From
Dr. R.V. Subrahmanya Prasad,
Chairman, BOS in Computer Applications,
Krishna Chaitanya Institute of Science and Technology (A),
Nellore.

To
The Principal,
Krishna Chaitanya Institute of Science and Technology (A),
Kakutur - 524320.

Sir,

Sub. : KIST, Kakutur-BOS Computer Applications- Submission of revised syllabus for UG Major and PG Programs - Reg.

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Under the subject Cited the B.O.S of Computer Applications had met on 01-11-2025 at 03:15 PM in Online to revise the syllabus for UG and PG Major Programs for the Academic Year 2025-2026. I am here with submitting the syllabus for UG Major and PG Programs after the discussion of the BOS by online, confirming the Rules and Regulations laid down by the APSCHE & VSU.

i. **B.C.A / M.C.A. (Dual Degree)**
ii. **M.C.A**

The Revised Syllabus along with Model Papers and signatures of B.O.S members, are Enclosed.

Thanking you,

Dr. R.V. Subrahmanya Prasad
(**Chairman – BoS**)

Members:

1 Prof. M .Padmavatamma
Professor, Department Of Computer Science,
Sri Venkateswara University, Tirupati

2 Prof. N. Geethanjali,
Professor, Department Of Computer Science & Technology, Sri Krishna Devaraya University, Ananthapur.

3 Dr. J. Suresh Babu,
Associate Professor, Department Of Computer Science & Engineering K.L.University,
Guntur.

4 Sri Srihari .Munta,
Managing Director, Munthasoft Technologies Pvt. Ltd
Hyderabad.

5 Sri K. Ananth Kumar,
Senior Software Engineer,
People Combine Basics Pvt. Ltd, Hyderabad.

6 Sri A.V. Phani Kumar

7 Dr.B.Gopi

8 Sri M. Venkatesam

9 Sri N.Venkata Krishna

10 Smt. N. Sumalatha

Krishna Chaitanya Institute of Science & Technology::Kakutur
(AUTONOMOUS)
(Accredited by NAAC, Recognized by UGC Under 2(f), Approved by AICTE & Affiliated to V.S. University, Nellore)

MCA

(Master of Computer Applications)

Course Structure & Syllabus

(2025-26 Academic Year)

(w.e.f AY : 2025-26)

Krishna Chaitanya Institute of Science and Technology, Kakutur

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DEPARTMENT OF COMPUTER APPLICATIONS

COURSE STRUCTURE AND SYLLABUS

FOR

MCA PROGRAMME FOR THE A.Y 2025-2026

MCA I-Semester:

S. No	Course Category	Course Code	Title of the Course	Hours / Week	Credits	SEE	IA	Total
1	Core Course	R25MCA101A	Data Communication and Computer Networks	4	4	70	30	100
2	Core Course	R25MCA102A	Discrete Mathematical Structures	4	3	50	25	75
		R25MCA102B	Data Structure and Algorithms					
3	Core Course	R25MCA103A	Operating Systems	4	3	50	25	75
		R25MCA103B	Design and Analysis of Algorithm					
4	Practical	R25MCA104P	Core course 102 & 103 [Elective Papers only]	6	2	35	15	50
5	Skill Oriented Courses (Elective)	R25MCA105A	Java Full Stack Development	4	3	50	25	75
		R25MCA105B	Ethical Hacking					
6	Skill Oriented Courses (Elective)	R25MCA106A	Adv. Python Programming	4	3	50	25	75
		R25MCA106B	Database Management Systems					
7	Practical	R25MCA107P	Core course 105 & 106 [Elective Papers only]	6	2	35	15	50
8	Open online Trans disciplinary course	R25MCA108M	MOOCs(or)Elective(courses offered by other department)	0	2	70	30	100
9	Audit Course (Elective)	R25MCA109A	Indian History and Culture	4	0	0	0	0
		R25MCA109B	Information Technology Act					
	Total			36	22	410	190	600

Note: Every student should submit the certificate related MOOCs / Open Online Elective on or before the Final year result without fail.

Dr. P... N. Geethanjali ... ... K. Aranth Kumar

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DEPARTMENT OF COMPUTER APPLICATIONS

COURSE STRUCTURE AND SYLLABUS

FOR

MCA PROGRAMME FOR THE A.Y 2025-2026

MCA II-SEMESTER

S. No	Course Category	Course Code	Title of the Course	Hours/ Week	Credits	SEE	IA	Total
1	Core Course	R25MCA201	Enterprise Software Engineering	4	4	70	30	100
2	Core Course (Elective)	R25MCA202A	Artificial Intelligence	4	3	50	25	75
		R25MCA202B	Cryptography and Network Security					
3	Core Course (Elective)	R25MCA203A	Data Science	4	3	50	25	75
		R25MCA203B	Block Chain Technology					
4	Practical	R25MCA204P	Core Course-2 & 3	6	2	35	15	50
5	Skill Oriented Courses (Elective)	R25MCA205A	Dev Ops	4	3	50	25	75
		R25MCA205B	Web Development using .Net Technology					
6	Skill Oriented Courses (Elective)	R25MCA206A	Fundamentals of Quantum Computing Techniques	4	3	50	25	75
		R25MCA206B	User Interface and User Experience (UI&UX) Design					
7	Practical	R25MCA207P	Practical - 4 (Related to SOC 5 & 6)	6	2	35	15	50
8	Open online Trans disciplinary course	R25MCA208M	MOOCs(or) Elective(Courses offered by other department)	0	2	70	30	100
9	Audit Course (Elective)	R25MCA209	Sanskrit and Classical Languages	4	0	0	0	0
			Vedic Mathematics					
	Total			36	22	410	190	600

Note: Every student should submit the certificate related MOOCs / Open Online Elective on or before the Final year result with out fail.

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R25MCA101A	**Data Communications & Computer Networks**	L	T	P	C
		4	0	0	4
Course Objectives	The aim of this course is to help the student : ▪ To attainthefollowingindustryidentifiedOutcomethroughvariousteaching learning experiences. • Manage Data Communication and Computer Networks				
Unit-1	**Fundamentals of Data Communication and Computer Network:** Process of data communication and its components. Standard organizations, Data Transmission Rate, Baud Rate and Bits per second, Modes of Communication: Simplex, Half duplex, Full Duplex. OSI model, TCP/IP model, differences between OSI and TCP/IP model. Signals Digital Signals , Analog signals, Analog To Digital, Digital To Analog Conversion, Network Benefits Classification Of Network: LAN, WAN, MAN and its Network topologies.				
Unit-2	**Transmission Media And Switching:** Communication Media: Guided Transmission Media Twisted-Pair Cable, Coaxial Cable, Fiber-Optic Cable, Unguided Transmission Media:RadioWaves,Microwaves,Infrared,,Line-of-SightTransmission,Point-to-Point, Broadcast, Multiplexing:Frequency-DivisionMultiplexing,TimeDivisionMultiplexing, Switching: Circuit-switched network, Packet switched network.				
Unit-3	**Error Detection and Correction:** Types of Errors, Forward Error Correction Versus Retransmission, Framing: Fixed Sized and Variable Sized Framing, Error Detection: Repetition codes, Parity bits, Checksums, CRC, Error Correction: Automatic Repeat Request (ARQ), Hamming Code, Wireless LAN IEEE 802.11 standard Architecture.				
Unit-4	**Network Communication Models:** THE OSI MODEL : Tcp/Ip layer architecture ,Transport Layer protocols , Application Layer and Protocols: Host To Network Layer-SLIP,PPP, Internet Layer-IP,ARP,RARP,ICMP,FTP,HTTP, SMTP, TELNET DHCP - IPv4Addressarchitecture and classification ,IPV6 Architecture , differences between IPv4 and IPv6.				
Text Books	1. Data Communication and Networking ,Behrouz A.Forouzan,McGraw-HillHigher 2. TCP/IP Protocol Suit, Behrouz A.Forouzan : TCP/IP Protocol Suit, McGraw Hill EducationISBN-13 978-0073376042. 3.ComputerNetworks,A.S.Tanenbaum,PRENTICEHALLISBN-10:0-13-212695-8 ,ISBN13:978-0-13-212695-3.				
Reference Books	1. Data Communication and Networks, God bole Achyut,Mc Graw Hill EducationISBN-10 9780071077705, ISBN-13 978-0071077705. 2. TCP/IP Principles, Protocols and Architectures, Comer Douglas E., PEARSON ISBN 10: 0-13-608530-X ISBN 13: 9780-13-608530-0.				

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Course Outcomes : After completion of the course students are able to

	Course out comes description	knowledge level
CO1	Ability to understand the various hard ware and software Components of computer networks	K1
CO2	Ability to understand the layered [illegible] architecture	K2
CO3	Ability to configure networks and [illegible] issues in networks	K3

K1:Remembering,K2:Understanding,K3:Applying,K4:AnalyzingK5:Evaluating,K6:Creating COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	-	3	-	-	-	-	-	-	-	-	-	2
CO2	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	2	2	-	-	-	-	-	-	-	-	-	-
1-Low,2-Medium, 3-High													

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R25MCA 102B	**Discrete Mathematical Structures**	L	T	P	C
		4	0	0	3
Course Objectives	▪ Introduce the concepts of mathematical logic ▪ Gain knowledge insets, relations and functions ▪ Solve problems counting techniques and combinatory. ▪ To introduce generating functions and recurrence relations. ▪ Use Graph Theory for solving real world problems.				
Unit-1	**Mathematical Logic:** Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Preicate Calculus,Inference theory of Predicate Calculus.				
Unit-2	**Set theory:** Basic Concepts of Set Theory, Relations and Ordering, The Principle of Inclusion-Exclusion,Pigeon hole principle and its application,Functionscompositionoffunctions,Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.				
Unit-3	**Elementary Combinatorics:** Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems. **Recurrence Relations:** Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots, Solutions of Inhomogeneous Recurrence Relations.				
Unit-4	**Graphs:** Basic Concepts, Isomorphism and Sub-graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi graphs and Euler Circuits, Hamiltonian Graphs, Chromatic, The Four Color Problem.				
Text Books	1. JoeL.Mott,Abraham KandelandTheodoreP.Baker,DiscreteMathematicsforComputer Scientists & Mathematicians, 2nd Edition, Pearson Education. 2. J.P.TremblayandR.Manohar,DiscreteMathematical Structures with Applications to				

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	Computer Science, Tata McGrawHill, 2002.
Reference Books	1. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, McGraw Hill Education (India) Private Limited. 2. GraphTheorywithApplicationstoEngineeringandComputerSciencebyNarsinghDeo.

