary Search - Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing.					
UNIT - IV	ALGORITHM DESIGN AND ANALYSIS				12
Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Greedy Algorithms – Knapsack Problem – Dynamic Programming – Warshall's Algorithm for Finding Transitive Closure.					
UNIT - V	P & NP PROBLEMS				12
Backtracking – N-Queen's Problem – Subset sum problem- Branch and Bound – Assignment Problem - Approximation algorithms for NP-hard problems – Travelling salesman problem.					
					TOTAL : 60 PERIODS
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Demonstrate the operations of Linear Data Structures [Unit I] [K3]					
CO2: Demonstrate Non-Linear Data Structure [UNIT II] [K3]					
CO3: Determine the various sorting and searching techniques [Unit III] [K3]					
CO4: Apply different algorithm design strategies [UNIT IV] [K3]					
CO5: Calculate the Efficiency of given algorithm. [UNIT V] [K3]					

REFERENCES:

1. Anany Levitin —Introduction to the Design and Analysis of Algorithms|| Pearson Education, 2015
2. E. Horowitz, S.Sahni and Dinesh Mehta, —Fundamentals of Data structures in C++||, University Press, 2007
3. E. Horowitz, S. Sahni and S. Rajasekaran, —Computer Algorithms/C++||, Second Edition, University Press, 2007
4. Tanaenbaum A.S.,Langram Y. Augestein M.J, —Data Structures using C|| Pearson Education 2004
5. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", Third Edition, PHI Learning Private Ltd, 2012.



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24MC203	MACHINE LEARNING	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To gain knowledge on foundations of machine learning and apply suitable dimensionality reduction techniques for an application To select the appropriate model and use feature engineering techniques To gain knowledge on Probability and Bayesian Learning to solve the given problem To design and implement the machine learning techniques for real world problems To analyze, learn and classify complex data without predefined models also 					
Unit – I	INTRODUCTION				9
Human Learning - Types – Machine Learning - Types - Problems not to be solved - Applications – Languages / Tools – Issues. Preparing to Model: Introduction - Machine Learning Activities – Types of data – Exploring structure of data - Data quality and remediation – Data Pre-processing					
Unit - II	MODEL EVALUATION AND FEATURE ENGINEERING				9
Model Selection – Training Model – Model Representation and Interpretability - Evaluating Performance of a Model – Improving Performance of a Model – Feature Engineering: Feature Transformation – Feature Subset Selection					
UNIT - III	Bayesian Learning				9
Basic Probability Notation – Inference – Independence – Baye’s Rule. Bayesian Learning: Maximum Likelihood and Least Squared error hypothesis - Maximum Likelihood hypotheses for predicting probabilities- Minimum description Length principle - Bayes optimal classifier – Naïve Bayes classifier-Bayesian Belief networks – EM algorithm					
Unit - IV	PARAMETRIC MACHINE LEARNING				9
Logistic Regression: Classification and representation– Cost function – Gradient descent – Advanced optimization – Regularization – Solving the problems on over fitting. Perceptron – Neural Networks – Multi – class Classification – Back propagation - Non-linearity with activation functions(Tanh, Sigmoid, Relu, PRelu) - Drop out as regularization					
Unit - V	NON PARAMETRIC MACHINE LEARNING				9
k- Nearest Neighbors- Decision Trees – Branching – Greedy Algorithm - Multiple Branches –Continuous attributes – Pruning. Random Forests: ensemble learning. Boosting – Ada boost algorithm - Support Vector Machines – Large Margin Intuition–Loss Function-Hinge Loss – SVM Kernals					
					TOTAL : 45 PERIODS
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Understand about Data Preprocessing, Dimensionality reduction - UNIT – I – (K2)					
CO2: Apply proper model for the given problem and use feature engineering techniques– UNIT – II – (K3)					
CO3: Make use of Probability Technique to solve the given problem- UNIT – III – (K3)					
CO4: Choose and apply appropriate algorithm to learn and classify the data- UNIT – IV – (K3)					
CO5: Analyze the working model and features of Decision tree– UNIT – V– (K3)					

REFERENCES:

1. Ethem Alpaydin, "Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)", Third Edition, MIT Press, 2014
2. Tom M. Mitchell, "Machine Learning", India Edition, 1st Edition, McGraw-Hill Education Private Limited, 2013
3. Saikat Dutt, Subramanian Chandramouli and Amit Kumar Das, "Machine Learning", 1st Edition, Pearson Education, 2019
4. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Revised Edition, Springer, 2016.
5. Aurelien Geron, "Hands – On Machine Learning with Scikit - Learn, Keras, and TensorFlow", 2nd Edition, O'Reilly, 2019
6. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", Second Edition, Chapman and Hall / CRC Machine Learning and Pattern Recognition Series, 2014.



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24MC204	ADVANCED JAVA	L	T	P	C
		4	0	0	4
OBJECTIVES:					
<ul style="list-style-type: none"> • To understand the fundamentals of web programming and client-side scripting. • To learn server-side development using servlets , web sockets. • To learn the Spring framework and build applications using Spring. • To learn and implement the concept of Java Persistence API. • To learn the advanced client side scripting and framework 					
UNIT-1	INTRODUCTION TO OOPS CONCEPTS	12			
Introduction to Java – version – Data types – Control Statements – Function Arrays – Multidimensional Array - Introduction to oops – objects – class – Inheritance – Polymorphism – Abstraction – Encapsulation – Exception Handling – Exception Handling Mechanism – try, catch, throws – Threading – Multithreading – Streams – IO Streams – Byte Array Streams – Buffered Streams – Files – Introduction to Utility Packages					
UNIT - II	INTRODUCTION TO WEB &SERVER – SIDE PROGRAMMING	12			
Introduction to Web: Server - Client - Communication Protocol (HTTP), Fetch API – Storage: Local Storage, Cookies, Indexed DB, JSON- Web Server: Web Containers - Web Components, Servlet : Lifecycle - Request – Servlet Context - Response - Filter - Session - Dispatching Requests					
UNIT-III	SPRING	12			
Spring Configuration and Spring Boot, Spring MVC, Spring Bean Lifecycle – Dispatcher Servlet and Configuration - Interceptors – Annotations, Controllers - Views - Input Validation -File Upload Container Dependency and IOC.					
UNIT-IV	AOP AND JAVA PERSISTENCE API	12			
Aspect Oriented Programming (AOP) - Entity: Basic, Embeddable and Collection Types - Identifiers - Entity Relationship - Inheritance, Persistence Context and Entity Manager, JPQL, Criteria API, Spring Data JPA - Specification and Projection.					
UNIT-V	ADVANCED SPRING PROGRAMMING	12			
Spring Boot JDBC - Spring Boot Actuator - Spring Cloud -Spring Boot Testing - Spring Security Architecture, Spring Cache – Building RESTful Web Services					
TOTAL : 60 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Describe the OOPs concepts- UNIT-I (K2)					
CO2: Develop server side Web Application - UNIT-II (K3)					
CO3: Develop Web Application using Spring. - UNIT-III (K3)					
CO4: Use Java Persistence API to develop Java application. - UNIT-IV (K3)					
CO5: Develop a full-stack Single Page Application using React, Spring and JPA. - UNIT-V (K3)					

REFERENCES:

1. David Flanagan, "Java Script: The Definitive Guide", O'Reilly Media, Inc, 7th Edition, 2020
2. Matt Frisbie, "Professional JavaScript for Web Developers", Wiley Publishing, Inc, 4th Edition, ISBN: 978-1-119-36656-0, 2019
3. Alex Banks, Eve Porcello, "Learning React", O'Reilly Media, Inc, 2nd Edition, 2020
4. David R. Heffelfinger, "Java EE 8 Application Development", Packt Publishing, First Edition 2017
5. Benjamin Muschko, "Gradle in Action", Manning Publications, First edition 2014
6. Iuliana Cosmina, Rob Harrop, Chris Schaefer, Clarence Ho, "Pro Spring 5: An In-Depth Guide to the Spring Framework and Its Tools", Apress, Fifth edition 2017

A handwritten signature in black ink on a light purple rectangular background. The signature appears to be "M. R. Lang" written in a cursive style.

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24MC2L1	DATA STRUCTURES AND ALGORITHMS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To develop skills in design and implementation of data structures and their applications
- To learn and implement linear, non linear and tree data structures
- To study, implement and analyze the sorting technique.
- To implement some common algorithm design techniques

LIST OF EXPERIMENTS:

1. Stack ADT implementation – Array implementation
2. Infix to postfix conversion
3. Queue ADT implementation – Linked list implementation
4. Singly Linked List operations
5. Binary Tree implementation.
6. Binary Search tree implementation
7. Graph Traversals (Breadth First and Depth First search)
8. Minimum Spanning Tree Implementation (Prim’s and Kruskal’s)
9. Merge Sort –Divide and Conquer
10. Knapsack Problem – Greedy method
11. Warshall’s Algorithm for finding transitive closure using Dynamic programming

TOTAL: 60 PERIODS

SOFTWARE REQUIREMENTS

1. Code Blocks / C Compiler

OUTCOMES:

Upon Completion of the Course, the Students will be able to:

- CO1: Demonstrate** the various Linear Data Structures –[K3]
CO2: Demonstrate Tree Operations - [K3]
CO3: Demonstrate Graph Operations- [K3]
CO4: Apply different sorting techniques-[K3]
CO5: Apply Greedy method to find the shortest path problem - [K3]



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24MC2L2	ADVANCED JAVA LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To implement the client-side scripting
- To implement server-side development using servlets, web sockets.
- To build applications using Spring.
- To implement the concept of Java Persistence API.
- To development the advanced client-side scripting and framework.

LIST OF EXPERIMENTS:

1. Create an event registration application using JavaScript. It should implement different widgets for registration form and registered records view using tabs. It should perform the form validation.
2. Create a JavaScript application in an Object-Oriented way using Classes and Modules. It should also use browser storage for persistence
3. Build a web application using Gradle. The server side of the application should implement RESTful APIs using Servlet and do necessary logging. The client side of the application should be a single page Application which consumes the RESTful APIs through AJAX.
4. Build a chat application using WebSocket.
5. Create a Spring MVC application. The application should handle form validation, file upload, session tracking.
6. Implement a RESTful Spring Boot application using Spring REST, Spring Security and Spring Cache.
7. Design a system using JPA and Hibernate. The system should have multiple entities and relationships between the entities. The database schema should be generated through Hibernate .Provide RESTful endpoints for CRUD operations for the defined entities. Also, support pagination and searching using JPA's JPQL and Criteria API.
8. Create a Spring RESTful Application with Spring Data JPA. Support pagination and searching using Specifications.
9. Create a React application with different components and interactions between the components.
10. Develop a full-stack application using React and Spring. Make use of Spring REST, Spring Security, Spring Data JPA, Hibernate, Spring Boot, Gradle and React JS state and component mechanism

TOTAL: 60 PERIODS

SOFTWARE REQUIREMENTS

1. JAVA Spring Boot, JAVA Hibernate, JAVA Restful Services, TOMCAT Server
Visual Code, IntelliJ

OUTCOMES:

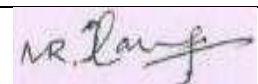
Upon Completion of the Course, the Students will be able to:

- CO1: Develop** the client side of the web application. – **(K3)**
CO2: Develop and deploy server-side applications using J2EE. - **(K3)**
CO3: Use Spring Boot framework in web development. -**(K3)**
CO4: Develop database systems in both NoSQL and SQL environments. -**(K3)**
CO5: Develop a full stack single page application using React, Spring Boot, and a Database and test using gradle. - **(K3)**



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24MC2L3	MACHINE LEARNING LABORATORY	L	T	P	C
		0	0	4	2
<p>OBJECTIVES:</p> <ul style="list-style-type: none"> • To understand about data cleaning and data preprocessing • To familiarize with the Supervised Learning algorithms and implement them in practical situations. • To familiarize with unsupervised Learning algorithms and carry on the implementation part. • To involve the students to practice ML algorithms and techniques. • Learn and use algorithms for real time datasets. 					
<p>LIST OF EXPERIMENTS:</p> <ol style="list-style-type: none"> 1. Demonstrate how do you structure data in Machine Learning 2. Implement data preprocessing techniques on real time dataset 3. Implement Feature subset selection techniques 4. Demonstrate how will you measure the performance of a machine learning model 5. Write a program to implement the naïve Bayesian classifier for a sample training dataset. Compute the accuracy of the classifier, considering few test data sets. 6. Write a program to construct Bayesian network considering medical data. Use this model to Demonstrate the diagnosis of heart patients using the standard Heart Disease Data Set. 7. Apply EM algorithm to cluster a set of data stored in a CSV file. 8. Write a program to implement k-Nearest Neighbor algorithm to classify the dataset. 9. Apply the technique of pruning for a noisy data monk2 data, and derive the decision tree from this data. Analyze the results by comparing the structure of pruned and unpruned tree. 10. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate datasets 11. Implement Support Vector Classification for linear kernels. 12. Implement Logistic Regression to classify problems such as spam detection. 					
<p>TOTAL: 60 PERIODS</p>					
<p>SOFTWARE REQUIREMENTS</p> <ol style="list-style-type: none"> 1. Jupyter Notebook, Python -3.12.6 , Google Colab 2. Any ML Tools like R 					
<p>OUTCOMES:</p> <p>Upon Completion of the Course, the Students will be able to:</p> <p>CO1: Apply data preprocessing technique and explore the structure of data to prepare for predictive modeling [K3]</p> <p>CO2: Understand how to select and train a model and measure the performance. [K2]</p> <p>CO3: Apply feature selection techniques in Machine Learning [K3]</p> <p>CO4: Construct Bayesian Network for appropriate problem [K3]</p> <p>CO5: Learn about parametric and non- parametric machine learning algorithms and Apply to Practical situations. [K3]</p>					