Course Out comes :After completion of the course students are able to

CO1	Make use of mathematical logic to solve problems	knowledge level
CO2	Analyze the concepts and perform the operations related to sets, Relations and functions.	K1
CO3	Identifybasiccountingtechniquestosolvecombinatorialproblems.	K2
CO4	evaluatesolutionsbyusingrecurrence relations	K3
CO5	UtilizeGraphTheoryinsolvingcomputerscienceproblems	K3

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating

COURSEANDPROGRAMMEOUTCOMESMAPPING

CO1	2	3	-	-	-	-	-	-	-	-	3	-	-
CO2	-	3	2	-	-	-	-	-	-	-	2	2	-
CO3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO4	3	-	3	-	-	-	-	-	-	-	-	3	-

1-Low,2-Medium, 3-High

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R25MCA102A	**Data Structures & Algorithms**	L	T	P	C
		4	0	0	3
Course Objectives	▪ To understand the usage of algorithms in computing. ▪ To learn and use hierarchical data structures and its operations ▪ To learn the usage of graphs and its applications. ▪ To select and design data structures and algorithms that is appropriate for problems. ▪ To study about NP Completeness of problems.				
Unit-1	ROLE OF ALCORITHMS IN COMPUTING: Algorithms. Algorithms as a Technology. Insertion Sort, Analyzing Algorithms, Designing Algorithms, Growth of Functions: Asymptotic Notation, Standard Notations and Common Functions, Recurrences: The Substitution Method.				
Unit-2	HIERARCHICAL DATA STRUCTURES: Binary Search Trees: Basics, Querying a Binary search tree, Insertion and Deletion. AVL Trees Different operation, Red-Black trees: Properties ofRed-BlackTrees,Rotations,Insertion.Deletion.B-Trees:DefinitionofB-trees,Basic Operation B-Trees, Deleting a key from a B-Tree.				
Unit-3	Elementary Graph Algorithms: Representations of Graphs, Breadth-First Search, Depth-First Search, Topological Sort. Strongly Connected Components. Minimum Spanning Trees: Growing a Minimum Spanning Tree, Kruskal and Prim, Single Source Shortest Paths: The Bellman-Ford algorithm, Single-Source Shortest paths in Directed Acyclic Graphs,				
Unit-4	ALGORITHM DESIGN TECHNIQUES: Dynamic Programming: Elements of Dynamic Programming,LongestCommonSubsequence.GreedyAlgorithms:AnActivity-Selection Problem. Elements of the Greedy Strategy, Huffman Codes. NPCOMPLETEANDNPHARD:NP-Completeness:PolynomialTime,Polynomial-Time Verification, NP- Completeness and Reducibility, NP-Completeness Proofs. NP-Complete Problems.				
TextBooks	-DataStructuresandAlgorithms, PearsonEducation,AlfredV.Aho,JohnE.Hopcroft,JeffreyD. Ullman Reprint 2006. 2. Robert Sedge wick and Kevin Wayne, ALGORITHMS, Fourth Edition, Pearson Education.				
Reference Books	l."Design and Analysis of Algorithms". BYS.Sridhar,FirstEdition,Oxford University Press. 201 4. 2.ThomasH.Cormen,CharlesE.Leiserson,RonaldL.Rivest,CliffordStein, -Introduction to Algorithms. Third Edition, Prentice-Hall. 201L				

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Course Outcomes :After completion of the course students are able to

	Course out comes description	knowledge level
CO1	Make use of mathematical logic to solve problems	K2
CO2	Analyze the concepts and perform the operations	K3
CO3	Identify basic counting techniques to solve combinatorial problems	K4

K1:Remembering,K2:Understanding,K3:Applying,K4:AnalyzingK5:Evaluating,K6:Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	-	3	-	-	-	-	-	-	-	1	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-	2
CO3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO4	3	-	-	-	-	-	-	-	-	-	-	2	-
1-Low,2-Medium,3-High													

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		L	T	P	C
R25MCA103A	**Operating Systems**	4	0	0	3
Course Objectives	• To understand the fundamental concepts and techniques of Operating Systems. • Tostudytheconceptsinprocessmanagementandconcurrencycontrolmechanisms.. • To understand the concepts in memory managements and deadlocks • To study on file management and storage structures. • Identify the components and management aspects of Real time, Embedded operating Systems.				
Unit-1	**Operating System Overview, Process Description and Control:** Operating System Objectives and Functions, The Evolution of Operating System, Major Achievements, Developments Leading to Modem Operating Systems, Microsoft Windows Overview. Traditional UNIX Systems, Modem UNIX Systems, Linux. Process, Process States, Process Description, Process Control, Execution of the OperatingSystem, Security Issues. UNIX SVR4 Process Management.				
Unit-2	**Threads, SMP, and Microkernel, Virtual Memory:** Processes and Threads, Symmetric Multiprocessing (SMP), Micro kernels, Windows Vista Thread and SMP Hours Management, Linux Process and Thread Management, Hardware and Control structures, Operating System Software, UNIX Memory Management, Windows Vista Memory Management. **Concurrency Mutual Exclusion and Synchronization:** Principles of Concurrency, Mutual Exclusion: Hardware Support, Semaphores, Monitors. Message Passing. Readers/Writers Problem. Concurrency Dead lock and Starvation: Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance. Deadlock Detection. An Integrated Deadlock Strategy.DiningPhilosophersProblem.UNIXConcurrencyMechanisms,LinuxKernelConcurrency Mechanisms,SolarisThreadSynchronization.Primitives.WindowsVistaConcurrencyMechanisms				
Unit-3	**Memory Management:** Memory Management Partitioning ,Paging, Segmentation. Security Issues**. Uni-processor Scheduling:** Types of Scheduling, Traditional UNIX Scheduling. **Multiprocessor and Real-Time Scheduling:** Multiprocessor Scheduling, Real-Time Scheduling, Linux Scheduling, UNIX Precls Sl) Scheduling, Windows Vista Hours Scheduling, Process Migration, Distributed Global States, Distributed Mutual Exclusion, Distributed Deadlocks. **Embedded Operating Systems:** Embedded Systems, Characteristics of Embedded Operating Systems, eCOS, Tiny OS, Computer Security Concepts, Threats,Attacks,andAssets,Intruders,MaliciousSoftwareOverview,Viruses,Worms,andBots, Root kits.				
Unit-4	**Kernel Organization:** Using Kernel Services, Daemons, Starting the Kernel, Control in the Machine , Modules and Device Management, MODULE Organization, MODULE Installation and Removal, Process and Resource Management, Running Process Manager, Creating a new Task , IPC and Synchronization, The Scheduler , Memory Manager , The Virtual Address Space, The Page Fault Handler , File Management. The windows NT/2000/XP kernel: Introduction, The NT kernel, Objects , Threads, Multiplication Synchronization, Traps, Interrupts and Exceptions, The NT executive , Object Manager,ProcessandThreadManager,VirtualMemoryManager,I/oManager,ThecacheManager Kernel local procedure calls and IPC , The native API ,subsystems.				
	1. William Stallings: Operating Systems: Intenals and Design Principles, 6thEdition.PrenticeHall.				
TextBooks	Operating Systems, 3rd Edition, Pearson, 2014.				

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Reference Rooks	1. Silberschatz,Galvin,Gagne:OperatingSystemConcepts,8thEdition,Wiley,2008 2. Andrew S. Tanenbaum, Albert S. Woodhull Operating Systems, Design and implementation, 3rd Edition, Prentice Hall, 2006. 3. Pradeep K Sinha :Distribute Operating Systems, ConceptandDesign,PHI,2007

Course Outcomes: After completion of the course students are able to

	Course out comes description	knowledge level
CO1	Demonstrate the Mutual exclusion ,Dead lock detection of operating system.	K2
CO2	Learn the various resource management techniques for operating systems.	K3
CO3	Identify the different features of real time and mobile operating system.	K4

K1:Remembering,K2:Understanding,K3:Applying,K4:AnalyzingK5:Evaluating,K6:Creating COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	**3**	-	-	-	-	-	-	-	-	-	-	-	**2**
CO2	**3**	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	**3**	-	-	-	-	-	-	-	-	-	-	**2**
CO4	-	**3**	-	-	-	-	-	-	-	-	-	-	-
1-Low,2-Medium, 3-High													

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R25MCA103B	**Design & Analysis of Algorithms**	L	T	P	C
		4	0	0	3
Course Objectives	▪ To understand the usage of algorithms in computing. ▪ To learn and use hierarchical data structures and its operations. ▪ To learn the usage of parallel algorithms and its applications. ▪ To select and design data structures and algorithms that is appropriate for problems. ▪ To study about NP Completeness of problems. ▪ To analyze the running time and space complexity of algorithms.				
Unit-1	**Introduction to Analysis of Algorithms:** Design and analysis fundamentals, Performance analysis: space and time complexity, Growth of a function: Asymptotic notation, Mathematical background for algorithm analysis, Recurrences: Substitution method, Recursion-tree method, Master method, Randomized algorithms. **Advanced Data Structures:** B trees; B+ trees, 2-3 tree operations, Tries, Heap operations, AVL tree, Huffman code, Heap operations, Topological sort, Analysis of all problems.				
Unit-2	**Greedy and Dynamic Algorithms:** Characteristics of greedy algorithms, Problem solving using greedy algorithms: Job scheduling problem, Graph travelling and coloring problem, Knapsack problem, Matrix Chain Multiplication problem, The principle of optimality for dynamic programming, Problem solving using dynamic algorithms: Making change problem, Assembly line scheduling, Knapsack problem, Matrix chain multiplication problem; Analysis of all problems.				
Unit-3	**Parallel Algorithms:** Sequential vs. Parallel Algorithms; Models: Data parallel model, Task graph model, Work pool model, Master slave model, Producer consumer or pipeline model; Hybrid model; Speedup and efficiency; Examples of parallel algorithms: Parallel sorting, Parallel matrix chain multiplication; Analysis of all problems.				
Unit-4	**Applied Algorithms:**String matching algorithms: The naive string-matching algorithm, The Rabin-Karp algorithm, String Matching with finite automata, The Knuth-Morris-Pratt algorithm, Longest Common Subsequence, Randomized Algorithms: Monte Carlo andLas Vegas algorithms; Analysis of artificial intelligence algorithms: Decision tree classifier, Neural networks. **NP-Completeness and Approximation Algorithms:** Introduction to NP-Completeness: The class P and NP, NP-Complete, NP-Hard, NP-Completeness and reducibility; Approximation algorithms: Vertex-cover problem, Traveling-salesman problem				
TextBooks	1.T.Cormen, C.Leiserson, R Rivest and C.Stein, Introduction to Algorithms, 3rdedition, Prentice Hall. 2. G.Brassard, P.Bratley, Fundamental of Algorithms, PHI.				

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	1. Introduction to Design and Analysis of Algorithms, BYA. Levitin, Pearson. 2. S.Basu, Design Methods and Analysis of Algorithm,PHI.	
Reference Books	3. A.Bhargava,Grokking Algorithms: An illustrated guide for programmers and other curious people, Manning Publications. 4. A.Basheer,M.Zaghlool,FPGA-BasedHighPerformanceParallelComputing, Scholars 'Press.	
CO1	Understand fundamentals of designing and analyzing algorithms.	knowledge level
CO2	Design advanced data structures and algorithms to solve Computing problems.	K2
CO3	Analyze the running time and space complexity of algorithms	K3
CO4	Design algorithms using greedy ,dynamic and string-matching Algorithms to solve real-life problems.	K4

K1:Remembering,K2:Understanding,K3:Applying,K4:AnalyzingK5:Evaluating,K6:Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	2	2	-
CO2	3	3	-	-	-	-	-	-	-	-	2	2	-
CO3	2	3	3	-	-	-	-	-	-	-	2	2	-
CO4	2	3	3	-	-	-	-	-	-	-	2	2	-
1-Low,2-Medium, 3-High													

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		L	T	P	c
R25MCA105A	**Java Full Stack Development**	4	0	0	3
Course Objectives	▪ Learn the basic data structure operation using Java Collection Frame work and understand Lambda expressions. ▪ Build web applications using JSP and JSTL. ▪ Understand Spring Frame work and build Java EE applications and services. ▪ Apply Data Access using Spring Framework ▪ Understand how to simplify Spring applications using Spring Boot and spring Boot REST ful Web Services.				
Unit-1	**Collection and Generics:** Introduction to Generics, Generics Types and Parameterized Types, Wild Cards, Java Collection Framework, Collections: Basic Operations, Bulk Operations, Iteration, List, Set, Maps. **Lambda Expressions:** Lambda Type Inference, Lambda Parameters, Lambda Function Body, Returning a Value From a Lambda Expression, Lambdas as Objects.				
Unit-2	**Introduction Java EE Programming:** JSP Architecture, JSP building blocks, Scripting Tags, implicit object, Introduction to Bean, standard actions, session tracking types and methods, Custom Tags, Introduction to JSP Standard Tag Library (JSTL) and JSTL Tags.				
Unit-3	**Spring Frameworks:** Introduction to Spring Framework, POJO Programming Model, Lightweight Containers: Spring IOC container, Configuration MetaData, Configuring and using the Container, Dependency Injection with Spring- Setter Injection, Constructor Injection, Circular Dependency, Overriding Bean, Auto Wiring Bean Looksup, Spring Manage Beans.				
Unit-4	**JDBC Data Access with Spring:** Managing JDBC Connection, Configuring Data SourcetoobtainJDBCConnection,DataAccessoperationswithJdbcTemplateand Spring. **Spring Boot:** Spring Boot and Database, Spring Boot Web Application Development.				
TextBooks	1. Java6ProgrammingBlackBook, Wiley–Dream tech publications. 2. Beginning Spring, Mert Calıskan and KenanSevindik Published by John Wiley & Sons, Inc. 3. Core Servlets and Java Server Pages : Vol I: Core Technologies 2/e , Marty Hall and Larry Brown, Pearson.				

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Reference Books	1. WebEnabledCommercialApplicationDevelopmentusingjava2.0,Ivan Byaross. 2. Java EE 6 Server Programming For Professionals, Sharanam Shah and Vaishali Shah, SPD. 3. Java Enter priseina Nutshell,3rdEditionAPracticalGuide,JimFarley,William Crawford,O'Reilly.

Course Outcomes: After completion of the course students are able to

	Course outcomes description	knowledge level
CO1	UnderstandingonJ2EEArchitectures,clientandserver communication process ,servlets and JSP	K2
CO2	Handle errors and exception sin Web Applications	K3
CO3	Analyse effectiveness of creating dynamic webpages using servlet and JSP	K4

K1:Remembering,K2:Understanding,K3:Applying,K4:AnalyzingK5:Evaluating,K6:Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	-	3	-	-	-	-	-	-	-	-	2	3
CO2	2	2	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	-	-	-	-	-	-	-	-	2	2	-
CO4	-	-	3	-	-	-	-	-	-	-	2	-	-
1-Low,2-Medium, 3-High													

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R25MCA105B	**Ethical Hacking**	L	T	P	C
		4	0	0	3
Course Objectives	▪ Teach students to think like an ethical hacker and at the same time follow the code of professional ethics and the prescribed cyber laws. ▪ Make one self aware of the cybercrimes that are taking place in the real world. ▪ Learn about the different hacking tools and techniques and practically use these tools to gain better understanding of the ethical hacking concepts. ▪ Provideadeepunderstandingofsecurityissues,threatsandconcernsinthe cyber world and provide countermeasures to curb hacking				
Unit-1	Introduction to ethical hacking, Types of hacking, advantages, disadvantages and purpose of hacking, Types of hackers, Code of ethics, Types of attacks and attack vector types, Prevention from hackers, The Indian IT Act 2000 and Amendments to the Indian IT Act (2008), Phases of hacking. **FootprintingandReconnaissance:**Introductiontofootprinting,Activeand passive foot printing, purpose of foot printing, objectives of foot printing, foot printing threats, Types of foot printing, foot printing countermeasures.				
Unit-2	**Scanning networks, Enumeration and sniffing: Scanning networks:** Network scanning and its types, objectives of network scanning, scanning live systems, scanning techniques-TCP Connect / Full Open Scan, Types of Stealth scans, port scanning countermeasures, IDS evasion techniques, Banner grabbing and its tools, vulnerability scanning, proxy servers, anonymizers, IP spoofing and its countermeasures. **Enumeration and Sniffing:** Introduction to Enumeration, Enumeration techniques, Enumeration types, Enumeration countermeasures, sniffing, Wiretrappinganditstypes,packetsniffing,sniffingthreats,workingofsniffers, sniffing methods-ARP spoofing and MAC flooding, active and passive sniffing, types of sniffing attacks, sniffing countermeasures, sniffing detection techniques.				
Unit-3	**Trojans and other Attacks:** Worms, viruses, Trojans, Types of worms, viruses and worms, Preventing malware attacks, types of attacks**:** (DoS /DDoS), Waterhole attack, brute force, phishing and fake WAP, Eavesdropping, Man-in-the-middle, buffer overflow, DNS poisoning, ARP poisoning, Identity Theft, IoT Attacks, BOTs and BOTNETs, Steganography - text, image and audio and video, types of Social Engineering: Physical social engineering**,** Remote social engineering and hybrid social engineering. **Hacking web servers, web applications and sql injection: Session hijacking:** Introduction to session hijacking, session hijacking techniques, session hijacking process, Types of session hijacking, session hijacking countermeasures: protecting and preventing				

Unit-4	**Hacking web servers and web applications:** Causes of web servers being compromised, web server attacks, stages of web server attacks, defending against web server attacks, web application components, its working, architecture, web server attack vectors, web application threats and counter measures. **SQL Injection:** Introduction to SQL injection, SQL injection threats, SQL injection attacks, SQL injectiondetection,TypesofSQLinjection,SQLinjectionmethodology,SQL Injection prevention and countermeasures.
	Wireless network hacking, cloud computing security, cryptography, Pen testing: Types of wireless Architecture, wireless encryption techniques-WEP and WPA, breaking WEP/WPA and defending WPA encryption, wireless Sniffing, Characteristics, types of cloud computing services, models and benefits, threats and attacks, cryptography and its objectives, cryptography types, cryptography attacks,PenTesting,needforpentesting,typesandtechniquesofpentesting, phases of pen testing.
TextBooks	1. All-In-One-CEH-Certified-Ethical-Hacker-Exam-Guide.-Matt Walker, 2. Man than Desai Basics of ethical hacking for beginners. 3. Sunit BelapureandNinaGodbole, CyberSecurity: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives.
Reference Books	Srinivasan, J.Suresh, Cloud Computing: A practical approach for learning and implementation, Pearson. 2. Sean-Philip Oriyano, Sybex, Certified Ethical Hacker Study Guidev9, Study Guide Edition, 2016. 3. Emmett Duley and Chuck Easttom, Comptia Security+StudyGuide. 4. Tutorials Point Professionals,Ethical Hacking by Tutorials Point.

Course Outcomes :After completion of the course students are able to

CO1	Recall the networking ,sql,and encryption algorithm Concepts' ofurther studyethicalhackingtechniques, threats, tools and prevention against attacks.	knowledge level
CO2	Understand ethical hacking concepts, cases, ethics and cyber laws.	K2
CO3	Apply available hacking tools to find a solution to a given hacking issue.	K3
CO4	Analyze and classify the real-world hacking cases and situations.	K4

K1:Remembering,K2:Understanding,K3: Applying,K4:AnalyzingK5:Evaluating,K6:Creating

COURSEANDPROGRAMMEOUTCOMESMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	2	-	-	1	-	-	3	-	-	1	-	-
CO2	-	2	-	-	2	-	-	3	-	-	1	-	-
CO3	-	-	-	2	-	-	-	3	-	-	-	1	-
CO4	-	2	-	1	-	-	-	3	-	-	-	-	1

1-Low,2-Medium,3-High

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R25MCA106B	**Database Management systems**	L	T	P	C
		4	0	0	3
Course Objectives	▪ To emphasize the underlying principles of Relational Database Management System. ▪ To understand the design of databases. ▪ To acquire knowledge on Parallel and Distributed data bases and its applications. ▪ To understand the emerging databases like Mobile, XML, Cloud and Big Data.				
Unit-1	Basics of Database: Introduction and applications of DBMS, Purpose of database, Views of Data, Database Languages, Database architecture, Database users and DBA. Relational Model: Structure of Relational Databases, Database Schema, Keys, Relational Operations and Relational Algebra, Entity Relationship Model: Basic Concepts and definitions, Constraints, Entity Relationship Diagram, Weak Entity Sets, Extended E-R Features, Conversion of ER diagram into relations.				
Unit-2	Relational Model and Query Evaluation: Relational Model Concepts, Relational Algebra, SQL: Basic Queries, Complex SQL Queries, Views, Constraints, Relational Calculus, Tuple Relational Calculus, Domain Relational Calculus, Overview of commercial RDBMSs, Database Design, Functional Dependencies, Normal Forms: First Normal form, Second Normal form, Third Normal form, BCNF, Fourth Normal form, Fifth Normal form, Algorithms for Executing Query Operations, Cost Estimation. Transaction Processing: Transaction Processing, Properties of Transactions, Serializability, Transaction support in SQL, Locking Techniques, Time Stamp ordering, Validation Techniques, Granularity of Data Items, Recovery concepts, Shadow paging, LogBasedRecovery,DatabaseSecurityIssues,Accesscontrol,StatisticalDatabase Security.				
Unit-3	Parallel and Distributed Databases: Database System Architectures: Centralized and Client-Server Architectures, Server System Architectures, Parallel Systems, Distributed Systems, Parallel Databases: I/O Parallelism, Inter and Intra Query Parallelism, Inter and Intra operation Parallelism, Design of Parallel Systems, Distributed Database Concepts, Distributed Data Storage, Distributed Transactions, Commit Protocols, Concurrency Control, Distributed Query Processing. Intelligent Databases: Temporal Databases: Overview of Temporal Databases, TSQL2, Deductive Databases and Recursive Queries in SQL, Spatial Databases, Spatial Data Types, Spatial Relationships, Spatial Data Structures-Spatial Access Methods, Spatial DB Implementation.				

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Unit-4	XML Databases: XML Data Model, DTD, XML Schema, XML Querying, Web Databases, Open Database Connectivity. Mobile Databases: Location and Handoff Management, Effect of Mobility on Data Management, Location Dependent Data Distribution, Mobile Transaction Models, Concurrency Control and Transaction Commit Protocols. Multimedia Databases: Multidimensional Data Structures, Image Databases, Text / Document Databases, Video Data bases, Audio Databases, Multimedia Database Design.
	Emerging Technologies: Cloud data bases, Streaming Databases, Graph Data bases, New SQL.
TextBooks	1. Abraham Silberschatz, Henry F. Korth and S.Sundarshan "Database SystemConcepts", 6th Edition, McGraw Hill, 2010. 2. C.J. Date, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2003. 3. Carlo Zaniolo, Stefano Ceri, Christos Faloutsos, Richard T.Snodgrass, V.S.Subrahmanian, Roberto Zicari, Advanced Database Systems, Morgan Kaufmann publishers,2006.
Reference Books	1. Ramez Elamassri and Shankant B-Navathe, "Fundamentals of Database Systems", 6th Edition, Pearson Education Delhi, 2010. 2. Raghu Ramakrishnan, Johannes Gehrke, 'Data base management systems"McGraw Hill, 2003. 3. Peter Rob, Carlos Coronel, "Database SystemConcepts", Cengage Learning, 2008. 4. Frank. P. Coyle, "XML, Web Services and The Data Revolution", Pearson Education, 2012. 5. LeeChao, "Database Development and Management" , Auerbach Publications,2010. 6. PeterRob, Carloscoronel, "Database system concepts" , Ceange Learning 2008.