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24MC2L4	COMMUNICATION SKILLS LABORATORY - II	L	T	P	C
		0	0	2	1
<p>OBJECTIVES:</p> <ul style="list-style-type: none"> • To provide opportunities to learners to practice their communication skills to make them Become proficient users of English. • To enable learners to fine-tune their linguistic skills (LSRW) with the help of Technology to Communicate globally. • To enhance the performance of learners at placement interviews and group discussions and other recruitment procedures 					
<p>1. SOFT SKILLS</p> <ul style="list-style-type: none"> • People skills • Interpersonal skills • Team building skills • Leadership skills • Problem solving skills <p>2. PRESENTATION SKILLS</p> <ul style="list-style-type: none"> • Preparing slides with animation related to the topic • Introducing oneself to the audience • Introducing the topic • Presenting the visuals effectively –5 minute presentation <p>3. GROUP DISCUSSION SKILLS</p> <ul style="list-style-type: none"> • Participating in group discussions • Brainstorming the topic • Activities to improve GD skills. <p>4. INTERVIEW SKILLS</p> <ul style="list-style-type: none"> • Interview etiquette –dress code –body language • Attending job interviews • Answering questions confidently • Technical interview –telephone/Skype interview • Emotional and cultural intelligence • Stress Interview 					
<p>TOTAL: 30 PERIODS</p>					
<p>REFERENCES / MANUALS / SOFTWARE: Open Sources / websites</p> <p>OUTCOMES: Upon Completion of the Course, the Students will be able to:</p> <p>CO1: Students will be able to make presentations and participate in Group discussions with confidence.</p> <p>CO2: Students will be able to perform well in the interviews.</p> <p>CO3: Students will make effective presentations.</p>					



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24MC301	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To provide a strong foundation on fundamental concepts in Artificial Intelligence. To enable Problem – solving through various searching techniques. To apply Knowledge Representation in AI techniques. To provide Reasoning and Planning techniques in detail. To know the various Learning Techniques in detail. 					
UNIT - I	INTRODUCTION				9
AI Problems-Underlying Assumption- AI Technique - Level of the model- AI Applications Intelligent Agents- Agents and Environments- Good Behavior: The concept of Rationality- Nature of Environments- Task Environments.					
UNIT - II	PROBLEM SOLVING BY SEARCH TECHNIQUES				9
Defining Problem as a State Space Search- Production Systems- Problem Characteristics - Production System Heuristic Search Techniques-Generate and Test – Hill Climbing- Best-First search- The A* Algorithm – Problem Reduction- The AO* Algorithm					
UNIT - III	KNOWLEDGE REPRESENTATION				9
Knowledge Representation - Representations and Mapping- Approaches to knowledge representations- Using Predicate Logic- Representing simple facts in logic- Representing Instance and ISA Relationships- Computable functions and predicates- Representing knowledge using Rules- Procedural versus Declarative knowledge					
UNIT - IV	REASONING AND PLANNING				9
Forward versus Backward Reasoning- Symbolic Representation under Uncertainty- Non monotonic Reasoning- Logics for Non monotonic Reasoning- Implementation issues- Implementation: Depth First Search, Breadth-First Search- Planning- Overview- An Example Domain – Components of a Planning system					
UNIT - V	LEARNING				9
Learning-Forms of Learning-Supervised Learning- Role Learning- Learning by taking advice- Learning by parameter adjustment-- Learning from Examples - Induction, Winston’s Learning Program- Learning Decision Trees- Explanation based Learning- Analogy-Online Learning					
TOTAL:45PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Determine the basic and fundamental of Artificial Intelligence Techniques – UNIT – I – (K3)					
CO2: Use different problem – solving approach to AI problems. – UNIT – II – (K3)					
CO3: Use different knowledge representation schemes for typical AI problems. – UNIT – III – (K3)					
CO4: Construct the various Reasoning and Planning Techniques. - - UNIT – IV – (K3)					
CO5: Solve AI Problem using different Learning Techniques – UNIT –V – (K3)					

REFERENCES:

1. Stuart J. Russell and Peter Norvig—Artificial Intelligence: A Modern Approach, Pearson Edition, Third Edition, 2022
2. Elaine Rich and Kevin Knight, Artificial Intelligence, Third Edition, Tata McGraw-Hill, 2010.
3. Patrick H. Winston. "Artificial Intelligence", Third edition, Pearson Edition, 2006.
4. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI, 2006.
5. Nils J. Nilsson, Artificial Intelligence: A new Synthesis, Harcourt Asia Pvt. Ltd., 2000.
6. I. Bratko, Prolog: Programming for Artificial Intelligence, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011. Gerhard Weiss, Multi Agent Systems, Second Edition, MIT Press, 2013.

A handwritten signature in black ink on a light purple rectangular background. The signature appears to be "N.R. Rang".

DIRECTOR / MCA

24MC302	CLOUD COMPUTING	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> • To understand the basic concepts of Distributed systems. • To learn about the current trend and basics of Cloud computing. • To be familiar with various Cloud concepts. • To expose with the Server, Network and storage virtualization. • To be aware of Micro services and DevOps. 					
UNIT - I	DISTRIBUTED SYSTEMS				9
Introduction to Distributed Systems – Characterization of Distributed Systems – Distributed Architectural Models –Remote Invocation – Request-Reply Protocols – Remote Procedure Call – Remote Method Invocation – Group Communication – Coordination in Group Communication – Ordered Multicast – Time Ordering – Physical Clock Synchronization – Logical Time and Logical Clocks.					
UNIT - II	BASICS OF CLOUD COMPUTING				9
Cloud Computing Basics – Desired features of Cloud Computing – Elasticity in Cloud – On demand provisioning - Applications – Benefits – Cloud Components: Clients, Datacenters & Distributed Servers – Characterization of Distributed Systems – Distributed Architectural Models - Principles of Parallel and Distributed computing - Applications of Cloud computing – Benefits –Cloud services – Open-source Cloud Software: Eucalyptus, Open Nebula, Open stack, Aneka, Cloud Sim.					
UNIT - III	CLOUD INFRASTRUCTURE				9
Cloud Architecture and Design – Architectural design challenges – Technologies for Network based system - NIST Cloud computing Reference Architecture – Public, Private and Hybrid clouds– Cloud Models :IAAS, PAAS and SAAS– Cloud storage providers – Enabling Technologies for the Internet of Things – Innovative Applications of the Internet of Things.					
UNIT - IV	CLOUD ENABLING TECHNOLOGIES				9
Service Oriented Architecture – Web Services – Basics of Virtualization – Emulation – Types of Virtualization – Implementation levels of Virtualization – Virtualization structures – Tools & Mechanisms – Virtualization of CPU, Memory & I/O Devices – Desktop Virtualization – Server Virtualization – Google App Engine – Amazon AWS - Federation in the Cloud.					
UNIT - V	MICROSERVICES AND DEVOPS				9
Defining Micro services - Emergence of Micro service Architecture – Design patterns of Micro services – The Mini web service architecture – Micro service dependency tree – Challenges with Micro services - SOA v Micro service – Micro service and API – Deploying and maintaining Micro services – Reason for having DevOps– Overview of DevOps– Core elements of DevOps– Life cycle of DevOps–Adoption of DevOps - DevOps Tools – Build, Promotion and Deployment in DevOps.					
TOTAL : 45 PERIODS					

OUTCOMES:

Upon Completion of the Course, the Students will be able to:

CO1: Use Distributed systems in Cloud Environment. **-UNIT – I - (K3)**

CO2: Demonstrate the main concepts, key technologies, strengths and limitations of Cloud Computing.
UNIT – II - (K3)


CO3: Identify the Architecture, Infrastructure and delivery models of Cloud computing- **UNIT– III- (K3)**

CO4: Choose and use the appropriate current technology for the implementation of Cloud-**UNIT – IV- (K3)**

CO5: Demonstrate Micro services and DevOps in Cloud environments. **-UNIT – V - (K3)**

REFERENCES:

1. Kai Hwang, Geoffrey C. Fox & Jack J. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, First Edition, 2012
2. Andrew S. Tanenbaum & Maarten Van Steen, "Distributed Systems - Principles and Paradigms", Third Edition, Pearson, 2017.
3. Thomas Erl, Zaigham Mahood & Ricardo Puttini, "Cloud Computing, Concept, Technology & C Architecture", Prentice Hall, Second Edition, 2013.
4. Richard Rodger, "The Tao of Micro services", ISBN 9781617293146, Manning Publications, First Edition, December 2017.
5. Magnus Larsson, "Hands-On Micro services with Spring Boot and Spring Cloud: Build and Deploy Micro services using spring cloud, Istio and Kubernetes", Packt Publishing Ltd, First Edition, September 2019
6. Jim Lewis, "DEVOPS: A complete beginner's guide to DevOps best practices", ISBN-13:978-1673259148, ISBN-10: 1673259146, First Edition, 2019



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24MC303	FOUNDATIONS OF DATA SCIENCE	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To impart knowledge and explore the need of Data Science Apply various statistics measures in Data Science Data manipulation using Python Correlation and Regression analysis Data visualization using Python 					
UNIT - I	BASICS OF DATA SCIENCE				9
Need for data science – benefits and uses – facets of data – data science process – setting the research goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – build the models – presenting and building applications					
UNIT – II	STATISTICS				9
Frequency distributions – Outliers – relative frequency distributions – cumulative frequency distributions – frequency distributions for nominal data – interpreting distributions – graphs – averages – mode – median – mean – averages for qualitative and ranked data – describing variability – range – variance – standard deviation – degrees of freedom – inter quartile range –variability for qualitative and ranked data					
UNIT – III	DATA MANIPULATION USING PYTHON				9
Basics of NumPy arrays – aggregations – computations on arrays – comparisons, masks, Boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – hierarchical indexing – combining datasets – aggregation and grouping – pivot tables					
UNIT – IV	NORMAL DISTRIBUTION, CORRELATION & REGRESSION ANALYSIS				9
Normal distributions – z scores – normal curve problems – finding proportions – finding scores – correlation – scatter plots – correlation coefficient for quantitative data – computational formula for correlation coefficient – regression – regression line – least squares regression line					
UNIT – V	DATA VISUALIZATION USING PYTHON				9
Visualization with matplotlib – line plots – scatter plots – visualizing errors – density and contour plots – histograms, binnings, and density – three-dimensional plotting – geographic data – data analysis using stats models and seaborn – graph plotting using Plotpy – interactive data visualization using Bokeh					
					TOTAL:45 PERIODS

OUTCOMES:

Upon Completion of the Course, the Students will be able to:

CO1: Apply the skills of data inspecting and cleansing -**UNIT – I - (K3)**

CO2: Determine the relationship between data dependencies using statistics - **UNIT – II - (K3)**

CO3: Use Python tools to handle data -**UNIT – III - (K3)**

CO4: Classify the relationship between the variables using statistical techniques - **UNIT – IV- (K3)**

CO5: Use Python tools to visualize the data - **UNIT – V - (K3)**

Text Book:

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, “Introducing Data Science”, Manning Publications, 2016. (Unit – I)
2. Robert S. Witte and John S. Witte, “Statistics”, 11th Edition, Wiley Publications, 2017. (Unit – II, IV)
3. Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 2016. (Unit – III, V)

Reference Book:

1. Uma Maheswari, R. Sujatha, “Introduction to Data Science – Practical Approach with R and Python”, Wiley, 2021.
2. Nicholas J. Horton, Ken Kleinman,” Using R and RStudio for Data Management, Statistical Analysis, and Graphics”, CRC Press, Second edition, 2015.
3. John Main Donald, W. John Braun,” Data Analysis and Graphics Using R: An Example-Based Approach”, University Press, Cambridge, Third edition, 2010.
4. K.G. Srinivasa, G. M. Siddesh, ChetanShetty, “Statistical Programming in R”, Oxford University Press, New Delhi, 2017.

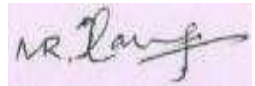


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24MC304	SECURITY IN COMPUTING	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To understand the basics of cryptography Learn to find the vulnerabilities in programs and to overcome them, Know the different kinds of security threats in networks and its solution Know the different kinds of security threats in databases and solutions available Learn about the models and standards for security. 					
UNIT - I	ELEMENTARY CRYPTOGRAPHY				9
Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms – Data Encryption Standard – AES Encryption Algorithm – Public Key Encryption – Cryptographic Hash Functions – Key Exchange – Digital Signatures – Certificates					
UNIT – II	PROGRAM SECURITY				9
Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code – Controls Against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project Flaws – Common Weakness Enumeration Most Dangerous Software Errors					
UNIT – III	SECURITY IN NETWORKS				9
Threats in networks – Encryption – Virtual Private Networks – PKI – SSH – SSL –IPSec – Content Integrity – Access Controls – Wireless Security – Honey pots – Traffic Flow Security – Firewalls – Intrusion Detection Systems–Secure e-mail.					
UNIT – IV	SECURITY IN DATABASES				9
Security requirements of database systems – Reliability and Integrity in databases –Redundancy – Recovery – Concurrency / Consistency – Monitors – Sensitive Data – Types of disclosures – Inference – finding and confirming SQL injection					
UNIT – V	SECURITY MODELS AND STANDARDS				9
Secure SDLC –Secure Application Testing – Security architecture models – Trusted Computing Base Bell-LaPadula Confidentiality Model – Biba Integrity Model – Graham-Denning Access Control Model – Harrison-Ruzzo - Ulman Model – Secure Frameworks – COSO – CobiT – Compliances – PCIDSS–SecurityStandards-ISO27000 family of standards–NIST.					
					TOTAL: 45 PERIODS
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Demonstrate cryptographic algorithms for encrypting and decryption for secure data transmission – UNIT –I – (K2)					
CO2: Discuss the importance of Digital signature for secure - documents exchange – UNIT – II – (K2)					
CO3: Determine the program threats for good programming practice – UNIT–III –(K3)					
CO4:Apply data vulnerability and SQL injection – UNIT –IV –(K3)					
CO5:Develop the knowledge of security models and published standards– UNIT –V –(K3)					

REFERENCES:

1. Charles P.Pfleeger, Shari Lawrence P.Pfleeger, "Security in Computing", Fourth Edition, Pearson Education, 2007.
2. Michael Whitman, Herbert J.Mattord, "Management of Information Security", Third Edition, Course Technology, 2010.
3. William Stallings, "Cryptography and Network Security: Principles and Practices", Fifth Edition, Prentice Hall, 2010.
4. Michael Howard, David LeBlanc, John Viega, "24 Deadly Sins of Software Security: Programming Flaws and How to Fix Them", First Edition, McGraw Hill Osborne Media, 2009.
5. Matt Bishop, "Computer Security: Art and Science", First Edition, Addison-
6. Wesley, 2002.
7. https://www.owasp.org/index.php/Top_10_2010
8. https://www.pci security standards.org/security_standards/pci_dss.shtml
9. <http://cwe.mitre.org/top25/index.html>
10. Justin Clarke "SQL injection Attacks and defense" Elsevier, 2012



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24MC3L1	FULL STACK DEVELOPMENT LABORATORY	L	T	P	C
		0	0	4	2
OBJECTIVES: <ul style="list-style-type: none"> To implement the client side of the web application using JavaScript. To understand Java Script on the desktop using Node JS. To develop a web application using NodeJS and Express. To implement a SPA using React. To develop a full stack single page application using React, NodeJS, and a Database (MongoDB or SQL). 					
LIST OF EXPERIMENTS: <ol style="list-style-type: none"> Create a form and validate the contents of the form using JavaScript. Get data using Fetch API from an open-source endpoint and display the contents in the form of a card. Create a NodeJS server that serves static HTML and CSS files to the user without using Express. Create a NodeJS server using Express that stores data from a form as a JSON file and displays it in another page. There direct page should be prepared using Handlebars. Create a NodeJS server using Express that creates, reads, updates and deletes students' details and stores them in MongoDB database. The information about the user should be obtained from a HTML form. Create a NodeJS server that creates, reads, updates and deletes event details and stores them in a MySQL database. The information about the user should be obtained from a HTML form. Create a counter using ReactJS Create a To do application using ReactJS. Store the data to a JSON file using a simple NodeJS server and retrieve the information from the same during page reloads. Create a simple Sign up and Login mechanism and authenticate the user using cookies. The user information can be stored in either MongoDB or MySQL and the server should be built using NodeJS and Express Framework. Create and deploy a virtual machine using a virtual box that can be accessed from the host computer using SSH. Create a docker container that will deploy a NodeJS ping server using the NodeJS image. 					
TOTAL: 60 PERIODS					
SOFTWARE REQUIREMENTS: <ol style="list-style-type: none"> NodeJS /Express JS, ReactJS, Docker, any IDE like NOTEPAD++/visual studio code /sublime text etc., MySQL, MongoDB 					

OUTCOMES:

Upon Completion of the Course, the Students will be able to:

CO1: Develop and deploy the client side of the web application. - **(K3)**

CO2: Develop and deploy server side applications using NodeJS.- **(K3)**

CO3: Use Express framework in web development. – **(K3)**

CO4: Develop an architect database systems in both NoSQL and SQL environments. – **(K3)**

CO5: Develop a full stack single page application using React, NodeJS, and a Database
And deploy using containers.- **(K3)**



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24MC3L2	CLOUD COMPUTING LABORATORY	L	T	P	C
		0	0	4	2
<p>OBJECTIVES:</p> <ul style="list-style-type: none"> • Be exposed to tool kits for cloud and Hadoop environment. • Be familiar with migration of Virtual Machines from one node to another • Learn to run virtual machines of different configuration. • Learn to use Hadoop Distributed File System (HDFS) to set up single and multi-node clusters. 					
<p><u>List of Experiments:</u></p> <ol style="list-style-type: none"> 1. Find procedure to run the virtual machine of Ubuntu configuration. 2. Find procedure to run the virtual machine of Windows-10 configuration 3. Install a C compiler in the virtual machine and execute any 'C' programs. 4. Find procedure to run the virtual machine of Windows - XP Configuration. 5. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine. 6. Find procedure to run the virtual machine configuration in Hyper-V 7. Find procedure to install storage controller (Disk Management) and interact with it. 8. Show the virtual machine migration based on the certain condition from one node to another 9. Use any open-source cloud software to run real time applications. (Eucalyptus, FUSE) 10. Setup Azure Devops 					
					TOTAL:60 PERIODS
<p>SOFTWARE REQUIREMENTS</p> <ol style="list-style-type: none"> 1. VM Ware Workstation Pro, Hyper –V, Devops 					
<p>OUTCOMES:</p> <p>Upon Completion of the Course, the Students will be able to:</p> <p>CO1: Use various virtualization tools such as Virtual box/VMware workstation. (K3)</p> <p>CO2: Apply C Compiler in Virtual Machine for various C Programs. (K3)</p> <p>CO3: Design and Implement applications on the Cloud environment. (K3)</p> <p>CO4: Experiment with Hadoop cluster concept (K3)</p> <p>CO5: Use the map reduce tasks and implement for various applications. (K3)</p>					



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24MC2E1	FUNDAMENTALS OF VIRTUAL REALITY	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To understand the basic functioning of virtual Reality systems. To understand the concepts of Geometric modeling and Geometrical Transformations To learn Animating the Virtual Environment. To learn applications of Virtual Environment. To understand various types of Hardware's and software's in virtual Reality systems 					
UNIT-I	INTRODUCTION				9
Virtual Reality & Virtual Environment : Introduction – Computer graphics – Real time computer graphics – Flight Simulation – Virtual environments –requirement – benefits of virtual reality- 3D Computer Graphics : Introduction – The Virtual world space – positioning the virtual observer – the perspective projection – Human vision – stereo perspective projection – 3D clipping – Colour theory – Simple 3D modeling – Illumination models – Reflection models – Shading algorithms					
UNIT-II	GEOMETRIC MODELING GEOMETRICAL TRANSFORMATIONS				9
Geometric Modeling: Introduction – From 2D to 3D – 3D space curves – 3D boundary representation - Geometrical Transformations: Introduction – Frames of reference – Modeling transformations – Instances – Picking – Flying – Scaling the VE – Collision detection - A Generic VR system: Introduction – The virtual Environment					
UNIT – III	VIRTUAL ENVIRONMENT				9
Animating the Virtual Environment: Introduction – The dynamics of numbers – Linear and Non-linear interpolation - The animation of objects – linear and non-linear translation - shape & object in betweening – freeform deformation – particle system- Physical Simulation: Introduction – Objects falling in a graphical field –Rotating wheels – Elastic collisions – projectiles – simple pendulum – springs – Flight dynamics of an aircraft					
UNIT – IV	VR HARDWARES & SOFTWARES				9
Human factors : Introduction – the age- the ear- the somatic senses - VR Hardware : Introduction – sensor hardware – Head-coupled displays –Aquatic hardware – Integrated VR systems-VR Software: Introduction – Modeling virtual world –Physical simulation- VR toolkits – Introduction to VRML					
UNIT – V	VR APPLICATION				9
Introduction – Engineering – Entertainment – Science – Training – The Future: Introduction – Virtual environments – modes of interaction					
TOTAL: 45 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Develop 3D virtual environments. UNIT – I (K3)					
CO2: Develop 3D interaction techniques. UNIT – II (K3)					
CO3: Develop immersive virtual reality applications. UNIT – III(K3)					
CO4: Select types of Hardware's and software's in virtual Reality systems. UNIT – IV(K3)					
CO5: Develop and design research ideas and results UNIT – V(K3)					

Text Book:

1. John Vince, "Virtual Reality Systems ", Pearson Education Asia, 2002 Reference Book:
2. Adams, "Visualizations of Virtual Reality", Tata McGraw Hill, 2000.
3. Grigore C. Burdea, Philippe Coiffet , "Virtual Reality Technology" , Wiley Interscience, Edition,1994.
4. William R. Sherman, Alan B. Craig, "Understanding Virtual Reality: Interface, Application, and Design", Morgan Kaufmann, 1st Edition, 2002.

Extensive Reading:

- www.vresources.org
- www.vrac.iastate.edu
- www.w3.org/Markup/VRML/




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24MC2E2	MOBILE COMPUTING	L	T	P	C
		3	0	0	3
OBJECTIVES: <ul style="list-style-type: none"> Learn the Mobile Computing Architecture concept. To learn the basic concepts, aware of the GSM, GPRS Architecture. To have an exposure about wireless protocols -WLAN, Bluetooth, WAP. To Know the Mobile IP Network Layer of Mobile communication To understand the concept of Mobile Transport Layer 					
UNIT – I	WIRELESS COMMUNICATION FUNDAMENTALS	9			
Mobile Computing Architecture –Signal Propagation-Frequency Spectrum – Multiplexing – Spread spectrum – GSM vs CDMA – Comparison of 2G3G, 4G — MAC Protocols — SDMA – TDMA - FDMA-CDMA					
UNIT – II	MOBILE TELECOMMUNICATION SYSTEM	9			
Global System for Mobile Communications (GSM) – GSM Architecture - GSM Entities - GSM Addresses and Identifiers - Mobility Management - General Packet Radio Service (GPRS) and Packet Data Network - GPRS Network Architecture - GPRS Network Operations - Data Services and Applications for GPRS					
UNIT – III	MOBILE WIRELESS SHORT - RANGE NETWORKS	9			
Introduction - WLAN Equipment - WLAN Topologies - WLAN Technologies - IEEE 802.11 Architecture WLAN MAC – Security of WLAN Power Management – Bluetooth Architecture Bluetooth enabled Devices Network – Layers in Bluetooth Protocol – Security in Bluetooth					
UNIT – IV	MOBILE IP NETWORK LAYER	9			
IP and Mobile IP network layers - Goals, Assumptions and Requirements - Mobile IP Architecture- Packet delivery and Handover Management- Location Management- Registration- Tunneling and Encapsulation- Route Optimization.					
UNIT – V	TRANSPORT LAYER AND APPLICATION LAYERS	9			
Conventional TCP/IP Transport Layer Protocols – UDP - TCP Data Flow Control - Congestion Control - Classical TCP Improvements - Indirect TCP- Snooping TCP- Mobile TCP-Transaction Oriented TCP-Wireless Application Protocol (WAP)- Architecture-Wireless Datagram Protocol (WDP)-Wireless Transport Layer Security (WTLS)					
TOTAL: 45 PERIODS					
OUTCOMES: Upon Completion of the Course, the Students will be able CO1: Discuss the basic concept of Mobile Computing Architecture – UNIT – I – (K3) CO2:Illustrate the concept of GSM Architecture and GPRS Architecture – UNIT – II – (K3) CO3:Apply the WLAN Equipment, Topologies and their Technologies for short range Networks UNIT– III – (K3) CO4:Use Packet Delivery and Hand over Management in IP Network Layer- – UNIT – IV – (K3) CO5:Compare the different types of TCP – UNIT – V – (K3)					

REFERENCES:

1. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal – Mobile Computing II, Tata McGraw Hill
Pub Aug– 2010
2. Raj Kamal – Mobile Computing II Oxford Higher Education, Second Edition, 2012
3. Pei Zheng, Larry L. Peterson, Bruce S. Davie, Adrian Farrell – Wireless Networking
Complete Morgan Kaufmann Series in Networking, 2009 (Introduction, WLAN MAC)
4. Vijay K Garg – Wireless Communications & Networking Morgan Kaufmann Series, 2010
5. Jochen Schiller – Mobile Communications, Pearson Education second Edition, 2009
6. William Stallings, Wireless Communication and Networks, Pearson Education, 2009.
7. C. Siva Ram Murthy and B. S. Manoj, Ad Hoc Wireless Networks, Pearson Education, 2004.



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24MC2E3	ACCOUNTING AND FINANCIAL MANAGEMENT	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To understand the basic principles of Double entry system and preparation of balance sheet. To understand the process of estimating the cost of a particular product. To Prepare the estimate for various business activities such as purchase, sale, production and cash budgets To ensure decision making process of an organization. 					
UNIT – I	FINANCIAL ACCOUNTING				9
Meaning and Scope of Accounting – Principles – Concepts – Conventions - Accounting Standards-Final Accounts – Trail Balance – Trading Account – Profit and Loss Account – Balance Sheet – Accounting Ratio Analysis – Funds Flow Analysis – Cash Flow Analysis					
UNIT – II	ACCOUNTING				9
Meaning – Objectives - Elements of Cost - Cost Sheet - Marginal Costing and Cost Volume Profit Analysis – Break Even Analysis – Applications – Limitations –Standard Costing and Variance Analysis – Material – Labor – Overhead – Sales – Profit Variances					
UNIT – III	BUDGETS AND BUDGETING CONTROL				9
Budgets and Budgetary Control – Meaning – Types – Sales Budget – Production Budget –Cost of Production Budget - Flexible Budgeting - Cash Budget – Master Budget - Zero Base Budgeting – Computerized Accounting.					
UNIT – IV	INVESTMENT DECISION AND COST OF CAPITAL				9
Objectives and Functions of Financial Management – Risk - Return Relationship - Time Value of Money Concepts - Capital Budgeting - Methods of Appraisal - Cost of Capital Factors Affecting Cost of Capital - Computation for Each Source of Finance and Weighted Average Cost of Capital.					
UNIT – V	FINANCING DECISION AND WORKING CAPITAL MANAGEMENT				9
Capital Structure – Factors Affecting Capital Structure – Dividend Policy –Types of Dividend Policy – Concepts of Working Capital – Working Capital Policies –Factors affecting Working Capital – Estimation of Working Capital Requirements					
TOTAL : 45 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Calculate to understand the balance sheet preparation and do analysis – UNIT –I –(K3)					
CO2: Compute the budget preparation and control of a company – UNIT –II –(K3)					
CO3: Derive the state of affairs of a particular firm /company. – UNIT –III –(K3)					
CO4: Develop the fiscal policies of the organization. – UNIT –IV –(K3)					
CO5: Compute the factors to be considered in investment policies. – UNIT –V –(K3)					

REFERENCES:

1. Aswat Damodaran, "Corporate Finance Theory and Practice", John Wiley & Sons, 2008
2. Brigham, Ehrhardt, "Financial Management Theory and Practice" 11th Edition, Cengage Learning, 2008
3. I.M. Pandey, "Management Accounting", Vikas Publishing House Pvt. Ltd., 3rd Edition, 2009
4. I.M. Pandey, "Financial Management", Vikas Publishing House Pvt. Ltd., 9th Edition, 2009
5. M.Y. Khan and P.K. Jain, "Financial Management, Text, Problems and Cases", Tata McGraw Hill, 5th Edition, 2008
6. S.N. Maheswari, "Financial and Management Accounting", Sultan Chand & Sons, 5th edition, 2010
7. Srivatsava, Mishra, "Financial Management", Oxford University

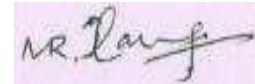


DIRECTOR / MCA

24MC2E4	SOFT COMPUTING TECHNIQUES	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> • To gain knowledge of soft computing theories and its fundamentals. • To design a soft computing system required to address a computational task. • To learn and apply artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms in problem solving and use of heuristics based on human experience. • To introduce the ideas of fuzzy sets, fuzzy logic and to become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems. • To familiarize with genetic algorithms and other random search procedures while seeking global optimum in self – learning situations 					
UNIT – I	FUZZY COMPUTING				9
Basic Concepts of Fuzzy Logic, Fuzzy Sets and Crisp Sets, Fuzzy Set Theory and Operations, Properties of Fuzzy Sets, Fuzzy and Crisp Relations, Fuzzy to Crisp Conversion Membership Functions, Inference in Fuzzy Logic, Fuzzy If – Then Rules, Fuzzy Implications and Fuzzy Algorithms, Fuzzification and Defuzzification, Fuzzy Controller, Industrial Applications.					
UNIT – II	FUNDAMENTALS OF NEURAL NETWORKS				9
Neuron, Nerve Structure and Synapse, Artificial Neuron and its Model, Activation Functions, Neural Network Architecture: Single Layer and Multilayer Feed Forward Networks, Recurrent Networks. Various Learning Techniques; Perception and Convergence Rule, Auto-Associative and Hetero-Associative Memory					
UNIT – III	BACKPROPAGATION NETWORKS				9
Back Propagation (Networks) Architecture: Perceptron Model, Solution, Single Layer Artificial Neural Network, Multilayer Perception Model; Back Propagation Learning Methods, Effect of Learning Rule Co – Efficient; Back Propagation Algorithm, Factors Affecting Back Propagation Training, Applications					
UNIT – IV	COMPETITIVE NEURAL NETWORKS				9
Kohonen's Self Organizing Map – SOM Architecture, learning procedure – Application; Learning Vector Quantization – learning by LVQ; Adaptive Resonance Theory – Learning procedure – Applications.					
UNIT – V	GENETIC ALGORITHM				9
Basic Concepts, Working Principle, Procedures of GA, Flow Chart of GA, Genetic Representations, (Encoding) Initialization and Selection, Genetic Operators, Mutation, Generational Cycle, Applications					
TOTAL : 45 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Demonstrate Fuzzy set theory – UNIT –I-(K2)					
CO2: Derive neural networks to pattern classification and regression problems using a soft computing approach – UNIT –II-(K3)					
CO3: Apply ANN Back propagation algorithm for classification – UNIT III –(K3)					
CO4: Develop applications using neural networks – UNIT IV – (K3)					
CO5: Apply genetic algorithms to optimization problems – UNIT V – (K3)					

REFERENCES:

1. J.S.R. Jang, C.T. Sun and E. Mizutani, "Neuro – Fuzzy and Soft Computing", Pearson Education, 2004.
2. S. Rajasekaran and G.A. VijayalakshmiPai, "Neural Networks, Fuzzy Systems and Evolutionary Algorithms: Synthesis and Applications", PHI Learning, 2nd Edition, 2017.
3. S.N. Sivanandam, S. N. Deepa, "Principles of Soft Computing", Third Edition, Wiley, 2018.
4. Simon Haykin, "Neural Networks and Learning Machines", Pearson, 3rd Edition, 2009.
5. Timothy Ross, "Fuzzy Logic with Engineering Applications", Wiley Publications, 4 th Edition 2016.

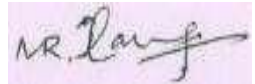


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24MC2E5	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To understand the various number systems To become familiar with Boolean algebra To study the different types of combinational and sequential circuits To comprehend the basis operations that happen in a CPU To learn the Computer Architecture and Parallel Processing To become familiar with the Memory Architecture and I/O Systems 					
UNIT – I	DIGITAL FUNDAMENTALS				9
Number Systems and Conversions – Complements – SOP, POS - Boolean Algebra and Simplifications - Minimization of Boolean Functions – Karnaugh Map, QuinMc Clusky Method. Logic Gates –NAND NOR implementation.					
UNIT – II	COMBINATIONAL AND SEQUENTIAL CIRCUITS				9
Design of Circuits – Adder/ Subtractor – Encoder – Decoder – MUX/DEMUX – Flip flops – Triggering – Master – Slave Flip Flop – State Diagram and Minimization – Registers					
UNIT – III	BASIC STRUCTURE OF COMPUTER				9
Functional Units – Basic Operational Concepts – Bus structures – instruction and instruction sequencing – Hardware Software Interface – Addressing modes – Instruction Sets – RISC and CISC – ALU Design – Fixed point and Floating – point operations					
UNIT – IV	COMPUTER ARCHITECTURE AND PARALLEL PROCESSING				9
Superscalar Architecture – VLIW Architecture – Pipelining and types of Hazards – Parallel Processing – Multiple Processor Organization – Cluster Computer Architecture – Symmetric Multiprocessor					
UNIT – V	MEMORY ARCHITECTURE AND I/O SYSTEMS				9
Parallel Architecture Taxonomy – Shared Memory Architecture – Centralized and Distributed. Memory – Virtual, Cache, Associative -Programmed I/O – DMA and Interrupts – I/O Devices					
					TOTAL:45 PERIODS
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Solve using laws of Boolean algebra and Karnaugh map method – UNIT – I – (K3)					
CO2: Construct various combinational and sequential circuits - UNIT – II – (K3)					
CO3: Determine the various addressing modes - UNIT – III – (K3)					
CO4: Classify the various Computer Architecture techniques. UNIT – IV – (K3)					
CO5: Analyze the various Memory Architecture and I/O systems - UNIT –V – (K4)					

REFERENCES:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, fifth edition, -Computer Organization II
Tata McGraw Hill, 2015
2. David A.Patterson and John L.Hennessy, -Computer Organization and Design,
Fourth Edition Morgan Kaufmann Publishers, 2011.
3. William Stallings, Computer Organization & Architecture, Tenth Edition, Pearson Education, 2015.
4. M.Morris Mano & Michael B.Cilepti, Digital Design II, Fourth Edition, Pearson Education, 2011.
5. M.Morris Mano, -Computer System Architecture II, Third Edition, Prentice Hall of India, 2009.
6. B.Govindarajalu – Computer Architecture and Organization – Design Principles and Applications Tata
McGraw Hill Publishing Company Limited. 2014
7. K.A. Parthasarathy, A. Ramachandran, R. Purushothaman Advanced Computer Architecture
Second Edition Tata McGraw Hill, 2015.




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24MC2E6	OPERATIONS RESEARCH	L	T	P	C	
		3	0	0	3	
OBJECTIVES:						
<ul style="list-style-type: none"> To understand, develop and solve mathematical model of linear programming problems. To understand, develop and solve mathematical model of Transport and assignment problems. To understand network modeling for planning and scheduling the project activities. 						
UNIT – I	LINEAR PROGRAMMING MODELS					9
Mathematical Formulation – Graphical Solution of linear programming models – Simplex method – Artificial variable Techniques.						
UNIT – II	TRANSPORTATION AND ASSIGNMENT MODELS					9
Mathematical formulation of transportation problem – Methods for finding initial basic feasible solution – optimum solution – degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm.						
UNIT – III	INTEGER PROGRAMMING MODELS					9
Formulation – Gomory’s IPP method – Gomory’s mixed integer method – Branch and bound technique.						
UNIT – IV	SCHEDULING BY PERT AND CPM					9
Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling.						
UNIT – V	QUEUEING MODELS					9
Characteristics of Queuing Models – Poisson Queues - (M/M/ 1): (FIFO/ ∞ /∞), (M/ M/1) : (FIFO/N/∞),(M /M/C):(FIFO/∞/∞),(M /M/C):(FIFO/N/∞) models.						
TOTAL : 45 PERIODS						
OUTCOMES:						
Upon Completion of the Course, the Students will be able to:						
CO1: Apply simplex method to solve LPP– UNIT – I – (K3)						
CO2: Solve transportation and assignment problem– UNIT –II-(K3)						
CO3: Solve pure and mixed IPP– UNIT – III –(K3)						
CO4: Determine the critical path and PERT calculation of the project network – UNIT – IV-(K3)						
CO5: Classify the various queuing models using single, multiple server, finite and Infinite Capacity - UNIT-V- (K3)						

REFERENCES:

1. Taha H.A., "Operations Research: An Introduction "8th Edition, Pearson Education,2008
2. N. DVohra, "Quantitative Techniques in Management", Tata McGraw Hill,2010
3. Gross, D. and Harris, C.M., "Fundamentals of Queueing Theory", Wiley Student,3rd Edition, New Jersy, 2004
4. A.M. Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2005
5. Prem kumar Gupta, D.S. Hira, "Operations Research", S. Chand & Company Ltd, NewDelhi,3rd Edition, 2008



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24MC2E7	SERVICE ORIENTED ARCHITECTURE	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To provide fundamental concepts of xml and web services To understand Service Oriented Architecture and its principles. To gain knowledge about WS standards To be familiar with building application based on SOA To learn SOA support in .NET and J2EE 					
UNIT – I	XML AND WEBSERVICES				9
Introduction - XML document structure – Well formed and valid documents – Namespaces – DTD – XML Schema – Parsing XML – using DOM, SAX – XML Transformation and XSL – XSL Formatting – Web service architecture – Overview					
UNIT – II	SOA BASICS				9
Characteristics of SOA, Comparing SOA with Client - Server and Distributed architectures – Benefits of SOA — Principles of Service orientation – Service layers.					
UNIT – III	WEB SERVICE STANDARDS				9
Descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Service - Level Interaction Patterns – Orchestration and Choreography					
UNIT – IV	BUILDING SOA - BASED APPLICATIONS				9
Service Oriented Analysis and Design – Service Modeling – Design standards and guidelines — Composition – WS - BPEL – WS-Coordination – WS-Policy – WS-Security					
UNIT – V	SOA SUPPORT IN J2EE				9
SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC) - Web Services Interoperability Technologies (WSIT)					
TOTAL : 45 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Illustrate the need of various XML Technologies in SOA – UNIT – I –(K3)					
CO2: Demonstrate the Serviced Oriented Architecture and the composition of Web Service in it UNIT –II –(K3)					
CO3: Illustrate how the various Web Service Standards are related to each other in SOA UNIT –III–(K3)					
CO4:Build SOA based Applications – UNIT – IV –(K3)					
CO5:Construct web services according to user needs using J2EE – UNIT – V –(K3)					

REFERENCES:

1. Thomas Erl, - Service - Oriented Architecture: Concepts, Technology, and DesignII, Pearson Education, 2006.
2. Heather Williamson, - XML, The Complete Referencell, McGraw Hill Education, 2012.
3. Frank. P. Coyle, —XML, Web Services and The Data RevolutionII, Pearson Education, 2002.
4. Sandeep Chatterjee, James Webber, —Developing Enterprise Web Services. An Architect's Guidell, Pearson Education, 2005
5. Newcomer, Lomow, —Understanding SOA with Web ServicesII, Pearson Education, 2005

A handwritten signature in black ink on a light purple rectangular background. The signature appears to be "N.R. Rao" with a stylized flourish at the end.

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24MC2E8	BUSINESS DATA ANALYTICS	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To understand the basics of business analytics and its lifecycle. To gain knowledge about fundamental business analytics. To learn modeling for uncertainty and statistical inference. To understand analytics using Hadoop and Map Reduce frameworks. To acquire insight on other analytical frameworks. 					
UNIT – I	OVERVIEW OF BUSINESS ANALYTICS				9
Introduction – Drivers for Business Analytics – Applications of Business Analytics : Marketing and Sales, Human Resource, Healthcare, Product Design, Service Design, Customer Service and Support – Skills Required for a Business Analyst – Framework for Business Analytics Life Cycle for Business Analytics Process.					
UNIT – II	ESSENTIALS OF BUSINESS ANALYTICS				9
Descriptive Statistics – Using Data – Types of Data – Data Distribution Metrics: Frequency, Mean, Median, Mode, Range, Variance, Standard Deviation, Percentile, Quartile, z-Score, Covariance, Correlation – Data Visualization: Tables, Charts, Line Charts, Bar and Column Chart, Bubble Chart, Heat Map – Data Dashboards.					
UNIT – III	MODELING UNCERTAINTY & STATISTICAL INFERENCE				9
Modeling Uncertainty: Events and Probabilities – Conditional Probability – Random Variables – Discrete Probability Distributions – Continuous Probability Distribution –Statistical Inference: Data Sampling – Selecting a Sample – Point Estimation – Sampling Distributions – Interval Estimation –Hypothesis Testing.					
UNIT – IV	ANALYTICS USING HADOOP AND MAPREDUCE FRAMEWORK				9
Introducing HADOOP – RDBMS versus HADOOP – HADOOP Overview – HDFS (HADOOP Distributed File System) – Processing Data with HADOOP – Introduction to Map Reduce – Features of Map Reduce – Algorithms Using Map - Reduce: Matrix – vector Multiplication, Relational Algebra Operations, Grouping and Aggregation – Extensions to Map Reduce					
UNIT – V	OTHER DATA ANALYTICAL FRAMEWORKS				9
Overview of Application development Languages for HADOOP – Pig Latin – Hive – Hive Query Language (HQL) – Introduction to Pentaho, JAQL – Introduction to Apache: Sqoop, Drill and Spark, Cloudera Impala – Introduction to NoSQL Databases – HBase and MongoDB.					
TOTAL : 45 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Identify the real-world business problems and model with analytical solutions. – UNIT – I (K3)					
CO2: Solve analytical problems with relevant mathematics background knowledge. – UNIT –II –(K3)					
CO3: Identify any real-world decision-making problem to hypothesis and apply suitable Statistical testing. – UNIT – III –(K3)					
CO4: Demonstrate simple applications involving analytics using HADOOP and Map Reduce UNIT- IV(K3)					
CO5: Use open-source frameworks for modeling and storing data. – UNIT – V –(K3)					

REFERENCES:

1. U. Dinesh Kumar, "Business Analytics: The Science of Data-Driven Decision Making", Wiley, First Edition, 2017.
2. Umesh RHodeghatta, Umesha Nayak, "Business Analytics Using R–A Practical Approach", Apress, First Edition 2017.
3. Jeffrey D.Camm, James J.Cochran, Michael J.Fry, Jeffrey W.Ohlmann, David R.Anderson, "Essentials of Business Analytics", Cengage Learning, second Edition, 2016.
4. RuiMiguel Forte, "Mastering Predictive Analytics with R", Packt Publication, First Edition 2015.
5. Vignesh Prajapati, "Big Data Analytics with Rand Hadoop", Packt Publishing, First Edition 2013.
6. Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, First Edition 2012.
6. A.Ohri, "R for Business Analytics", Springer, First Edition, 2012



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24MC3E1	SOFTWARE TESTING AND QUALITY ASSURANCE	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> • To know the behavior of the testing techniques and to design test cases to detect the errors in the software • To get insight into the levels of testing in the user environment • To understand standard principles to check the occurrence of defects and its removal. • To learn the functionality of automated testing tools to apply in the specialized environment. • To understand the models and metrics of software quality and reliability. 					
UNIT – I	TESTING TECHNIQUES & TEST CASE DESIGN				9
Using White Box Approach to Test design - Test Adequacy Criteria – Static Testing Vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White box Based Test Design – Code Complexity Testing – Evaluating Test Adequacy Criteria. Test Case Design Strategies –Using Black Box Approach to Test Case Design – Random Testing – Requirements based testing–Boundary Value Analysis – Decision tables – Equivalence Class Partitioning – State - based testing – Cause-effect graphing – Error guessing – Compatibility testing – User documentation testing – Domain testing – Case study for Control Flow Graph and State –based Testing.					
UNIT – II	LEVELS OF TESTING				9
The Need for Levels of Testing - Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording Results – Integration Tests – Designing Integration Tests – Integration Test Planning – Scenario Testing – Defect Bash Elimination. System Testing – Acceptance testing – Performance testing – Regression Testing - Internationalization testing - Ad-hoc testing – Alpha, Beta Tests- Testing OO systems –Usability and Accessibility Testing – Configuration Testing – Compatibility Testing –Testing the documentation – Website Testing – Case Study for Unit and Integration Testing.					
UNIT – III	TESTING FOR SPECIALIZED ENVIRONMENT				9
Testing Client/Server Systems – Testing in a Multiplatform Environment – Testing Object - Oriented Software – Object Oriented Testing – Testing Web based systems – Web based system – Web Technology Evolution – Traditional Software and Web based Software – Challenges in Testing for Web-based Software – Quality Aspects – Web Engineering –Testing of Web based Systems. Case Study for Web Application Testing					
UNIT – IV	TEST AUTOMATION				9
Selecting and Installing Software Testing Tools – Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges In Automation – Tracking the Bug – Debugging – Case study using Bug Tracking Tool.					
UNIT – V	SOFTWARE TESTING AND QUALITY METRICS				9
Six-Sigma – TQM - Complexity Metrics and Models – Quality Management Metrics - Availability Metrics - Defect Removal Effectiveness - FMEA - Quality Function Deployment – Taguchi Quality Loss Function – Cost of Quality. Case Study for Complexity and Object					
TOTAL: 45 PERIODS					

OUTCOMES:

Upon Completion of the Course, the Students will be able to:

CO1: Apply various testing techniques to test the software. - **UNIT –I-(K3)**

CO2: Determine the method to debug the project. - **UNIT –II-(K3)**

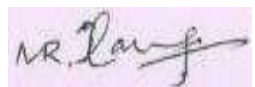
CO3: Use various automation tools to test the applications in the specialized environment- **UNIT –III-(K3)**

CO4: Determine bug tracking tools to test the web applications - **UNIT –IV-(K3)**

CO5: Determine quality and reliability metrics to ensure the performance of the software- **UNIT –V-(K3)**

REFERENCES:

1. Adithya P.Mathur, “Foundations of Software Testing – Fundamentals algorithms and techniques”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008
2. Boris Beizer, “Software Testing Techniques”, Dream Tech Press, 2009
3. Dale H.Bester filed, “Total Quality Management”, Pearson Education Asia, Third Edition, Indian Reprint (2011).
4. EdwardKit, “Software Testing in the Real World – Improving the Process”, Pearson Education, 1995
5. Glenford J. Myers, Tom Badgett, Corey Sandler, “The Art of Software Testing”, 3rdEdition,John Wiley & Sons Publication, 2012
6. Illene Burnstein, “Practical Software Testing”, Springer International Edition, Chennai, 2003.
7. Naresh Chauhan, “Software Testing Principles and Practices” Oxford University Press, New Delhi,2010
8. Ron Patton, “Software Testing”, Second Edition, Pearson Education, 2009
9. Renu Rajani, Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2004
10. Srinivasan Desikan and Gopaldaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson Education, 2009.
11. StephanKan, “Metrics and Models in Software Quality”, Addison – Wesley, Second Edition, 2004
12. William Perry, “Effective Methods of Software Testing”, Third Edition, Wiley Publishing.

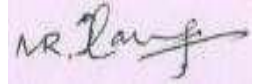


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24MC3E2	FULL STACK DEVELOPMENT	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To understand the fundamentals of web programming and client side scripting. To learn server side development using NodeJS. To understand API development with Express Framework. To understand and architect databases using NoSQL and SQL databases. To learn the advanced client-side scripting and React JS framework 					
UNIT – I	INTRODUCTION TO CSS and JAVASCRIPT				9
Introduction to Web: Server-Client – Communication Protocol (HTTP) – Structure of HTML Documents – Basic Markup tags – Working with Text and Images with CSS – CSS Selectors – CSS Flex box – Java Script : Data types and Variables – Functions - Events – AJAX : GET and POST					
UNIT – II	SERVER-SIDE PROGRAMMING WITH NODEJS				9
Introduction to Web Servers – JavaScript in the Desktop with NodeJS – NPM – Serving files with the http module – Introduction to the Express framework – Server-side rendering with Templating Engines – Static Files – async / await - Fetching JSON from Express					
UNIT – III	ADVANCED NODEJS AND DATABASE				9
Introduction to NoSQL databases – MongoDB system overview - Basic querying with MongoDB shell – Request body parsing in Express – NodeJS MongoDB connection – Adding and retrieving data to MongoDB from NodeJS – Handling SQL databases from NodeJS – Handling Cookies in NodeJS – Handling User Authentication with NodeJS					
UNIT – IV	ADVANCED CLIENT-SIDE PROGRAMMING				9
ReactJS: React DOM – JSX – Components – Properties – Fetch API – State and Life cycle —JS Local storage – Events - Lifting State Up - Composition and Inheritance					
UNIT – V	APP IMPLEMENTATION IN CLOUD				9
Cloud providers Overview – Virtual Private Cloud – Scaling (Horizontal and Vertical) –Virtual Machines, – Docker Container – Kubernetes					
TOTAL : 45 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Develop client side scripting using HTML, CSS and JS.- UNIT – I – (K3)					
CO2: Construct the architect the server side of the web application. – UNIT – II – (K3)					
CO3: Develop web Applications using NodeJS. – UNIT – III – (K3)					
CO4: Construct NoSQL databases with MongoDB. – UNIT – IV – (K3)					
CO5: Develop a full-stack Single Page Application using React, NodeJS and MongoDB and deploy on Cloud. – UNIT – V – (K3)					

REFERENCES:

1. David Flanagan, "Java Script: The Definitive Guide", O'Reilly Media, Inc, 7th Edition, 2020
2. Matt Frisbie, "Professional JavaScript for Web Developers", Wiley Publishing, Inc, 4th Edition, ISBN:978-1-119-36656-0,2019
3. Alex Banks, EvePorcello, "Learning React", O'Reilly Media, Inc,2nd Edition, 2020
4. Marc Wand schneider, "Learning Node", Addison-Wesley Professional, 2nd Edition, 2016
5. JoeBeda, Kelsey High tower, Brend an Burns, "Kubernetes: Up and Running", O'Reilly Media, 1st edition, 2017
6. PaulZikopoulos, Christopher Bienko, Chris Backer, Chris Konarski, Sa I Vennam, "Cloud With out Compromise", O'Reilly Media,1st edition,2021



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24MC3E3	PROFESSIONAL ETHICS IN IT	L	T	P	C
		3	0	0	3
OBJECTIVES: <ul style="list-style-type: none"> • To understand the concepts of computer ethics in the work environment. • To understand the threats in computing environment • To understand the intricacies of accessibility issues • To ensure safe exits when designing the software projects 					
UNIT – I	INTRODUCTION TO ETHICS	9			
Definition of Ethics - Right, Good, Just – The Rational Basis of Ethics – Theories of Right : Intuitionist vs. End – Based vs. Duty – Based - Rights, Duties, Obligations – Theory of Value –Conflicting Principles and Priorities – The Importance of Integrity – The Difference Between Morals, Ethics, and Laws - Ethics in the Business World – Corporate Social Responsibility - Creating an Ethical Work Environment Including Ethical Considerations in Decision Making					
UNIT – II	ETHICS IN INFORMATION TECHNOLOGY, INTERNET CRIME	9			
IT Professionals - Are IT Workers Professionals - Professional Relationships That Must Be Managed – Professional Codes of Ethics – Professional Organizations – Certification – IT Professional Ethics, Three Codes of Ethics, Management Conflicts. The Reveton Ransom Ware Attacks - IT Security Incidents: A Major Concern - Why Computer Incidents Are So Prevalent –Types of Exploits –Types of Perpetrators – Federal Laws for Prosecuting Computer Attacks – Implementing Trust worthy Computing – Risk Assessment – Establishing a Security Policy - Educating Employees and Contract Workers					
UNIT – III	FREEDOM OF EXPRESSION, PRIVACY	9			
First Amendment Rights -Obscene Speech - Defamation - Freedom of Expression : Key Issues - Controlling Access to Information on the Internet - Strategic Lawsuit Against Public Participation (SLAPP)-Anonymity on the Internet - Hate Speech- Privacy Protection and the Law - Information Privacy - Privacy Laws, Applications, and Court Rulings - Key Privacy and Anonymity Issues-Data Breaches – Electronic Discovery – Consumer Profiling – Workplace Monitoring –advanced Surveillance Technology					
UNIT – IV	FREEDOM OF EXPRESSION, INTELLECTUAL PROPERTY RIGHTS	9			
Intellectual Property Rights – Copyrights – Copyright Term - Eligible Works - Fair Use Doctrine – Software Copyright Protection – Copyright Laws and the internet – Copyright and Piracy – Patents - Software Patents – Cross - Licensing Agreements - Trade Secrets - Trade Secret Laws – Employees and Trade Secrets - Key Intellectual Property Issues – Plagiarism – Reverse Engineering – Open – Source Code - Competitive Intelligence - Trademark Infringement - Cyber squatting					
UNIT – V	SOCIAL NETWORKING ETHICS AND ETIQUETTES	9			
Social networking Website – Business Applications of Online Social Networking - Social Network Advertising - The Use of Social Networks in the Hiring Process-Social Networking Ethical Issues – Cyber bullying - Online Virtual Worlds - Crime in Virtual Worlds - Educational and Business Uses of Virtual Worlds					
TOTAL: 45 PERIODS					

OUTCOMES:

Upon Completion of the Course ,the Students will be able to:

CO1: Determine situations and to internalize the need for applying ethical principles, values to tackle various situations. **UNIT I – (K3)**

CO2: Develop are possible attitude towards the use of technology. **UNIT II – (K3)**

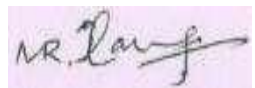
CO3: Compute the societal impact on the products/projects they develop in their career-**UNIT-III– (K3)**

CO4: Demonstrate the code of ethics and standards of computer professionals .**Unit IV – (K3)**

CO5: Identify the Ethical Issues in Social Networking – **UNIT V – (K3).**

REFERENCES:

1. Caroline Whit back, " Ethics in Engineering Practice and Research ", Cambridge University Press, 2ndEdition 2011.
2. George Reynolds, "Ethics in Information Technology", C engage Learning, 6thEdition2018.
3. Barger, Robert. (2008). Computer ethics: A case – based approach. Cambridge University Press1stEdition.
4. John Weckert and Douglas Adeney, Computer and Information Ethics, Greenwood Press, First Edition1997.
5. Penny Duquenoy, Simon Jones and Barry GBlundell, "Ethical, legal and professional Issues in scomputing" , Middlesex University Press, First Edition 2008.
6. Sara Baase, "AGiftofFire:Social,Legal,andEthicalIssuesforComputingTechnology", 4thEdition, Pearson India, 2018.
7. http://www.infosectoday.com/Articles/Intro_Computer_Ethics.html

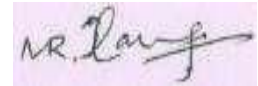


DIRECTOR / MCA

24MC3E4	DEVOPS AND MICRO SERVICES	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To introduce Micro services and Containers. To understand the key concepts and principles of DevOps To be familiar with most common DevOps tools To explain the business benefits of DevOps and continuous delivery. To recall specific DevOps methodologies and frameworks 					
UNIT - I	INTRODUCTION TO MICROSERVICES				9
Definition of Micro services – Characteristics - Micro services and Containers –Interacting with Other Services – Monitoring and Securing the Services – Containerized Services – Deploying on Cloud					
UNIT – II	MICROSERVICES ARCHITECTURE				9
Monolithic architecture – Micro services architectural style - Benefits - Drawbacks of Micro services architectural style – decomposing monolithic applications into Micro services					
UNIT – III	DevOps Tools				9
History of DevOps - DevOps and Software Development Life Cycle – Waterfall Model - Agile Model – DevOps Life Cycle – DevOps Tools: distributed version of control tool Git - Automation testing tools- Selenium – report generation – TestNG – User Acceptance Testing – Jenkins					
UNIT – IV	MICROSERVICES IN DEVOPS ENVIRONMENT				9
Evolution of Micro services and DevOps – Benefits of combining DevOps and Micro services – working of DevOps and Micro services in Cloud environment - DevOps Pipeline representation for a NodeJS based Micro services					
UNIT – V	VELOCITY AND CONTINUOUS DELIVERY				9
Velocity – Delivery Pipeline – test stack - Small/Unit Test – medium/integration testing – system testing – Job of Development and DevOps – Job of Test and DevOps – Job of Op and Devops –Infrastructure and the job of Ops					
					TOTAL: 45 PERIODS
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Select the Micro services design and apply the principles.					
CO2:Apply Micro services in DevOps					
CO3: Understand about DevOps and the common tools used in DevOps.					
CO4: Develop and integrate projects using DevOps					
CO5: Deploy and monitor projects using DevOps					

REFERENCES:

1. Namit Tanasseri, Rahul Rai, Micro services with Azure, 1stEdition, Packt Publishing, UK,2017
2. Eberhard Wolff, Micro services: Flexible Software Architecture,1stEdition, Pearson Education,2017
3. James A Scott, A Practical Guide to Micro services and Containers, Map R Data Technologies – book.<https://mapr.com/ebook/microservices-and-containers/assets/microservices-and-containers.pdf>
4. Joyner Joseph, DevOps for Beginners, First Edition, Mihails Konoplo vs publisher,2015.
5. GeneKim, Kevin Behr, George Spafford, The Phoenix Project, A Novel about IT, DevOps,5th Edition,IT Revolution Press,2018.
6. Michael Hüttermann, DevOps for Developers, 1stEdition, A Press, e-book,2012.