Course Outcomes: After completion of the course students are able to

	Course Outcome Description	Knowledge Level
CO1	To develop skills on database optimize their performance in Practice.	K6
CO2	To analyze each type of databases and its necessity.	K4
CO3	To design faster algorithms in solving practical database Problems.	K6

K1:Remembering,K2:Understanding,K3:Applying,K4:AnalyzingK5:Evaluating,K6:Creating COURSE AND PROGRAMME OUTCOMES MAPPING

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	**3**	-	-	-	-	-	-	-	-	-	**2**	-	-
CO2	**3**	-	-	-	-	-	-	-	-	-	**3**	**2**	-
CO3	-	**3**	-	-	-	-	-	-	-	-	-	**2**	**2**
1-Low,2-Medium, 3-High													

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R25MCA106A	**Advanced Python Programming**	L	T	P	C
		4	0	0	3
Course Objectives	▪ To learn how to design object-oriented programs with Python classes. ▪ To learn about reading, writing and implementing other operation on files in Python. ▪ To implement the reading concept and multithreading on Python ▪ To design GUI Programs and implement data base interaction using Python. ▪ To know about use of regular expression and handling exceptions for writing robust python programs.				
Unit-1	Introduction to Python- Introduction to Python programming language - Setting up development environment - Basic programming concepts. Object oriented Programming in Python- introduction to object-oriented programming-Classes. Methods and properties in Python – Inheritance, Polymorphism, and encapsulation. Functions: Functions and its types, Parameters, Return Statement, Type of arguments, Type of Variables, Name spaces and global keywords, Recursive functions.				
Unit-2	Python Libraries and Packages-Working with popular Python libraries such as NumPy, Pandas, and Matplotlib - Installing, managing, and publishing Python Packages using pip - Using Python virtual environments effectively.				
Unit-3	Introduction to Flask framework, Flask Web Development - Flask routes and views-Templates and rendering in Flask-Forms and user input –Handling API Requests.				
Unit-4	Introduction to Django –Overview of Django framework-Setting up a Django project - Creating apps in Django - Django models and database.				
TextBooks	1. Core Python Programming, WeselyJ.Chun,2ndedition, Pearson. 2. Ultimate Django for Web App Development Using Python, Leonardo Luis Lazzaro.				
Reference Books	1. Programming through Python,M. T Savaliya,R.K.Maurya,G M Magar, Revised Edition, Sybgen Learning India, 2020. 2. ThinkPython, AllenDowney, GreenTea Press. 3. Introduction to Python,KennethA.Lambert,Cengage.				

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Course Outcomes: After completion of the course students are able to		
	Course out comes description	knowledge level
CO1	Describe the basics of Python programming language	K2
CO2	Understand and implement the Python packages to solve real time problems	K3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	2	-	-	-	-	-	-	-	2	2	2
CO2	3	1	2	-		-	-	-	-	-	2	2	2
CO3	3	2	3	-	-	-	-	-	-	-	2	2	2
CO4	3	2	3	-	-	-	-	-	-	-	2	2	2
1-Low,2-Medium, 3-High													

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R25MCA102P	PRACTICAL– I Discrete Mathematical Structures	L	T	P	C
		3	0	0	2

List of programs

set theory

1. Write a program to implement Inclusion-Exclusion principle.
2. Write a program to implement Power Sets.
3. Write a program to implement Mathematical Induction.

Functions and Algorithms

4. Write a program to implement Recursively defined functions.

Counting

5. Write a program to implement Permutations with repetitions.
6. Write a program to implement Combinations with repetitions.

Recurrence relations

7. Write a program for solving recurrence relations by substitution and Generating functions.

Graph Theory

7. Write a program to implement Four Colour problem.
8. Write a program to Construct Spanning Trees.

R25MCA102P	PRACTICAL–I Data Structures & Algorithms	L	T	P
		3	0	0

1. Write a program to implement Linear Array Operations.
2. Write a program to implement double Linked List operations.
3. How to create circular Linked list operations.
4. Write a program to implement stack operation using Array.
5. Write a program to implement linear queue operations using Array.
6. Write a program to implement the Traversal operations using binary Tree.
7. Write a program to arrange the Element of an Array in a store order using selection sort.
8. Write a program to arrange the Elements of an Array in a sorted order using quick sort.
9. Write a program to search for the given Element in a Linear Array of N elements using binary search

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R25MCA103P	PRACTICAL –I OPERATING SYSTEMS	L	T	P	C
		3	0	0	2

List ofPrograms

SHELLPROGRAMMING

1. a. Counting number of lines and words present in a given file.
   b. Displays the list of all of the directory files in a directory.
   c. Copy a file to a New Location.
   d. Delete a given file if it exists.

PROCESSMANAGEMENT

2. a. Check if a Process is running.
   b. Stop a Running Process.
   c. Kill Processes of a Specific User.

OPERATINGSYSTEMCONCEPTS

CPUSCHEDULINGALGORITHMS

3. FCFSCPU scheduling algorithm.
4. SJFCPU scheduling algorithm.
5. Round Robin CPU scheduling algorithm.

INTERPROCESS COMMUNICATIONS

6. Pipes

APPLICATIONSOFINTERPROCESSCOMMUNICATIONS

7. Dining Philosophers Problem.
8. Producer–Consumer Problem.
9. Readers–Writers Problem.

DEADLOCKS

10. Bankers Algorithm for Deadlock Detection.
11. Bankers Algorithm for Deadlock Avoidance.
12. LAZYBUDDYSYSTEM.

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R25MCA104P	PRACTICAL–I Design and Analysis of Algorithm	L	T	P	C
		3	0	0	2

List of Programs

1. Write a program to implement Merge Sorting.
2. Write a program to implement Quick Sort.
3. Write a program to implement Strassen's Matrix Multiplication.
4. Write a program to implement Shortest Path.
5. Write a program to implement Optimal Binary Search Tree.
6. Write a program to implement The Eight Queens Problem.
7. Write a program to implement Graph Coloring.
8. Write a program to implement Traveling Sales Person Problem

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R25MCA105P	PRACTICAL–II Java Full Stack Development	L	T	P	C
		3	0	0	2

LIST OF PROGRAMS

JavaGenerics

1. Write a Java Program to demonstrate a Generic Class, Generic Methods.
2. Write a Java Program to demonstrate Wild cards in Java Generics.

WebapplicationdevelopmentusingJSP

3. Design loan calculator using JSP which accepts Period of Time(in years) and Principal Loan Amount. Display the payment amount for each loan and then list the loan balance and interest paid for each payment over the term of the loan for the following time period and interest rate:

a. 1to 7year at5.35%

b. 8to15yearat5.5%

c. 16to 30year at5.75%

4. Write a JSP program that demonstrates the use of JSP declaration, scriptlet, directives, expression, header and footer.

Spring Framework

5. Writeaprogramto demonstratedependencyinjectionviasettermethod.

6. Writeaprogramtodemonstratedependencyinjectionvia Constructor.

Aspect Oriented Programming

7. i)Write a program to demonstrate Spring AOP–before advice.

ii) Write a program to demonstrate Spring AOP–after advice.

iii) Write a program to demonstrate Spring AOP–around advice.

iv)Write a program to demonstrate Spring AOP –after returning advice.

vi)Write a program to demonstrate Spring AOP–after throwing advice.

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vii) Write a program to demonstrate Spring AOP–point cuts

Spring JDBC

8. Write a program to insert ,update and delete records from the given table.

9. Write a program to demonstrate Prepared Statement in Spring Jdbc Template

10. WriteaprograminSpringJDBCtodemonstrateResultSetExtractorInterface

11. WriteaprogramtodemonstrateRowMapperinterfacetofetchtherecordsfromthe database.

Spring Boot and REST fulWeb Services

12. Write a program to create a simple Spring Boot application that prints a message.

13. Write a program to demonstrate RESTful Web Services with spring boot.

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R25MCA105P	PRACTICAL–II Ethical Hacking	L	T	P	C
		3	0	0	2

List of Programs

1. Usesoftwaretools/commandstoperformfootprinting/informationgatheringand generate analysis report.
2. Usesoftwaretools/commandstoperformnetworkscanningandsniffingandgenerate analysis report.
3. Usesoftwaretools/commandstoperformmalwareattacksandothercyberattacksand generates analysis report.
4. Implementation of key loggers, viruses and trojans.
5. Useofsoftwaretools/commandsforwebserversandwebapplicationshacking and generate analysis report.
6. Useofsoftwaretools/commandsforperformingsqlinjectionandsessionhijackingand generate analysis report.
7. Use of software tools/commands to encrypt andecrypt password, implement encryption and decryption using Ceaser Cipher.
8. Using Meta sploit and meta sploitable for penetration testing.

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R25MCA106P	PRACTICAL-II Database Management Systems	L	T	P	C
		3	0	0	2

List of Programs

1. Create Student (HTNO, Surname, First Name, Last Name, Percentage_of_Marks, Data_of_Joining, Department_ID) and Department(Department_ID, Dept_Name, HOD, Contact No, E-Mail) tables with relevant Primary Key, Foreign Key and other constraints.Perform the following
   a. Insert five student details in five departments.
   b. Display all students order by department no.
   c. Display all students in each department who has highest percentage.
2. DesignadatabasefortheUniversityLibrarywhichincludetables1)Student2)books 3)Issue. Perform the following queries.
   a. Display all the books in the Library.
   b. Display the titles of only computer books in the Library.
   c. Display the book title which was most issued.
   d. Display the book title which was not read by any student.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4. Write a PL/SQL block to obtain factorial of a number and program for Fibonacci numbers in PL/SQL.
5. Write PL/SQL procedure for exception handling.
6. Write PL/SQL procedure for animplicit cursors and explicit cursor.
7. Create a trigger in PL/SQL such that on Sunday and Saturday after 1PMnotransactions should take place on the Account table.
8. Design ER-diagram for the following scenario, convert the same into a relational model and then solve the following queries. Consider a Cricket Tournment "ABC CUP" organized by an organization. In the tournament there are many teams are contesting each having a Team id, Team_name, City, a coach. Each team is uniquely identified by using Teamid. A team can have many players and a captain. Each player is uniquely identified by player id, having a Name, and multiple phone numbers, age. A player represents only one team. There are many stadiums to conduct matches. Each stadium is identified using Stadium id, having a stadium_name,Adress(involves city, area_ name, pin code). A team can play many matches. Each Match played between the two teams in the scheduled date and time in the predefined Stadium. Each match is identified uniquely by using Match id. Each match won by any of the one team that also wants to record in the database. For each match man_of_the match award given to a player.
   a. Display the youngest player (in terms of age) Name, Team name, age in which he belongs of the tournament.
   b. Listthedetailsofthestadiumwherethemaximumnumberofmatcheswereplayed.
   c. List the details of the player who is not a captain but got the man_of_match award at least in two matches.
   d. Display the Team details who won the maximum matches.
   e. Display the team name where all its won matches played in the stadium.

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R25MCA106P	PRACTICAL–II Advanced Python Programming	L	T	P	C
		3	0	0	2

List of Programs

1. Write a Python program about Class variables using Robot Class.
2. Implement Instance variable concept of ATM Machine Class.
3. Write a program to implement Inheritance.
4. Write a program to implement Polymorphism.
5. Write a program to implement Data encapsulation.
6. WriteaprogramtoimplementStringmanipulationoperationsusingpythonlibrary Numpy.
7. Write a program to create a series using python library Pandas.
8. Write a program to create a Data frame using python library Pandas.
9. Write a program to draw a line from position (1,3) to position (8,10) using python library Matplotlib.
10. Write a program to draw multiple lines (two lines) by specifying the x-values and y-values for both lines using python library Matplotlib.
11. WriteaprogramtodrawBarcharthorizontalandverticalbarsusingpythonlibrary Matplotlib.
12. Write a program to draw a Scatter plot using python library Matplotlib.
13. Develop a Python Django web application: User registration with E-mail confirmation application.