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24MCOE1	SOFTWARE PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> • To know of how to do project planning for the software process. • To learn the cost estimation techniques during the analysis of the project. • To understand the quality concepts for ensuring the functionality of the software • To Analyze Risk Identification and Resource Allocation • To Identify Globalization issues in project management 					
UNIT – I	OVERVIEW OF SOFTWARE PROJECT MANAGEMENT	9			
Introduction to Software Project Management: An Overview of Project Planning: Select Project, Identifying Project scope and objectives, infrastructure, project products and Characteristics. Estimate efforts, identify activity risks, and allocate resources, TQM, Six Sigma					
UNIT – II	EVALUATION AND COSTING OF SOFTWARE	9			
Project Evaluation: Strategic Assessment, Technical Assessment, cost - benefit analysis, Cash flow Fore casting, cost - benefit evaluation techniques, Risk Evaluation. Selection of Appropriate Project approach: Choosing technologies, choice of process models, structured methods.					
UNIT – III	SOFTWARE ESTIMATION TECHNIQUES AND ACTIVITY PLAN	9			
Software Effort Estimation: Problems with over and under estimations, Basis of software Estimation, Software estimation techniques, expert Judgment, Estimating by analogy. Activity Planning: Project schedules, projects and activities, sequencing and scheduling Activities, networks planning models, formulating a network model					
UNIT – IV	RISK MANAGEMENT AND RESOURCE ALLOCATION	9			
Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Critical Paths, Cost scheduling, Monitoring and Control: Creating Framework, cost monitoring, prioritizing monitoring.					
UNIT – V	CHALLENGES IN PROJECT MANAGEMENT	9			
Globalization issues in project management: Evolution of globalization- challenges in building global teams-models for the execution of some effective management techniques for managing global teams. Impact of the internet on project management: Introduction – the effect of internet on project management – managing projects for the internet – effect on project management activities.					
TOTAL: 45 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Demonstrate the software project planning in Detail – UNIT I – K2					
CO2: Determine the cost benefit evaluation techniques – UNIT II – K3					
CO3: Compare the software estimation techniques available in SPM – UNIT III – K3					
CO4: Relate the risk identification and risk analysis – UNIT IV – K3					
CO5: Discuss the globalization challenges in project management – UNIT V – K4					

Text Books:

1. Bob Hughes & Mike Cotterell, "Software Project Management", Tata McGraw- Hill Publications, Fifth Edition 2012
2. Gopalswamy Ramesh, "Managing Global Software Projects", Tata McGraw Hill Publishing Company, 2003
3. Futrell, "Quality Software Project Management", Pearson Education India, 2008

References:

1. Richard H.Thayer "Software Engineering Project Management", IEEE Computer Society
2. S. A. Kelkar," Software Project Management" PHI, New Delhi, Third Edition ,2013 4.
3. http://en.wikipedia.org/wiki/Comparison_of_project_management_software
4. http://www.ogc.gov.uk/methods_prince_2.asp

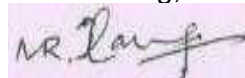


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24MCOE2	CRYPTOCURRENCY AND BLOCKCHAIN TECHNOLOGIES	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> • To understand the basics of Crypto currency • To understand the working of digital tokens and wallets • To understand the working of contracts • To understand the working of block chain platforms 					
UNIT – I	OVERVIEW OF BLOCK CHAIN				9
Why Block chain - The Structure of Block chain - Data Structure of Block chain - Data Distribution in Block chain - Block Validation. Block Validators: Consensus - Proof of Work – Proof of Stake - Proof of Activity - Proof of Elapsed Time - Proof of Burn					
UNIT – II	CRYPTO CURRENCY				9
Bitcoin: Bitcoin Working - Bitcoin Transactions - Bitcoin Mining - Value of Bitcoin - Community, Politics and Regulations – Advantages – Disadvantages. Ethereum: Overview – Decentralized Application. Components of Ethereum: Smart contracts – Ether - Ethereum Clients - Ethereum Virtual Machine – Ether scripiter					
UNIT – III	DEVELOPMENT FRAMEWORKS				9
Digital Tokens: Overview - Initial Coin Offering – Omise GO – EOS – Tether. Meta Mask: Wallet Seed – Meta Mask Transactions. Mist: Overview - Mist wallet. Truffle: Features of Truffle – Development Truffle boxes - Community truffle box.					
UNIT – IV	HYPERLEDGER				9
Hyper ledger Fabric: Introduction - Fabric v/s Ethereum – Hyper ledger Iroha - Features of Iroha. Hyper ledger Sawtooth: Components of sawtooth - Proof of Elapsed time.					
UNIT – V	BLOCK CHAIN PLATFORMS				9
Multi chain – Hydra Chain. Future Block chain: IOTA – Corda - Chain Core. Block chain Framework: CoCo Framework – Tierion – BigchainDB.					
					TOTAL:45 PERIODS
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1:Identify Block Chain as Data structure and Distribution Data - UNIT I – K3					
CO2: Apply the transactions of Crypto currency. – UNIT II – K3					
CO3:Identify the different ways to achieve Block chain Technology- UNIT III – K3					
CO4:Identify and build smart contracts – UNIT IV – K3					
CO5:Use smart contract for real world application in a Block chain Platform. – UNIT V – K3					

REFERENCES

1. Josh Thompson, 'Block chain: The Block chain for Beginnings, Guide to Block chain Technology and Block chain Programming', Create Space Independent Publishing Platform, 1 st Edition, 2017.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and crypto currency technologies: a comprehensive introduction. 1stEdition, Princeton University Press, 2016.
3. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and crypto currency, IEEE Symposium on security and Privacy, 1 st Edition, 2015.
4. Antony Lewis, The Basics of Bitcoin and Block chain: An Introduction to Crypto currencies and the Technology that Powers Them, Mango Publishing group, 2018
5. Tiana Laurence, Introduction to Block chain Technology, 1 st Edition, Van Haren Publishing,2019.



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24MCOE3	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> ○ To expose the students to the concepts of Data ware housing Architecture and Implementation ○ To Understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence ○ To learn to use association rule mining for handling large data ○ To understand the concept of classification for the retrieval purposes ○ To know the clustering techniques in details for better organization and retrieval of data ○ To identify Business applications and Trends of Data mining 					
UNIT – I	DATA WAREHOUSE				9
Data Warehousing - Operational Database Systems vs. Data Warehouses - Multidimensional Data Model – Schemas for Multidimensional Databases – OLAP Operations – Data Warehouse Architecture – Indexing – OLAP queries & Tools.					
UNIT – II	DATA MINING & DATA PREPROCESSING				9
Introduction to KDD process – Knowledge Discovery from Databases – Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.					
UNIT – III	ASSOCIATION RULE MINING				9
Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Item sets with and without Candidate Generation - Mining Various Kinds of Association Rules – Constraint - Based Association Mining.					
UNIT – IV	CLASSIFICATION & PREDICTION				9
Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor.					
UNIT – V	CLUSTERING				9
Cluster Analysis:- Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Outlier Analysis.					
					TOTAL: 45 PERIODS
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Describe techniques to store voluminous data for online processing – UNIT I – (K2)					
CO2: Explain the Preprocessing techniques for mining applications – UNIT II – (K2)					
CO3: Apply the association rules for mining the data – UNIT III – (K3)					
CO4: Develop an deploy appropriate classification techniques – UNIT IV – (K3)					
CO5: Apply Clustering techniques for the high dimensional data– Unit V – (K3)					

REFERENCES:

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques "Second Edition, Elsevier, Reprinted 2008.
2. K.P. Soman, Shyam Diwakar and V. Ajay, "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
4. BERSON, ALEX & SMITH, STEPHEN J, Data Warehousing, Data Mining, and OLAP, TMH Pub. Co. Ltd, New Delhi, 2012
5. Pang-NingTan, Michael Steinbach and VipinKumar, "Introduction to Data Mining", Pearson Education, 2007
6. PRABHU Data Ware housing, PHI Learning Private Limited,NewDelhi,2012,,
7. PONNIAH,PAULRAJ, Data Warehousing Fundamentals, John Wiley & Sons, NewDelhi,2011
8. MARAKAS, GEORGEM, Modern Data Ware housing, Mining, and Visualization, Pearson Education, 2011



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24MCOE4	BIG DATA ANALYTICS	L	T	P	C	
		3	0	0	3	
OBJECTIVES:						
<ul style="list-style-type: none"> To explore the fundamental concepts of big data analytics To learn to analyze the big data using intelligent techniques. To understand the various search methods and visualization techniques. To learn to use various techniques for mining data stream. To understand the applications using Map Reduce Concepts. 						
UNIT – I	INTRODUCTION TO BIG DATA					8
Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data – Analytic Processes and Tools - Analysis vs. Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.						
UNIT – II	MINING DATA STREAMS					9
Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.						
UNIT – III	HADOOP					10
History of Hadoop - The Hadoop Distributed File System – Components of Hadoop - Analyzing the Data with Hadoop - Scaling Out - Hadoop Streaming - Design of HDFS -Java interfaces to HDFS – Basics - Developing a Map Reduce Application - How Map Reduce Works - Anatomy of a Map Reduce Job run – Failures - Job Scheduling - Shuffle and Sort – Task execution - Map Reduce Types and Formats - Map Reduce Features						
UNIT – IV	HADOOP ENVIRONMENT					9
Setting up a HADOOP Cluster - Cluster specification - Cluster Setup and Installation - HADOOP Configuration - Security in HADOOP – Administering HADOOP – HDFS – Monitoring – Maintenance - HADOOP benchmarks - HADOOP in the cloud						
UNIT – V	FRAMEWORKS					9
Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and Zoo Keeper - IBM Info Sphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications						
					TOTAL:45 PERIODS	

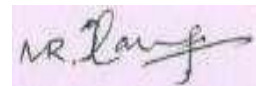
OUTCOMES:

Upon Completion of the Course, the Students will be able to:

- CO1: Demonstrate** big data platforms – **UNIT I (K3)**
- CO2: Illustrate** efficient algorithms for mining the data from large volumes. – **UNIT II (K3)**
- CO3: Determine** HADOOP and Map Reduce technologies associated with big data analytics-**UNIT III (K3)**
- CO4: Develop** Big Data applications Using Pig and Hive – **UNIT IV (K3)**
- CO5: Apply** to various big data analysis techniques – **UNIT V (K3)**

REFERENCES:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Tom White "Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Ziko poulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill Publishing, 2012
4. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
6. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007
7. Pete Warden, "Big Data Glossary", O'Reilly, 2011.
8. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.
9. DaRuan, Guoqing Chen, Etienne E. Kerre, Geert Wets, Intelligent Data Mining, Springer, 2007
10. Paul Ziko poulos, Dirk de Roos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan, Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, 2012
11. Michael Minelli (Author), Michele Chambers (Author), Ambiga Dhiraj (Author), Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, 2013
12. Ziko poulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, 2011




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24AC101	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
		2	0	0	0
OBJECTIVES: This course is intended to provide an integrated framework for the students can able to:					
<ul style="list-style-type: none"> • Understand that how to improve your writing skills and level of readability • Learn about what to write in each section • Understand the skills needed when writing a Title • Ensure the good quality of paper at very first-time submission 					
UNIT – I					4
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.					
UNIT – II					4
Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts and Introduction.					
UNIT – III					4
Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.					
UNIT – IV					4
Key skills are needed when writing a Title, Key skills are needed when writing an Abstract, Key skills are needed when writing an Introduction, Skills needed when writing a Review of the Literature.					
UNIT - V					4
Skills are needed when writing the Methods, Skills needed when writing the Results, Skills are needed when writing the Discussion, Skills are needed when writing the Conclusions.					
UNIT - VI					4
Useful phrases, How to ensure paper is as good as it could possibly be the first-time submission.					

TOTAL: 24 PERIODS

REFERENCES:

1. Robert Gold bort, "Writing for Science", Yale University Press, 2006.
2. Robert A Day and Barbara Gastel, "How to Write and Publish a Scientific Paper", Seventh Edition, Green wood Press, 2011.
3. Nicholas J Higham, "Handbook of Writing for the Mathematical Sciences", Society for Industrial and Applied Mathematics, 1998.
4. Adrian Wall work, "English for Writing Research Papers", Springer, 2011.




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24AC102	DISASTER MANAGEMENT	L	T	P	C
		2	0	0	0
OBJECTIVES: <ul style="list-style-type: none"> Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in 					
UNIT – I	INTRODUCTION				4
Disaster: Definition, Factors and Significance, Difference between Hazard and Disaster. Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.					
UNIT – II	REPERCUSSIONS OF DISASTERS AND HAZARDS				6
Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches. Man-made Disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Out breaks of Disease and Epidemics, War and Conflicts.					
UNIT – III	DISASTER PRONE AREAS IN INDIA				4
Disaster Prone are as in India: Study of Seismic Zones, Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post – Disaster Diseases and Epidemics.					
UNIT – IV	DISASTER PREPAREDNESS AND MANAGEMENT				4
Disaster Preparedness and Management Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard. Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and other Agencies. Media Reports: Governmental and Community Preparedness.					
UNIT - V	RISK ASSESSMENT				6
Risk Assessment Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co - Operation In Risk Assessment and Warning, People’s Participation in Risk Assessment. Strategies for Survival.					

TOTAL: 24 PERIODS

REFERENCES:

1. Nishith Rai and A.K. Singh, "Disaster Management in India: Perspectives, Issues and Strategies", New Royal Book Company, 2007.
2. Pardeep Sahni, Alka Dhameja and Uma Medury, "Disaster Mitigation: Experiences and Reflections", Prentice Hall India Learning Private Limited, 2001.
3. S.L.Goel, "Disaster Administration and Management: Text and Case Studies", Deep & Deep Publication Pvt.Ltd., 2007



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24AC103	SANSKRIT FOR TECHNICAL KNOWLEDGE	L	T	P	C
		2	0	0	0
OBJECTIVES:					
<ul style="list-style-type: none"> • This course is intended to provide an integrated frame work for the students can able to: • Get a working knowledge in illustrious Sanskrit, the scientific language in the world. • Learning of Sanskrit to improve brain functioning. • Learning of Sanskrit to develop the logic in mathematics, science and other subjects enhancing the memory power. • The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature. 					
UNIT – I					8
Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences					
UNIT – II					8
Order, Introduction of roots, Technical information about Sanskrit Literature					
UNIT – III					8
Technical concepts of Engineering - Electrical, Mechanical, Architecture, Mathematics					

TOTAL : 24 PERIODS

REFERENCES:

1. H.R. Vishwas and Samskrita Bharati, "Abhyāsapustakam", Samskrita-Bharti Publication, NewDelhi.
2. Vempati Kutumba Shastri, "Teach Yourself Sanskrit: Prathama Diksha (Sanskrit)", Rashtriya Sanskrit Samsthana, Delhi, 2012.
3. Suresh Soni, "India's Glorious Scientific Tradition", Prabht Prakashan, 2006.



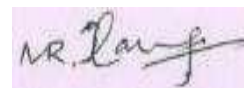
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24AC104	VALUE EDUCATION	L	T	P	C
		2	0	0	0
OBJECTIVES:					
<p>This course is intended to provide an integrated framework for the students can able to:</p> <ul style="list-style-type: none"> • Understand the value of education and self-development. • Imbibe good values in students and Know about the importance of character. • Learn the importance of Human values and developing the overall personality. 					
UNIT – I					6
<p>Values and self – development –Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non-moral Valuation, Standards and Principles, Value judgments.</p>					
UNIT – II					6
<p>Importance of cultivation of values. Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National Unity. Patriotism, Love for nature, Discipline.</p>					
UNIT – III					6
<p>Personality and Behavior Development – Soul and Scientific attitude, Positive Thinking, Integrity and Discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of Labour, Universal brotherhood and religious tolerance, True Friendship, Happiness vs. Suffering, Love for Truth, Aware of Self-Destructive habits, Association and Cooperation, Doing best for saving nature.</p>					
UNIT – IV					6
<p>Character and Competence – Holy books vs. Blind faith, Self – Management and Good health, Science of reincarnation, Equality, Non-violence, Humility, Role of Women, All religions and same message, Mind your Mind, Self - control, Honesty, Studying effectively.</p>					

TOTAL: 24 PERIODS

REFERENCES:

1. S.K. Chakra borty, "Values of Ethics for Organization: Theory and Practice", Oxford University Press, 1999.



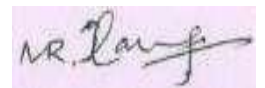
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24AC105	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	0
OBJECTIVES: This course is intended to provide an integrated framework for the students can able to: <ul style="list-style-type: none"> • Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective. • Address the growth of Indian opinion regarding modern Indian intellectuals’ constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism. • Address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution. 					
UNIT – I	HISTORY OF MAKING OF THE INDIAN CONSTITUTION	4			
History, Drafting Committee (Composition and Working)					
UNIT – II	PHILOSOPHY OF THE INDIAN CONSTITUTION	4			
Preamble, Salient Features					
UNIT – III	CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES	4			
<ul style="list-style-type: none"> ➤ Fundamental Rights ➤ Right to Equality ➤ Right to Freedom ➤ Right against Exploitation ➤ Right to Freedom of Religion ➤ Cultural and Educational Rights ➤ Right to Constitutional Remedies ➤ Directive Principles of State Policy ➤ Fundamental Duties 					
UNIT – IV	ORGANS OF GOVERNANCE	4			
<ul style="list-style-type: none"> ➤ Parliament ➤ Composition ➤ Qualifications and Disqualifications ➤ Powers and Functions ➤ Executive ➤ President ➤ Governor ➤ Council of Minister ➤ Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions 					



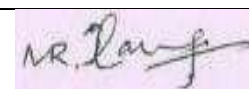
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UNIT-V	LOCAL ADMINISTRATION	4
<ul style="list-style-type: none"> ➤ District's Administration head: Role and Importance ➤ Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation ➤ Pachayatiraj: Introduction ➤ PRI: Zila Pachayat ➤ Elected officials and their roles ➤ CEO Zila Pachayat: Position and role ➤ Block level: Organizational Hierarchy(Different departments) ➤ Village level: Role of Elected and Appointed officials ➤ Importance of grass root democracy 		
UNIT-VI	ELECTION COMMISSION:	4
<ul style="list-style-type: none"> ➤ Election Commission: Role and Functioning ➤ Chief Election Commissioner and Election Commissioners ➤ State Election Commission: Role and Functioning ➤ Institute and Bodies for the welfare of SC/ST/OBC and women 		
TOTAL:24 PERIODS		
REFERENCES:		
<ol style="list-style-type: none"> 1. The Constitution of India, January 1950(Bare Act), Gazette of India. 2. S.N. Busi, "Dr.B.R. Ambedkar Framing of Indian Constitution", Vol.1 to 6, First Edition, 2016. 3. M.P.Jain, Justice Jasti Chelameswar and Justice Dama Seshadri Naidu, "Indian Constitution Law", Lexis Nexis, 2018. 4. D.D. Basu, "Introduction to the Constitution of India", Lexis Nexis, 2011. 		



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24AC106	PEDAGOGY STUDIES	L	T	P	C
		2	0	0	0
<p>OBJECTIVES: This course is intended to provide an integrated framework for the students can able to:</p> <ul style="list-style-type: none"> • Review existing evidence on the review topic to inform programme design and policy making undertaken by the Department for International Development (DFID), other agencies and researchers. • Identify critical evidence gaps to guide the development. • What pedagogical practices are being used by teachers informal and informal class rooms in developing countries? • What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners? • How can teacher education (curriculum and Practicum) and the school curriculum and guidance materials best support effective pedagogy? 					
UNIT-I	INTRODUCTION AND METHODOLOGY				5
<ul style="list-style-type: none"> ➤ Aim sandrationale, Policy background, Conceptual framework and terminology. ➤ Theories of learning, Curriculum, Teacher education. ➤ Conceptual frame work, Research questions. ➤ Overview of methodology and Searching. 					
UNIT-II	THEMATIC OVERVIEW				4
<ul style="list-style-type: none"> ➤ Pedagogical practices are being used by teachers in formal and informal Class rooms in developing countries. ➤ Curriculum, Teacher education. 					
UNIT-III	EVIDENCE ON THE EFFECTIVENESS OF PEDAGOGICAL PRACTICES				5
<ul style="list-style-type: none"> ➤ Methodology for the in depth stage: Quality assessment of included studies. ➤ How can teacher education (Curriculum and Practicum) and the school curriculum and guidance materials best support effective pedagogy? ➤ Theory of change. ➤ Strength and nature of the body of evidence for effective pedagogical practices. ➤ Pedagogic theory and pedagogical approaches. ➤ Teachers' attitudes and beliefs and Pedagogic strategies. 					
UNIT-IV	PROFESSIONAL DEVELOPMENT				5
<ul style="list-style-type: none"> ➤ Alignment with classroom practices and follow-up support. ➤ Peer support. ➤ Support from the head teacher and the community. ➤ Curriculum and Assessment. ➤ Barriers to learning: Limited resources and large class sizes. 					



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UNIT-V	RESEARCH GAPS AND FUTURE DIRECTIONS	5
<ul style="list-style-type: none"> ➤ Research design ➤ Contexts ➤ Pedagogy ➤ Teacher education ➤ Curriculum and assessment ➤ Dissemination and research impact 		
TOTAL : 24 PERIODS		
<p>REFERENCES:</p> <ol style="list-style-type: none"> 1. Jim Ackers and Frank Hardman, "Classroom Interaction in Kenyan Primary Schools", Compare, Vol. 31, No. 2, 2001. pp. 245-261. 2. Mamta Agrawal, "Curricular reform in schools: The importance of evaluation", Journal of Curriculum Studies, Vol. 36, No. 3, 2004. pp. 361-379. 3. Kwame Akyeampong, "Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER), Country Report One, London, DFID, March 2003. 4. Kwame Akyeampong, Kattie Lussier, John Pryor and Jo Westbrook, "Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count?", International Journal of Educational Development, Vol. 33, No. 3, 2013. pp. 272-282. 5. Robin J Alexander, "Culture and Pedagogy: International Comparisons in Primary Education", Wiley-Blackwell, 2001. 6. www.pratham.org/images/resource%20working%20paper%202.pdf. 		



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24AC107	STRESS MANAGEMENT BY YOGA	L	T	P	C
		2	0	0	0
OBJECTIVES:					
This course is intended to provide an integrated framework for the students can able to:					
<ul style="list-style-type: none"> ➤ Achieve overall health of body and mind ➤ Overcome stress ➤ Develop healthy mind in a healthy body thus improving social health also ➤ Improve efficiency 					
UNIT-I	ASHTANGA				8
Definitions of Eight parts of yoga.					
UNIT-II	YAMANDNIYAM				8
Do and Not Do in life					
<ul style="list-style-type: none"> ➤ Ahinsa, Satya, Astheya, Bramhacharya and Aparigraha ➤ Shaucha, Santosh, Tapa, Swadhyay, Ishwarpranidhan 					
UNIT-III	ASANANDPRANAYAM				8
<ul style="list-style-type: none"> ➤ Various yoga poses and their benefits for mind and body ➤ Regularization of breathing techniques and its effects- Types of Pranayam 					
TOTAL: 24 PERIODS					
REFERENCES:					
<ol style="list-style-type: none"> 1. "Yogic Asanas for Group Training - Part-I", Janardan Swami Yogabhyasi Mandal, Nagpur. 2. Swami Vivekananda, "Raja-Yoga or Conquering the Internal Nature", Vedanta Press,1998. 					



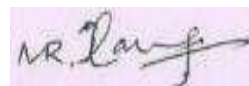
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24AC108	PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	L	T	P	C
		2	0	0	0
OBJECTIVES:					
This course is intended to provide an integrated framework for the students can able to:					
<ul style="list-style-type: none"> ➤ Learn to achieve the highest goal happily ➤ Become a person with stable mind, pleasing personality and determination ➤ Awaken wisdom in students ➤ Study of Shrimad – Bhagwad - Geet a will help the student in developing his personality and achieve the highest goal in life ➤ The person who has studied Geet a will lead the nation and mankind to peace and prosperity • Study of Neetishatakam will help in developing versatile personality of students 					
UNIT – I	NEETISATAKAM – HOLISTIC DEVELOPMENT OF PERSONALITY				8
<ul style="list-style-type: none"> ➤ Verses - 19,20,21,22(Wisdom) ➤ Verses- 29, 31, 32(Pride and Heroism) ➤ Verses-26,28,63,65(Virtue) ➤ Verses-52,53,59 (Dont's) ➤ Verses-71,73,75,78(Do's) 					
UNIT – II	APPROACH TODAY – TO - DAYWORK AND DUTIES: SHRIMADBHAGWADGEETA				8
<ul style="list-style-type: none"> ➤ Chapter2-Verses -41,47,48 ➤ Chapter3-Verses -13,21,27,35 ➤ Chapter6-Verses -5,13,17,23, 35 ➤ Chapter18–Verses -45, 46,48 					
UNIT – III	STATEMENTS OF BASIC KNOWLEDGE: SHRIMAD BHAGWAD GEETA				8
<ul style="list-style-type: none"> ➤ Chapter2-Verses-56, 62,68 ➤ Chapter12-Verses -13,14,15,16,17,18 Personality of role model: Shrimad Bhagwad Geeta ➤ Chapter2-Verses –17 ➤ Chapter3-Verses -36, 37,42 ➤ Chapter4-Verses -18, 38,39 ➤ Chapter18-Verses-37, 38,63 					

TOTAL: 24 PERIODS

REFERENCES:

1. Swami Swarupananda, "Sri madBhagavad Gita", by Advaita Ashram, Kolkata.
2. Pt.Gopinath, "Three Satakam of Bharathari (Niti,Srngara, Vairagya)", Rashtriya Sanskrit Sansthan,2010.