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Programme	MCA	Semester	First			
Course Code	R25MCA109A	Course Name	INDIAN HISTORY AND CULTURE			
Course Category	INDIAN KNOWLEDGE SYSTEMS – 1A.	Hours/Week	L	T	P	C
			4	0	0	0
Course Objectives	• Learnaboutthechangesinsociety,economy,politics,andcultureundervarious dynasties. • Know media eval Indian history and culture. • Understand the concept and meaning of culture • Establish the relationship between culture and civilization • Discuss the role and impact of culture in human life. • Trace the influence and significance of geographical features on Indian culture.					
UNIT-1	Ancient Indian History and Culture: What is History-Evolution of Man-Science and Technology in Harappan Civilisation-Vedic Literature- Difference between Jainism and Buddhism Philosophy-Ashoka Dhamma Policy-Science and TechnologyinGupthaPeriod-ChronologyofVariousDynastiesthatruledIndia (6thCenturyBCto1206CE).					
UNIT-2	History and Culture of Medieval India: Delhi Sultanate: Rulers (Brief), Alla-Ud-Din Khilji and Muhammad-Bin-Tuglaq Reforms-Greater Mughals (Brief)-MughAdministration-Akbar Religious Policy-Mughal Art and Architecture-Bhakti Saints. History of Modern India: European Settlements-British Revenue Policies-Economic Impact of British Rule-Socio-Religious Reform Movements-Causes for 1857Revolt-IndianFreedomStruggle:Vandemataram,HomeRuleMovement-Gandhi'sRole:Non-CooperationMovements,SaltSatyaGrahaandQuitIndia Movement-Subash Chandra Bose-Partition of India.					
UNIT-3	Introduction to Indian Culture: Characteristics of Indian culture, Significance of Geography on Indian Culture. Society in India through ages- Ancient period -varna and jati, family and marriage in india, position of women in ancient india, Contemporary period; caste system and communalism.Religionand Philosophy in India:AncientPeriod:Pre-VedicandVedicReligion,BuddhismandJainism, Indian philosophy– Vedanta and Mimans a school of Philosophy.					
UNIT-4	Spread of Indian Culture Abroad: Causes, Significance and Modes of Cultura Exchange - Through Traders, Teachers, Emissaries, Missionaries and Gypsies.IndianCultureinSouthEastAsiaIndia,CentralAsiaandWesternWorldthrough ages.					
Text Books	1. D.N.Jha, Ancient India: In Historical Outline, Manohar Publishers, 1999. 2. R.C.Majumdar,K.K.Dutta&H.C.Roy Chowdhuri (ed.), An Advanced History o India, Macmillan, 1948. 3. SumitSarkar.,ModernIndia,PearsonIndia, 2014. 4. Kabir,Humayun,OurHeritage,NationalInformationandPublicationsLtdMumbai, 1946. 5. Malik, S. C., And Understanding Indian Civilisation: A Framework of Enquiry, India Institute of Advanced Study, Simla, 1975. 6. Pandey,GovindChandra,FoundationsofIndianCulture,BooksandBooks,Ne Delhi,1984.					

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Reference Books	1. Satish Chandra.,History of MedievalIndia,800-1700,OrientalBlackswan, 2007. 2. Harbans Mukhia., The Mugh als of India, WileyPublishers, 2008. 3. Bipan Chnadra,A.Tripathi, Barunde, Freedom Struggle, National Book Trust, 1987.

Course Outcomes: After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Students will have an overall understanding of Indian history and culture From ancient to modern India.	K2
CO2	Understand the greatness of the Mughals and their administration.	K2

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	2	-	-	-	-	-
CO2	-	-	-	-	-	-	-	2	-	-	-	-	-
CO3	-	-	-	-	-	-	-	2	-	-	-	-	-
CO4	-	-	-	-	-	-	-	2	-	-	-	-	-

1-Low,2-Medium, 3-High

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Programme	MCA	Semester	First			
CourseCode	R25MCA109B	CourseName	INFORMATION TECHNOLOGY ACT			
Course Category	INDIAN KNOWLEDGE SYSTEMS – 1B.	Hours/Week	L	T	P	C
			4	0	0	0
Course Objectives	▪ This course end eavorsto give an in sightful understanding of fundamental nuances of this information technology ecosystem and its legal concerns. ▪ Due emphasison the social, intellectual property issues and legal analysis of new emerging technologies of Cyberspace. ▪ Thecapitalideaofthiscourseistoprofessionallyequipstudentswithadetailed Understanding of national and international regulatory framework and mechanics of cyber law.					
UNIT-1	INTRODUCTION: Origin and meaning of Cyberspace, Cyberspace vs. Physical space, Legal Issues in Cyberspace, Phases of Cyberspace Regulation, Need of Regulation for Cyberspace, Different Models of Cyberspace Regulation: No Regulation, Government Regulation, Self-Regulation and Government Regulation, Cyber Libertarianism, Cyber patternalism, Network Communitarianism. Symbiotic Regulation, Behavioural Regulation, Algorithmic Regulation etc. CYBER JURISDICTION: Concept of Jurisdiction, Jurisdiction in Cyberspace, Issues andconcernsofCyberspaceJurisdictioninIndia,InternationalpositionofCyberspace Jurisdiction, Judicial interpretation of Cyberspace Jurisdiction.					
UNIT-2	INFORMATION TECHNOLOGY ACT:A brief overview of Information Technology Act 2000, IT Act 2000 vs. IT Amendment Act 2008, Relevant provisions from Indian Penal Code, Indian Evidence Act, Bankers Book Evidence Act, Reserve Bank of India Act, etc. CONCEPT OF ELECTRONIC SIGNATURE AND DIGITAL SIGNATURE: Relevance of Signature, Handwritten signature vs Digital Signature, Technological Advancement and development of signature, Digital Signature: IT Act,2000,Cryptography, Public Key and Private Key, Public KeyInfrastructure,ElectronicSignature,ElectronicSignaturevs. Digital Signature, UNCITRAL Model Law on Electronic Signature.					
UNIT-3	CYBER CRIMES: Cyber Crimes - Definitions – Nature, Conventional Crimes vs Cyber Crimes, Types of Cyber Crimes, Cyber offences covered under the Information Technology Act, 2000, Cyber offences and other laws (IPC, POCSO etc.), Issues relating to investigation of cybercrimes in India, Cyber Contravention, Cybercrime vs Cyber Contravention, Cyber Contraventions -Civil Liabilities and Adjudication. LAW RELATING TO LIABILITIES OF INTER MEDIARIES:Meaningandconcept of intermediary, International legal framework on intermediary, Liability of intermarry under the IT Act, Critical analysis of The Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules 2021 and its comparison with old intermediary guide lines, Recent developments and judicial interpretation of intermediaries liability. DATAPROTECTIONANDPRIVACYCONCERNSINCYBERSPACE:Needto protect data in cyberspace, Types of data, Legal framework of data protection, Data protection bill -an overview, GDPR, Concept of privacy ,Privacy concerns of cyberspace, Indian Constitutional framework of privacy and its Judicial interpretation, Emerging issues of Data protection.					

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UNIT-4	APPRECIATION OF ELECTRONIC EVIDENCE: Concept of Electronic Records and ElectronicEvidence,RecognitionofelectronicrecordsundertheUNCITRALModel Law&ITAct,TypesofElectronicEvidence,Sourcesofelectronicevidence,Technical
	Issues in collection of electronic Evidence, Chain of custody of electronic evidence, Admissibility of electronic evidence under Indian laws. IPPROTECTIONISSUESINCYBERSPACE:COPYRIGHTISSUESIN CYBERSPACE: Fundamental notions of copyright law, Copyright issues in cyberspace, Copyright infringement in digital environment-Software piracy, Linking, Framing, Caching, Meta Tagging, Legal protection of copyright in International Framework-WCT, WPPT, TRIPS .Indian legal protection of copyright in cyberspace & concept of DRM. TRADEMARK ISSUES IN CYBERSPACE: Meaning, Purpose and Kinds of Domain Name, Domain Name Vs Trademark, Domain Name Registration, ICANN, Domain NamedisputeandRelatedLaws,DifferentFormofDomaininCyberspace,Judicial Approach.
Text Books	1. Chris Reed,Internet Law-Text and Materials,Universal Law Publishing Co., New Delhi, 2nd Edition, 2005. 2. IanJLloyd,InformationTechnologyLaw,OxfordUniversityPress,7thEdition, 2014.
Reference Books	1. VakulSharma, InformationTechnologyLawandPractice, UniversalLawPublishing, 2017. 2. RodneyD Ryder&NikhilNaren,InternetLaw-RegulatingCyberspaceand emerging Technologies,Bloomsbury,2020.

Course Outcomes: After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Understand conceptual framework and theoretical foundation of Cyber space regulatory framework.	K2
CO2	Analysis of jurisdictional issues of cyberspace.	K4
CO3	Critically analyse the Information technology act ,2000 and related rules.	K4
CO4	Understand Intellectual Property issues and evidentiary concerns of Cyber space.	K2

K1-Remembering, K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6-Creating

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COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	2	-	-	1	-	-	-	-	-	2	-	-
CO2	-	3	-	-	1	-	-	-	-	-	-	1	-
CO3	-	3	-	-	2	-	-	-	-	-	-	1	-
CO4	-	3	-	-	1	1	-	-	-	-	2	-	-
1-Low,2-Medium, 3-High													

Dr. P... N. Geethanjali K. Aranth Kumar

R25MCA201	Enterprise Software Engineering	Hours/Week	L	T	P	C
			4	0	0	4
Course Objectives	1. Understand how large enterprises manage software projects across dozens of engineering teams. 2. Understandtheoperationsandresponsibilitiesofdifferentfunctionalteams within a large technology organization. 3. Learnaboutdifferenttypesofenterprisearchitectureandassociateddesign patterns. 4. Expand upon the standard software development life cycle, from understanding the business need to deployment and ultimately Decommissioning or replacement of software.					
UNIT-1	**Introduction:** Enterprise Software Challenges & Benefits, Measuring Success & Impact, Organizational Structures, Cross-Functional Partners, Large-Scale Agile Frameworks, Open Source & Inner Source, Dependency Management &Licensing. DevOpsPractices,SiteReliabilityEngineering,ProductionSupport,Code Readability & Documentation, Code Review & Collaboration, Refactoring, Debugging, & Linting.					
UNIT-2	**Enterprise Architecture:** Domain-Driven architecture, Domain-Driven Design (DDD), Object-relational mapping (ORM). **Service-Oriented Architecture (SOA):** Standardized service, contract, Loose coupling, service abstraction, Reusability and autonomy, Statelessness, Service discoverability. **Resource-Oriented Architecture (ROA):** Plain Old XML(POX)and REST, Hypermedia networks. MessageBrokerArchitecture,Event-BasedArchitecture,BusinessProcess Management, Business Process Modelling, Descriptive and analytical BPMN.					
UNIT-3	**Software Audits and Regulatory Impacts**: Data Processing, Data Governance, Web Application Development, Web Frameworks, Front-End & Back-End. **Mobile Application Development:**Android &Ios, Unique Challenges - devices, screen size, performance, battery consumption, accessibility. **Cloud Computing:** Containerization,Orchestration,ServerlessComputing, PaaS& IaaS. **InformationSecurity:**VulnerabilityManagement,RiskManagement,Access Control(ID,AuthN,AuthZ)					
UNIT-4	**Continuous Integration & Delivery:** Change Management, Release Management. **Enterprise Quality Assurance(MA):**Testing Techniques, Automated Test Frameworks, Quality Metrics, Decommissioning Software, Software Modernization and Innovation in Large Enterprises (MA).					
Text Books	1. Raising Enterprise Applications A Software Engineering Perspective by Pradhan, Wiley India,2010. 2. Fundamentals of Software Architecture: An Engineering Approach by Mark Richards & Neal Ford, O'Riely publications.					
Reference Books	1.**Designing SoftwareArchitecturesbyHUMBERTOCERVANTES,Rick Kazman, PEARSON INDIA.**					

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Course Outcomes: After completion of the course student able to		
	Course Outcome Description	Knowledge Level
CO1	Understand enterprise-levels of tware development challenges	K2
CO2	Apply appropriate design patterns and architectures	K3
CO3	Model complex business processes	K4
CO4	Integrate with legacy systems	K4

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating

COURSEANDPROGRAMMEOUTCOMESMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	3	-	-	-	-	-	-	-	2	-
CO3	3	-	3	-	-	-	-	-	-	-	-	-	2
CO4	-	-	3	2	-	-	-	-	-	-	3	-	-

1-Low,2-Medium,3-High

R25MCA202A	Artificial Intelligence	Hours/Week	L	T	P	C
			4	0	0	3

Course Objectives	1. Learn the basic AI approaches 2. Develop problem solving agents 3. Perform logical and probabilistic reasoning
UNIT-1	**IntelligentAgents:**IntroductiontoAI,AgentsandEnvironments,conceptofrationality,natureofenvironments,structureofagents.Problemsolvingagents, Search algorithms ,un informed search strategies.
UNIT-2	**Problem Solving:** Heuristic search strategies, heuristic functions. Local search and optimization problems, local search in continuous space, search with non-deterministic actions, search in partially observable environments, online search agents and unknown environments.
UNIT-3	**Game Playing and CSP:** Game theory, optimal decisions in games, alpha-beta search, monte-carlo tree search, stochastic games, partially observable games. Constraint satisfaction problems, constraint propagation, backtracking search for CSP, local search for CSP – structure of CSP.
UNIT-4	**Logical Reasoning:** Knowledge-based agents, propositional logic, propositional theorem proving, propositional model checking, agents based on propositional logic. First-order logic, syntax and semantics, knowledge representation and engineering, inferences in first-order logic, forward chaining, backward chaining, resolution. **ProbabilisticReasoning:**Actingunderuncertainty,Bayesianinference,naïve Bayes models. Probabilistic reasoning, Bayesian networks, exact inference in BN, approximate inference in BN, causal networks.
Text Books	1. Stuart Russell and Peter Norvig, “Artificial Intelligence – A Modern Approach”, Fourth Edition, Pearson Education, 2021.
Reference Books	1. DanW.Patterson,“IntroductiontoAI andES”,PearsonEducation,2007 2. Kevin Night, Elaine Rich,and Nair B.,“Artificial Intelligence”,McGraw Hill, 2008 3. Patrick H. Winston, "Artificial Intelligence", Third Edition, Pearson Education, 2006 4. DeepakKhemani,“ArtificialIntelligence”,TataMcGrawHillEducation,2013

Course Outcomes: After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Explain intelligent agent frameworks	K4
CO2	Apply problem solving techniques	K3
CO3	Apply game playing and CSP techniques	K3
CO4	Perform logical reasoning and probabilistic reasoning under Uncertainty.	K4

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating

N. Geethanjali K. Ananth Kumar

COURSEANDPROGRAMMEOUTCOMESMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	1	2	3	3	-	1	-	-	-	3	3
CO2	2	2	3	3	3	3	-	1	-	-	3	3	3
CO3	2	3	3	3	1	3	-	1	-	-	2	3	3
CO4	2	3	3	3	1	3	-	1	-	-	-	3	3
CO5	2	2	3	2	3	3	-	1	-			3	3
1-Low,2-Medium,3-High													

R25MCA202B	Cryptography and Network Security	Hours/Week	L	T	P	C
			4	0	0	3

Course Objectives	1. To know the methods of conventional encryption. 2. To understand the concepts of public key encryption and number theory. 3. To know the network security tools and applications. 4. To understand the system level security practices.
UNIT-1	Attacks on Computers & Computer Security Introduction, Need for Security, Security approaches, Principles of Security, Types of attack. **Cryptography:** Overview of Cryptography, Substitution and affine cipher , Poly-alphabetic Cipher and their cryptanalysis, Perfect Security, Block Cipher, Data EncryptionStandard(DES),2DES,3DES,DifferentialandlinearCryptanalysis, Block Cipher Design Principles, Block Cipher modes of operation, Advanced Encryption Standard.
UNIT-2	**Principles of Public-Key Cryptosystems:** The RSA Algorithm, Key Management, Diffie-Hellman Key Exchange and Cryptanalysis, Authentication Functions,MessageAuthenticationCodes(MAC),HashFunctions,MD5algorithm,Securityof Hash Functions and MAC, Secure Hash Algorithm, HMAC.
UNIT-3	**Discrete Logarithms:** ElGamal System, Schnorr signature scheme, The ElGamal signature scheme, The digital signature algorithm, Provable secure signatureschemes. **Elliptic curve cryptography:** Ellipticcurveover thereals, Ellipticcurves modulo a prime, Properties of Elliptic cures Point compression and ECIes, Computing pointmultiplesonEllipticcurves,Ellipticcurvedigitalsignaturealgorithm, ECElGamal Cryptosystem, ElGamal EC Digital signature scheme, Elliptic curve factorization, Elliptic curve primality test.
UNIT-4	**Network Security Practice:** Kerberos, X.509 Authentication Service, Public Key Infrastructure. E-Mail Security: Security Basics of mail security, Pretty Good Privacy, S/MIME. IP Security: Architecture, Authentication Header, Encapsulation Security Payload, Combining Security Associations, Key Management. Web Security: Secure Sockets Layer and Transport Layer Security. Firewalls :Introduction, Types of firewall, Firewall Configurations, DMZ Network. Applications of Cryptography: Block chain, Bit coin and Crypto currency Technologies.
Text Books	**1.** William Stallings – Cryptography and Network Security- Pears on Education, New Delhi, 5th Edition, 2011. 2. BehrouzA. Forouzan,DebdeepMukhopadhyay-CryptographyandNetwork Security -Tata McGraw-HillEducationPvt.Ltd.,2ndEdition,2011 3. BernardMenezes,”NetworkSecurityandCryptography”,Cengage Learning.

Reference Books	1. CharlesPfleeger-Securityincomputing-PrenticeHallofIndia,4thEdition, 2006. 2. AtulKahate,"Cryptographyand NetworkSecurity",McGrawHillEducation 3. D.W. Davies and W.L. Price New York : Security for Computer Networks - John Wiley and Sons, 1984. 4. C.MeyerandS.M.Matyas:"Cryptography–ANewDimensionInComputer Security", John Wiley & Sons, New York (1982). Wiley. 5. Bruce Schneier: Applied Cryptography, John Wiley. 6. MICHAELWELSCHENBACH"CryptographyinCand C++"– A press.

Course Outcomes: After completionofthecoursestudentableto

	Course Outcome Description	Knowledge Level
CO1	Analyze and design classical encryption techniques and block Ciphers.	K4
CO2	Understand and analyzed at a encryption standard, public-key cryptography,RSAandother public-key cryptosystems.	K2
CO3	Understand key management and distribution schemes and design User Authentication Protocols.	K3
CO4	Analyze and design hash and MAC algorithms, and digital signatures.	K4
CO5	Design network application security schemes, such as PGP,S/ MIME ,IPSec ,SSL,TLS, HTTPS ,SSH, etc.	K6

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating

COURSEANDPROGRAMMEOUTCOMESMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	-	-	-	2	-	-	-	-	-	-	-	-	3
CO2	3	3	-	-	-	-	--	-	-	-	-	-	2
CO3	3	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	3	3	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-	3

1-Low,2-Medium,3-High

K. Aravith Kumar

<table>
<tr><td rowspan="2">R25MCA203B</td><td rowspan="2">Block Chain Technology</td><td rowspan="2">Hours/Week</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Course Objectives</td><td colspan="6">1. Togivestudentsanunderstandingofemergingabstractmodelsfor Blockchain Technology
2. Tofamiliarisewiththefunctional/operationalaspectsofthecryptocurrencyeco-system</td></tr>
<tr><td>UNIT-1</td><td colspan="6">Basics: Distributed Database, Two General Problem, byzantine General problemandFaultTolerance, HadoopDistributedFileSystem, Distributed Hash Table, ASIC resistance, Turing Complete.
Cryptography: Hash function, Digital Signature-ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.</td></tr>
<tr><td>UNIT-2</td><td colspan="6">BlockChain:Introduction,Advantageoverconventionaldistributeddatabase,Blockchain Network,MiningMechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Block chain application, Soft& Hard Fork, Private and Public block chain.</td></tr>
<tr><td>UNIT-3</td><td colspan="6">Distributed Consensus: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.
Crypto currency: History, Distributed Ledger, Bit coin protocols-Mining strategy and rewards, Ethereum- Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Name coin</td></tr>
<tr><td>UNIT-4</td><td colspan="6">Crypto currency Regulation: Stake holders, Roots of Bit coin, Legal Aspects-Crypto currencyExchange,BlackMarketandGlobalEconomy.Applications:InternetofThings,MedicalRecordManagementSystem,DomainName Service and future of Block chain.</td></tr>
<tr><td>Text Books</td><td colspan="6">1 Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and SteveGoldfeder,
Bitcoin andCryptocurrencyTechnologies:AComprehensiveIntroduction,PrincetonUniversity Press(July 19, 2016).
2. Melanie Swan,“Block Chain: Blue print for a New Economy”,OReilly,firstedition– 2015
3. DanielDrescher,“BlockChainBasics”,Apress;1stedition,2017
4. AnshulKaushik,“BlockChainandCryptoCurrencies”,KhannaPublishingHouse, Delhi.</td></tr>
<tr><td>Reference Books</td><td colspan="6">1. 1Antonopoulos,MasteringBitcoin:UnlockingDigitalCryptocurrencies
2. Satoshi Nakamoto,Bitcoin:APeer-to-Peer Electronic Cash System
3. DR. Gavin Wood, “ETHEREUM: A Secure Decentralized Transaction Ledger,”Yellowpaper.2014.
4. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts</td></tr>
</table>

N. Geethanjali K. Ananth Kumar

Course Outcomes :After completionofthecoursestudentableto		
	Course Outcome Description	Knowledge Level
CO1	Understand emerging abstract models for Block chain Technology	K2
CO2	Ensure a secure interaction with them, it's important to implement effective measures.	K3
CO3	Design, build, and deploys mart contracts and distributed applications,	K4
CO4	Integrate ideas from block chain technology into their projects.	K6
K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating		

COURSEANDPROGRAMMEOUTCOMESMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	2	2	-
CO2	2	2	2	-	-	-	-	-	-	-	2	2	2
CO3	2	2	2	-	-	-	-	-	-	-	2	2	-
CO4	3	3	3	-	-	-	-	-	-	-	2	2	-
1-Low,2-Medium,3-High													

Dr. Pad... N. Geethanjali ... K. Ananth Kumar

R25MCA203A	Data Science	Hours/Week	L	T	P	C
			4	0	0	3

Course Objectives	▪ Tounderstandthedatasciencefundamentalsand process. ▪ Tolearntodescribethedataforthedatascienceprocess. ▪ Tolearntodescribetherelationshipbetweendata. ▪ ToutilizethePythonlibraries forData Wrangling. ▪ TopresentandinterpretdatausingvisualizationlibrariesinPython
UNIT-1	**Introduction to Data Science:** Benefits and uses, facets of data, Data Science Process: Overview, Defining research goals, Retrieving data, Data preparation, ExploratoryDataanalysis,buildthemodel,presentingfindingsandbuilding applications, Data Mining, Data Warehousing, Basic Statistical descriptions of Data
UNIT-2	**DescribingData:**TypesofData,TypesofVariables,DescribingDatawith TablesandGraphs,DescribingDatawithAverages,DescribingVariability, NormalDistributionsand Standard(z) Scores
UNIT-3	**Describing Relationships:** Correlation, Scatter plots, correlation coefficient for quantitative data, computational formula for correlation coefficient , Regression, regressionline,leastsquaresregressionline,Standarderrorofestimate, interpretationofr2,multipleregressionequations,regressiontowardsthemean.
UNIT-4	**Python Libraries for Data Wrangling:** 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. **Data Visualization**: Importing Matplotlib, Line plots, Scatter plots, visualizing errors, density and contour plots, Histograms, legends, colors, subplots, text and annotation,customization,threedimensionalplotting,GeographicDatawith Basemap,VisualizationwithSeaborn.
Text Books	1. DavidCielen,ArnoD.B.Meysman,andMohamedAli,"IntroducingData Science", Manning Publications,2016.(UnitI) 2. RobertS.WitteandJohnS.Witte,"Statistics",EleventhEdition,WileyPublications, 2017. (UnitsII andIII) 3. JakeVanderPlas,"PythonDataScienceHandbook",O'Reilly,2016.(Units IV)
ReferenceBooks	1. AllenB.Downey, "ThinkStats:ExploratoryDataAnalysis inPython", Green TeaPress,2014.