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24MCBC1	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> •To understand the fundamentals of data model sand conceptualize and depict data base System using ER diagram. •To make a study of SQL and relational data base design. •To know about data storage techniques and query processing. •To impart knowledge in transaction processing, concurrency control techniques and recovery Procedures. 					
UNIT-I	INTRODUCTION				9
File systems versus Database systems – Data Models – DBMS Architecture–Data Independence – Data Modeling using Entity – Relationship Model – E – R Modeling.					
UNIT – II	RELATIONAL MODEL AND QUERY EVALUATION				9
Relational Model Concepts – Relational Algebra – SQL– Basic Queries – Complex SQL Queries–Views–Constraints					
UNIT – III	DATA BASE DESIGN & APPLICATION DEVELOPMENT				9
Functional Dependencies – Non – loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/ Codd Normal Form – Multi - valued, Dependencies and Fourth Normal Form.					
UNIT – IV	TRANSACTION PROCESSING				9
Query Processing – Transaction Processing – Properties of Transactions – Serializability – Locking Techniques – Validation Techniques – Recovery concepts – Log Based Recovery.					
UNIT - V	FILES AND INDEXING				9
File operations – Hashing Techniques – Indexing – Single level and Multi-level Indexes–B+ tree – Static Hashing					

TOTAL : 45 PERIODS


COURSE OUTCOMES:

Upon Completion of the course, the students will be able to

- CO1:** Describe the DBMS Architecture and Data Models. – **UNIT I – (K2)**
- CO2:** Demonstrate the use of basic and complex SQL queries –**UNIT II – (K3)**
- CO3:** Apply the concept of normal forms in database design -**UNIT III- (K3)**
- CO4:** Demonstrate the use of transactions, locks and log based recovery - **UNIT IV – (K3)**
- CO5:** Describe in detail hashing and indexing – **UNIT V (K2)**

REFERENCES:

1. Abraham Silberschatz, Henry F.Korth and S.Sundarshan "Database System Concepts", Seventh Edition, McGraw Hill, 2017.
2. Ramez Elmasri and Shamkant Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education Delhi, 2017
3. Raghu Ramakrishnan, — Database Management Systems II, Fourth Edition, McGraw Hill College Publications, 2015.
4. LeeChao, "Database Development and Management", Auerbach Publications, 1st edition, 2010
5. Carlos Coronel, Peter Rob, and Stephen Morris, "Database Principles Fundamentals of Design, Implementation, and Management – 10th Edition", Course Technology, Cengage Learning, 2013
6. C.J.Date, "An Introduction to Database Systems", Eighth Edition, Pearson Education Delhi, 2003



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24MCBC2	PROGRAMMING IN 'C'	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To know the data types supported by C To know the control and looping statements available in C To know how to use pointers in C 					
UNIT-I	INTRODUCTION				9
History of C, Character set, constants, variables, data types, declaration of variables, assigning values to variables, operators, input-output library functions, basic structure of C program, programming examples					
UNIT-II	CONTROL STATEMENTS AND LOOPING STATEMENTS				9
Conditional Control Statements, if, if-else, nested if-else, switch-case, Loop Control Statements, while, do-while, for, Nested Loops, programming examples					
UNIT-III	ARRAYS, STRUCTURES				9
Arrays - Types of arrays - Initialization - Accessing - examples- Structures: Declaration of Structure Variables, Initialization of Structure Variables, Accessing Structure Members, Reading and Displaying Structure Variables, Pointers to structures, Array of structures, Arrays within structures, Nested structures, Programming Example					
UNIT-IV	FUNCTIONS				9
Functions: Parameter Passing Techniques, call by value, call by address, Using Pointers as Arguments, Function Returning value, Functions Returning Address, Function Returning Pointers, Programming examples					
UNIT-V	POINTERS				9
Declaration of Pointer Variables, Assigning Address to Pointer Variables, Pointer to Pointer, Pointer Arithmetic. Programming examples					
TOTAL:45 PERIODS					
COURSE OUTCOMES:					
Upon Completion of the course, the students will be able to					
CO1: Describe the data types & input, output functions. –UNIT – I – (K2)					
CO2: Demonstrate the use of control and looping statements –UNIT – II – (K3)					
CO3: Develop programs using arrays &structures -UNIT – III-(K3)					
CO4: Develop the programs using functions.- UNIT – IV – (K3)					
CO5: Apply the concepts of pointers in C Programs. – UNIT –V (K3)					


REFERENCES:

1. Byron S Gottfried, —Programming with C++, Schaums Outlines, Second Edition, Tata McGraw-Hill, 2006.
2. Brian W. Kernighan and Dennis M. Ritchie, “The C programming Language”,2006, Prentice-Hall.
3. Deitel and Deitel, “C How to Program”, Pearson Education. 2013, 7th Edition.
4. Kamthane, A.N., “Programming with ANSI and Turbo C”, Pearson Education, Delhi, 2006.
5. Mastering C- by K R Venugopal, Sudeep R Prasad McGraw Hill Education (India) Private Limited; Second edition 2015.
6. Pradip Dey, Manas Ghosh, — Computer Fundamentals and Programming in C, Second Edition, Oxford University Press, 2013.
7. Reema Thareja, “Programming in C”, Oxford University Press, 2011.
8. Yashavant Kanetkar, “Understanding Pointers In C”, 4th Revised & Updated Edition, 2011, BPB Publications.



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24MCBC3	MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS	L	T	P	C
		3	0	0	3
OBJECTIVES: <ul style="list-style-type: none"> The primary objective of this course is to provide mathematical background and sufficient experience on various topics of discrete mathematics like matrix algebra, logic and proofs, formal languages and finite state automata. This course will extend student's Logical and Mathematical maturity and ability to deal with abstraction. To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems. 					
UNIT – I	MATRIX ALGEBRA				9
Matrices, Rank of Matrix, Solving System of Equations - Eigen values and Eigen vectors - Inverse of a Matrix.					
UNIT – II	BASIC SET THEORY				9
Basic Definitions - Venn Diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion-Relations-Properties of relations-Matrices of relations.					
UNIT-III	MATHEMATICAL LOGIC				9
Propositions and logical operators-Truth Table-Propositions generated by a set-Equivalence and implication-Basic laws-Some more connectives.					
UNIT-IV	FORMAL LANGUAGES				9
Languages and Grammars-Phrase Structure Grammar-Classification of Grammars-Pumping Lemma For Regular Languages-Context Free Languages.					
UNIT-V	FINITE STATE AUTOMATA				9
Finite State Automata - Deterministic Finite State Automata (DFA), Non - Deterministic Finite State Automata (NFA) - Equivalence of DFA and NFA.					
TOTAL: 45 PERIODS					
OUTCOMES: Upon Completion of the Course, the Students will be able to: <ul style="list-style-type: none"> CO1:Discuss the basic knowledge of matrix, Rank of a matrix – UNIT – I- (K2) CO2:Apply the set theory, function and relations concept needed for designing and solving problems – UNIT – II- (K3) CO3: Predict PCNF&PDNF and its conversion. Apply predict calculus – UNIT – III- (K3) CO4:Analyze the acquired knowledge of formal languages to the engineering areas like compiler design – UNIT – IV- (K4) CO5: Apply finite automata theory and construct NFA, DFA and its conversion. - UNIT – V (K3) 					

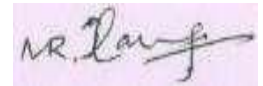


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24MCBC4	BASICS OF COMPUTER NETWORKS	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To understand networking concepts and basic communication model To understand network architectures and components required for data communication. To analyze the function and design strategy of physical, data link, network layer and transport layer To acquire basic knowledge of various application protocol for internet security issues and services. 					
UNIT-I	NETWORK FUNDAMENTALS				9
Uses of Networks – Categories of Networks -Communication model – Data transmission concepts and terminology – Protocol architecture – Protocols – OSI – TCP/IP – LAN Topology-Transmission media.					
UNIT-II	DATA LINK LAYER				9
Data link control – Flow Control – Error Detection and Error Correction – MAC – Ethernet, Token ring – Bluetooth – Bridges.					
UNIT-III	NETWORK LAYER				9
Network layer – Switching concepts – Circuit switching – Packet switching – IP- Data grams – IP addresses- IPV6– Routing Protocols –Distance Vector–Link State.					
UNIT-IV	TRANSPORT LAYER				9
Transport layer – service – Connection establishment – Flow control – Transmission control protocol – Congestion control and avoidance – User datagram protocol.					
UNIT-V	APPLICATIONS AND SECURITY				9
Applications-DNS-SMTP–WWW–SNMP-DES-RSA.					
TOTAL:45 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Describe the network terminology – UNIT – I – (K2)					
CO2: Identify the components required to build different types of networks – UNIT – II- (K3)					
CO3: Demonstrate the functionalities needed for data communication in network layer – UNIT–III- (K3)					
CO4: Illustrate the functionality at Transport layer for given application – UNIT – IV- (K3)					
CO5: Classify the various application protocols and services available. – UNIT – V- (K3)					

REFERENCES:

1. Achyut S Godbole, AtulHahate, " Data Communications and Networks", Second edition2011
2. Andrew S.Tannenbaum David J. Wether all, "Computer Networks" Fifth Edition ,Pearson Education 2011
3. Douglas E. Comer, Internet working with TCP/IP (Volume I) Principles, Protocols and Architecture, Sixth Edition , Pearson Education, 2013.
4. Forouzan, "Data Communication and Networking", Fifth Edition, TMH2012.
5. James F. Kurose, Keith W.Ross, "Computer Networking: A Top- down Approach, Pearson Education, Limited, sixth edition 2012.
6. John Cowley, "Communications and Networking : An Introduction", Springer Indian Reprint,2010.
7. Larry L. Peterson & Bruce S. Davie, "Computer Networks –A systems Approach", Fifth Edition, Morgan Kaufmann, 2012
8. William Stallings, Data and Computer Communications, Tent Edition,PearsonEducation,2013
9. Wayne To masi, "Introduction to Data communications and Networking",Pearson2011



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24MCBC5	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To learn how C++ supports Object Oriented principles such as abstraction, polymorphism etc To understand and apply the principles hiding, localization and modularity in software development. Use the generic programming features of C++. Design and implement reliable and maintainable object-oriented applications of moderate complexity composed of several classes 					
UNIT-I	FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING				9
Object–Oriented Programming concepts – Encapsulation – Programming Elements –Program Structure – Enumeration Types — Functions and Pointers – Function Invocation – Overloading Functions – Scope and Storage Class – Pointer Types – Arrays and Pointers – Call–by–Reference – Assertions.					
UNIT-II	IMPLEMENTING ADTS AND ENCAPSULATION				9
Aggregate Type struct – Structure Pointer Operators – Unions – Bit Fields – Data Handling and Member Functions – Classes – Constructors and Destructors – Static Member – this Pointer – reference semantics – implementation of simple ADTs.					
UNIT-III	POLYMORPHISM				9
ADT Conversions – Overloading – Overloading Operators – Unary Operator Overloading – Binary Operator Overloading					
UNIT-IV	INHERITANCE				9
Derived Class – Typing Conversions and Visibility – Code Reuse – Virtual Functions – Templates and Inheritance – Run–Time Type Identifications – Exceptions – Handlers – Standard Exceptions.					
UNIT IV	TEMPLATES				9
Template Class – Function Templates – RTTI Templates - Class Templates					
					Total : 45 Periods
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Describe the object-oriented programming concepts. – UNIT – I- (K2)					
CO2: Use proper class protection mechanism to provide security. – UNIT – II- (K3)					
CO3: Demonstrate the use of polymorphism in OOPS. – UNIT –III- (K3)					
CO4: Demonstrate the use of Inheritance concepts and exceptions in OOPS – UNIT – IV- (K3)					
CO5: Classify the features of C++ including templates – UNIT – V- (K3)					

Reference Books:

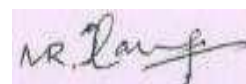
1. HM Deitel and PJ Deitel “C++ How to Program”, Seventh Edition, 2010, Prentice Hall
2. S.B Lippman, Josee, Josee Lajoie, Barbara, “ C++ Premier” 4 Edition, Pearson , 2012
3. E Balagurusamy, “Object oriented Programming with C++”, 3 Edition, 2006, Tata McGraw Hill


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24MCBC6	COMPUTER GRAPHICS AND MULTIMEDIA SYSTEMS	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> To provide knowledge and understanding in the fundamental principles of Computer To understand the basic concepts related to Multimedia Applications 					
UNIT-I	INTRODUCTION	9			
Overview of Graphics System - Line Drawing and Circle Drawing Algorithms - DDA - Line Clipping - Text Clipping.					
UNIT-II	2D TRANSFORMATIONS	9			
Two dimensional transformations – Scaling and Rotations - Interactive Input methods - Window view port mapping transformation.					
UNIT-III	3D TRANSFORMATIONS	9			
3D Concepts - Projections – Parallel Projection - Perspective Projection – Visible Surface Detection Methods					
UNIT-IV	OVERVIEW OF MULTIMEDIA	9			
Multimedia hardware & software - Components of multimedia – Text, Image – Graphics – Audio – Video – Animation – Authoring.					
UNIT-V	MULTIMEDIA SYSTEMS AND APPLICATIONS	9			
Multimedia communication systems – Data base systems – Presentation requirements – Video conferencing – Virtual reality – Interactive video.					
TOTAL : 45 PERIODS					
OUTCOMES:					
Upon Completion of the Course, the Students will be able to:					
CO1: Describe the fundamentals of Graphics System – UNIT – I- (K2)					
CO2: Apply two dimensional transformations in Graphic systems. – UNIT – II- (K3)					
CO3: Apply three dimensional transformations in Graphic systems. – UNIT – III- (K3)					
CO4: Demonstrate the different forms of Multimedia. – UNIT – IV- (K3)					
CO5: Apply the Multimedia communication systems in Multimedia Applications.– UNIT–V- (K3)					

REFERENCES

- Hearn D and Baker M.P, “Computer graphics – C Version”, 2nd Edition, Pearson Education, 2004 (unit 1, 2 &3).
- Ralf Steinmetz, Klara Steinmetz, “Multimedia Computing, Communications and Applications”, Pearson education, 2004 (unit 4 & 5).



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