CourseOutcomes:After completionofthecoursestudentableto

	CourseOutcomeDescription	Knowledge Level
CO1	Definethedatascience process	K2
CO2	Understanddifferenttypesofdatadescriptionfordatascience process	K2
CO3	Gainknowledgeonrelationshipsbetweendata	K3
CO4	UsethePythonLibrariesforDataWrangling	K3

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating

N. Geetharjali K. Aranth Kumar

COURSEANDPROGRAMMEOUTCOMESMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	2	1	2	2	-	-	-	1	1	1	2
CO2	2	1	-	1	1	-	-	-	2	1	-	1
CO3	2	2	1	2	2	1	1	-	1	2	1	1
CO4	3	2	2	1	2	-	-	-	1	1	1	1
CO5	2	3	1	2	2	-	-	-	1	1	2	-

<table>
<tr><td rowspan="2">R25MCA204</td><td rowspan="2">PRACTICAL– 3
ArtificialIntelligence.</td><td rowspan="2">Hours/Week</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>2</td></tr>
<tr><td colspan="7">List ofPrograms</td></tr>
<tr><td colspan="7">1. WriteaProgramtoImplementTic-Tac-ToegameusingPython.
2. I.WriteaProgramtoImplementDepthFirstSearchusingPython
. II.ImplementationofA*Algorithmusing Python.
3. WriteaProgramtoImplementWater-JugproblemusingPython.
4. WriteaProgramtoImplementTravellingSalesmanProblemusing Python.
5. WriteaProgramtoImplementTowerofHanoiusing Python.
6. WriteaProgramtoImplementMonkeyBananaProblemusingPython.
7. WriteaprogramtoimplementAlpha-BetaPruningUsingPython.
8. WriteaProgramtoImplement8-QueensProblemusingPython.</td></tr>
</table>

R25MCA202	PRACTICAL– 3 CryptographyandNetwork Security	Hours/Week	L	T	P	C
			3	0	0	2

List ofPrograms

1. WriteprogramstoimplementtheCaesarCipherandtheVigenèreCipher
2. Implement the RSA encryption and decryption algorithm. Use smallprime numbers for simplicity and test it with text data
3. ImplementtheAESorDESencryptionalgorithmstoencryptanddecryptafileor message
4. ImplementtheDiffie-Hellmankeyexchangealgorithmandsimulatekeyexchange between two parties.
5. Create a digitalsignature for a message using RSAor another public-keyalgorithmand implement verification of the signature
6. ImplementtheSHA-256hashfunctions inaprogramminglanguage.
7. ImplementtheMD5hashfunctions inaprogramminglanguage.
8. ImplementECCforencryptionanddigitalsignatures

R25MCA204	PRACTICAL– 3 BlockChainTechnology.	Hours/Week	L	T	P	C
			3	0	0	2

List ofPrograms

1. CreatingMerkle tree
2. CreationofBlock
3. BlockchainImplementationProgrammingcode
4. CreatingERC20token
5. Javacodeto implement blockchaininMerkleTrees
6. JavaCodeto implementMiningusing blockchain
7. JavaCodetoimplementpeer-to-peerusing blockchain
8. CreatingaCrypto-currencyWallet

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R25MCA204	PRACTICAL–3 Data Science	Hours/Week	L	T	P	C
			3	0	0	2

List of Programs

1. Write a programme in Python to predict House Prices.
2. Write a programme in Python to predict the class of the flower based on available attributes.
3. Write a programme in Python to predict if a loan will get approved or not.
4. WriteaprogrammeinPythontopredictthetrafficonanewmodeoftransport.
5. WriteaprogrammeinPythontopredicttheclassofuser.
6. WriteaprogrammeinPythontoindentifythetweetswhicharehatetweetsand whicharenot.
7. WriteaprogrammeinPythontopredicttheageoftheactors.
8. Miniproject to predictthetimetakentosolveaproblemgiventhecurrentstatusofthe user.

<table>
<tr><td rowspan="2">R25MCA205A</td><td rowspan="2">Devops</td><td rowspan="2">Hours/Week</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>CourseObjectives</td><td colspan="6">1. To provide basic concept ofDevOpsand recognizing business importance of DevOps.
2. TounderstandDevOpscapabilitiesinordertoachievebusinessobjectives.
3. Developtechnical expertiseindeploying,managing,andmonitoringcloud applications.
4. Learn to review deployment methodologies, CI/CD pipelines, &observability, and use DevOps tools like Git, Docker, & Jenkins.</td></tr>
<tr><td>UNIT-1</td><td colspan="6">Overview of Devops: Introduction to DevOps, DevOps principles, SDLC models, Agile Methodology, DevOps with Agile using Scrum, Overview of Tools we use in DevOps, CICD, DevOps Engineer Skills, DevOps Delivery Pipeline, DevOps Ecosystem.
GIT - Version Control System: Version Control System, Git, Git Installation with different environments, Commands And Operations In Git with GitHub: Initialize, Status,Add, Commit,Clone, Pull, Push, Difference, Reset, Log,Show, Tag,Stash,Remove.AdvancedGitoperations:Branching,Merging,Rebasing, Merge vs Rebase, Conflict resolving, Deleting remote repositories, Fork Operation.Git integration with Eclipse.</td></tr>
<tr><td>UNIT-2</td><td colspan="6">Configuration Management using Ansible: Needconfigurationmanagement, Introduction to tools like ansible, chef, puppet, Introduction to Ansible, Working of Ansible, Ansible setup and configuration, Ansible Inventory Introduction, Ansible ad-hoc commands, Managing Ansible Configuration file, Creating playbooks with structures and conditions, Managing Ansible Roles, Real-time servers management, Ansible vault to protect ansible playbooks, AWS Provisioning using Ansible.
Container Management using Docker: Introduction to Containerization, Introduction to Docker, Docker setup in multiple environments, Docker Images, Dockerfile creationand deployment,Working withDocker hub, Dockerad-hoc commandslikepush,pull,etc.,CreateYourOwnPrivateDockerRegistryon windows Server, Manage Docker Volumes, Docker Compose, Manage containers using Docker Compose files, Docker Swarm.</td></tr>
<tr><td>UNIT-3</td><td colspan="6">Container Orchestration using Kubernetes: Introduction toContainer Orchestration, Introduction of Kubernetes, Installing Kubernetes Cluster, Manage KubernetesMasterandNodes,Introductionto Pod,Managingpod network , Replication Controller, ReplicaSet, Deployment, Volume management.
Continuous Integration with Jenkins: Introduction to CICD, Introduction to Jenkins, TeamCity, Installation and configuration ofJenkins, Jenkins users and Roles Management, Adding a slave node to Jenkins, Building DeliveryPipeline, Pipeline as a Code, Implementation of Jenkins, Build the pipeline of jobs using Jenkins, Auto-Deployment with Jenkins using git, maven andTomcatserver,Jenkinnodesetupandconfiguration,Jenkinsintegrationwith GIT(SCM).</td></tr>
<tr><td>UNIT-4</td><td colspan="6">Backup / Artifactory Tool: Artifactory tools and purposes, Jfrog vs nexus, Install and setup Jfrog, Maven dependencies backup with Jfrog, Jenkin Jfrog automation job.
Monitoring Tools: Introduction to Nagios XI and Zabbix, Installation and setupofNagios,AddingnodestoNagiosmaster,MonitorWindowsServers, MonitorLinuxServers,Monitoringdifferent metricsinNagios.</td></tr>
</table>

	IntroductiontoDevOpsonCloud: DevOpsonCloud,IntroductiontoAWS, VariousAWSservices,DevOpsusingAWS.
Text Books	**1. DevOpsForBeginners:ACompleteGuideToDevOpsBestPractices by**Craig Berg 2. LearningContinuousIntegration with Jenkinsby Nikhil PathaniaPublished by Packt Publishing Limited, 2017. 3. MasteringDocker,FourthEditionbyRussMcKendrick, PacktPublishing. 4. KubernetesUp&Running:DiveintoTheFutureofInfrastructurebyJoe Beda, Brendan Burns, and Kelsey Hightower, O'Reilly publications.
ReferenceBooks	*1. PracticalDevOps:HarnessthePowerof DevOpstoBoostYourSkillSetand Make Your IT Organization Perform Better by Joakim Verona, PacktPublishing.* 2. EffectiveDevOps:BuildingaCultureofCollaboration,Affinity,andTooling at Scale by Jennifer Davis& Ray Daniels, **O'Reilly publications.**

CourseOutcomes:After completionofthecoursestudentableto

	CourseOutcomeDescription	KnowledgeLevel
CO1	Studentswill beabletoUnderstandtheconceptsofDevOps andtheissuesit resolves,Distributedversioningsystem	K2
CO2	StudentswillbeabletoLearncommonInfrastructure Servers,AvailabilityandScalability	K1
CO3	StudentswillbeabletoImplementAutomated Installations	K3
CO4	StudentswillbeabletoDevelopautomationusingMaven	K6

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating

COURSEANDPROGRAMMEOUTCOMESMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	-	2	-	-	-	-	2	-	-	-	2	-	-
CO2	2	3	2	3	2	-	--	-	-	-	-	-	3
CO3	-	3	-	2	-	-	-	-	-	-	-	2	-
CO4	-	-	3	-	3	-	-	-	-	-	-	2	-
1-Low,2-Medium,3-High													

K. Aranth Kumar

<table>
<tr><td rowspan="2">25MCA205B</td><td rowspan="2">Web Development using Net Technologies</td><td rowspan="2">Hours/Week</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>CourseObjectives</td><td colspan="6">1. To provide a foundationalunderstanding ofwebtechnologies suchas HTML, CSS, JavaScript, and how they work alongside .NET technologies
2. Toprovidehands-onexperiencewithASP.NETWindowsForms,Web Forms for building dynamic web applications
3. Todemonstratetheintegrationofdatabaseswith.NETapplicationsusing ADO.NET for data querying and manipulation
4. To demonstrate Model-View-Controller (MVC) design pattern to create web applications using MVC architecture</td></tr>
<tr><td>UNIT-1</td><td colspan="6">Introduction:NETframework,Namespace,Assemblies,OverviewofC#, Literals,Variables,DataTypes,Operators,Expressions,Branching,Looping, Methods, Arrays, Strings, Structures, Enumerations
Object Oriented Concepts of C#: Classes, Objects, Constructor and Destructors,Inheritance,Polymorphism,Interfaces,OperatorOverloading, Delegates, ErrorsandExceptions</td></tr>
<tr><td>UNIT-2</td><td colspan="6">Windows Applications: Windows Form, Common Controls, Container Controls, Developing Windows Application, Events, Types of Events – Mouse, Focus, Drag, Key and Other Related Events, Menus - Dialogs – ToolTips, Building Windows Applications.
ASP.NET:IntroductiontoASP.NET,WorkingwithWebandHTMLControls, Server Controls, Login controls, Validation Controls, Accessing Data using ADO.NET.</td></tr>
<tr><td>UNIT-3</td><td colspan="6">ADO.NET: Benefits of ADO.NET, Datasets, Managed Providers -, Data Binding: Data Source Controls -, Reading and Write Data Using the SqlDataSource Control
Themes and Master Pages: Creating a Consistent Website, Master Pages, Displaying Data with the GridView Control, Filter Data in the GridViewControl,AllowUserstoSelectfromaDropDownListintheGrid,Adda HyperlinktotheGrid,DeletingaRowandHandling Errors</td></tr>
<tr><td>UNIT-4</td><td colspan="6">Multithreaded Programming: Thread Class, Life Cycle of a Thread, Steps for Creating a Thread, Thread Synchronization.
WebServices:WebServices,WebServiceArchitecture,WSDL,BuildingWSDL Web Service.
Reports:Need ofReportsinapplications,Developing aReport,Differentways toInvoke/DeployReports</td></tr>
<tr><td>Text Books</td><td colspan="6">1. ProgramminginC#APrimer(FourthEdition),EBalagurusamy,McGraw Hill Education (India)
2. BeginningASP.NET2.0withC#ChrisHart,JohnKauffman,David Sussman, and Chris Ullman, Wiley Publishing, Inc.</td></tr>
<tr><td>ReferenceBooks</td><td colspan="6">1. AndrewStellman, Jennifer Greene - HeadFirst C#ALearner'sGuideto Real-World Programming with C# and .NET-O'Reilly Media (2024)
2. SimonJ.PainterFunctionalProgramming withC#-O’Reilly(2024)</td></tr>
<tr><td colspan="7"></td></tr>
</table>

CourseOutcomes:After completionofthecoursestudentableto

	CourseOutcomeDescription	KnowledgeLevel
CO1	Students understand thefundamentals of web development, including HTML, CSS and integratewith.NET technologies	K2
CO2	Studentsusethe.NETframeworktodevelopWindowsApplicationsandtodevelopdynamic,secure,andscalable WebApplications	K3
CO3	Students capable to integrate databases with .NET applications using ADO.NET and for accessing,modifying, and managing data	K3
CO4	StudentscreatewebapplicationsusingtheModel-View-Controller(MVC)designpattern	K6

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating

COURSEANDPROGRAMMEOUTCOMESMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	2	2	-
CO2	2	3	-	3	-	-	-	-	-	-	3	-	2
CO3	3	-	2	2	-	-	-	-	-	-	-	3	-
CO4	-	2	3	-	-	-	-	-	-	-	-	2	-

1-Low,2-Medium,3-High

N. Geethanjali K. Ananth Kumar

R25MCA206	Fundamentals of Quantum Computing Techniques	Hours/Week	L	T	P	C
			4	0	0	3
Course Objectives	1. Tointroducethe buildingblocksofQuantumcomputers 2. Tohighlighttheparadigmchangebetweenconventionalcomputingand quantum computing. 3. Tounderstand theQuantumstatetransformationsand thealgorithms 4. To understand entangled quantumsubsystems and properties ofentangled states 5. Toexploretheapplicationsofquantumcomputing.					
UNIT-1	**Introduction to Quantum Computing:** Introduction to Superposition, Classical superposition, Quantum superposition. **ClassicalInformationandComputation:**Bits,Logicgates,Addersand Verilog,Circuitsimulation andBoolean Algebra,Reversible Logic gates,Error Correction, Computational Complexity, Turing Machines.					
UNIT-2	**Quantum Building Blocks:** The Quantum Mechanics of Photon Polarization, Single-Qubit Quantum Systems, Quantum State Spaces, Entangled States, Multiple-QubitSystems,MeasurementofMultiple-QubitStates,EPRParadox andBell'sTheorem,Blochsphere.					
UNIT-3	**Quantum State Transformations**: Unitary Transformations, Quantum Gates, UnitaryTransformationsasQuantumCircuits, Reversible ClassicalComputations to Quantum Computations, Language for Quantum Implementations. **Quantum Algorithms:** Computing with Superpositions, Quantum Subroutines, QuantumFourierTransformations,Shor'sAlgorithmandGeneralizations, Grover'sAlgorithmand Generalizations					
UNIT-4	**EntangledSubsystemsandRobustQuantum:**QuantumSubsystems,Properties of Entangled States, Quantum Error Correction, Graph states and codes, CSS Codes, Stabilizer Codes, Fault Tolerance and Robust Quantum Computing. **Quantum Information Processing:** Limitations of Quantum Computing, Alternatives to the Circuit Model of Quantum Computation, Quantum Protocols, Building Quantum, Computers, Simulating Quantum Systems, Bell states. Quantum teleportation. Quantum Cryptography, no cloning theorem.					
Text Books	1. JohnGribbin,Computing withQuantumCats:FromColossustoQubits,2021 2. William(Chuck)Easttom,QuantumComputing Fundamentals, 2021. 3. EleanorRieffelandWolfgangPolak,QUANTUMCOMPUTINGAGentle Introduction, 2011.					

ReferenceBooks	1. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information Vol. I: Basic Concepts, Vol II: Basic Tools and Special Topics, World Scientific. 2004 2. PittengerA. O., AnIntroductiontoQuantumComputingAlgorithms2000. 3. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge University Press.2002.

CourseOutcomes:After completionofthecoursestudentableto

	CourseOutcomeDescription	Knowledge Level
CO1	Understandthebasicprinciplesofquantumcomputing.	K2
CO2	Gainknowledgeofthefundamentaldifferencesbetweenconventionalcomputing and quantum computing.	K3
CO3	Understandseveralbasicquantumcomputing algorithms.	K2
CO4	Understand the classes of problems that can be expected to be solved well by Quantum computers.	K2
CO5	SimulateandanalyzethecharacteristicsofQuantumComputingSystems.	K4
CO6	Exploreandunderstandtheapplicationsofquantumcomputing	K2

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating

COURSEANDPROGRAMMEOUTCOMESMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	-	-	2	-	-	-	-	-	-	-	-	3
CO2	-	3	-	2	-	-	--	-	-	-	2	-	2
CO3	-	3	2	-	-	-	-	-	-	-	-	2	-
CO4	2	-	3	-	-	-	-	-	-	-	-	2	-

1-Low,2-Medium,3-High

R25MCA206B	UserInterfaceandUser Experience(UI&UX) Design	Hours/Week	L	T	P	C
			4	0	0	3
Course Objectives	1. UnderstandcoreUI and UXprinciples 2. Conductuserresearchandcreateuserpersonas. 3. Developwireframesandprototypes. 4. EffectivelyuseFigmaforUI/UX design.					
UNIT-1	**UserInterface Design** **Introduction to UI Design:** What is UI? Importance of good UI. UI design principles. The relationship between UI and UX. **Visual Design Fundamentals:** Typography, Color theory, Layout, Imagery, and Iconography. Creating design systems and style guides. Accessibility considerations in UI design. **UI Design Elements:** Buttons, forms, navigation menus, modals, and other UI components. Best practices for designing interactive elements. **UI Design Process:** Understanding user needs, sketching, wireframing, prototyping, and visual design.					
UNIT-2	**UserExperienceDesign** **IntroductiontoUXDesign:**WhatisUX?Importanceof user-centereddesign. The UX design process. **User Research:** Understanding user needs, goals, and behaviors. User interviews, surveys, and usability testing. Creating user personas and scenarios. **InformationArchitecture:**Organizingandstructuringcontenttoimproveusability. Sitemaps, user flows, and navigation design. **InteractionDesign:**Designinghowusersinteractwithasystem.Userinput methods,feedback mechanisms,anderrorhandling.					
UNIT-3	**FigmaforUIDesign** **IntroductiontoFigma:**Figmainterfaceoverview.Creatingandmanagingfiles. Basic tools and features. **DesignToolsinFigma:**Workingwith shapes,text,images,andvectors.Using constraints and auto layout for responsive design. **PrototypinginFigma:**Creatinginteractiveprototypeswithanimationsand transitions. Using Figma's prototyping features for user testing. **CollaborationinFigma:**Real-timecollaboration,sharingfiles,andmanaging permissions. Using comments and feedback features.					
UNIT-4	**FigmaforUXDesign** **Figmafor UXResearch:** Using Figma for creating user journey maps, storyboards, and other UX research artifacts. **WireframinginFigma:**Creatinglow-fidelityandhigh-fidelitywireframes.Using Figma'swireframing tools and resources. **Prototyping for UX Testing:** Creatinginteractiveprototypes for usabilitytestinganduser feedback. **Plugins in Figma:** Exploring and using Figma plugins to enhance UX design workflows. **DesignSystemsinFigma:**BuildingandmaintainingdesignsystemsinFigmafor consistent UI/UX.					
Text Books	1. Figmafor UI/UXDesigners:ABeginners'GuidebyAdityaNair 2. JeffGothelf, JoshSeiden- LeanUX_ ApplyingLeanPrinciplestoImproveUser Experience-O'Reilly Media (2013) 3. TheEssentialGuidetoUserInterfaceDesignAnIntroductiontoGUIDesign PrinciplesandTechniquesWilbertO.GalitzWileyThird Edition.					

K. Aranth Kumar

Reference Books	1.JonYablonski-LawsofUx_UsingPsychologytoDesignBetterProducts& Services-O'ReillyMedia(2024)(5)

CourseOutcomes:After completionofthecoursestudentableto

	CourseOutcomeDescription	Knowledge Level
CO1	Learnhowto researchuserneedsand requirements	K2
CO2	Learnhowtomapouttheuser'sjourneyandcreateauser-centered design	K2
CO3	Learnhowto codein front-end development	K2
CO4	Learnhowtocreateanattractiveandinteractiveuserinterface	K2

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating

COURSEANDPROGRAMMEOUTCOMESMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	-	2	-	-	-	-	-	-	-	2	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	2	-
CO3	2	2	2	2	-	-	-	-	-	-	-	-	2
CO4	2	-	-	-	-	-	-	-	-	-	-	-	-

1-Low,2-Medium,3-High

K. Aravath Kumar

R25MCA207	PRACTICAL– 4 Devops.	Hours/Week	L	T	P	C
			3	0	0	2

List ofPrograms

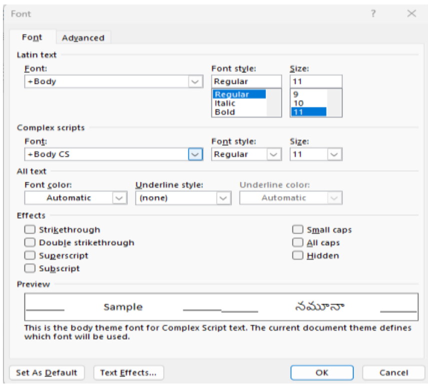
1. Writecodeforasimpleuserregistrationformforanevent.
2. ExploreGitandGitHubcommands
3. PracticeSourcecodemanagementonGitHub.
4. Jenkinsinstallationandsetup,explore theenvironment.
5. Demonstratecontinuousintegrationanddevelopment usingJenkins.
6. ExploreDockercommandsforcontentmanagement.
7. DevelopasimplecontainerizedapplicationusingDocker.
8. IntegrateKubernetesandDocker

R25MCA207	PRACTICAL–4 Web Development using .NetTechnologies	Hours/Week	L	T	P	C
			3	0	0	2

List ofPrograms

1. WriteaC# programto displaythedigitsofalargeintegerinwords(Upto OneCrore)
2. DesignthefollowingSimpleCalculatorusingC#C#WindowsApplications

3. DesignthefollowingFont DialogBoxusingC#WindowsApplications(Don't usebuilt-in font Dialog Box)
4. WriteaC#programtoimplementMultithreading andThread Synchronization
5. Create Windows Application to Add, Update, Search, Delete the Studentdetails (HTNO, Student_Name, Course1_Marks, Course2_Marks, Course3_Marks, Total_Marks, Results). Write a programming code to read read<HTNO, Student_Name, Course1_Marks, Course2_Marks, Course3_Marks>, calculate Total_Marks, Results and update Total_Marks, Results values in the Student table.
6. Create Web Application to Add, Update, Search, Delete the Book(ISBN, Title, Author, Price, Publisher)details.
7. DevelopWeb ApplicationforRegistrationofSemesterEndExaminationswithallValidationControls



8. Develop Web Application to bind the Student table details and performEdit, Delete operation in the Grid Control

<table>
<tr><td rowspan="2">R25MCA207</td><td rowspan="2">PRACTICAL– 4
QuantumComputing</td><td rowspan="2">Hours/Week</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>2</td></tr>
<tr><td colspan="7">List ofPrograms</td></tr>
<tr><td colspan="7">1.WriteaprogramtoimplementDeutsch’salgorithm
2 WriteaprogramtoimplementDeutsch’s-Jozsaalgorithm
3 WriteaprogramtoimplementShorfactorizationtechnique
4 WriteaprogramtoimplementGroversearchtechnique
5. Writeaprogramtoimplementquantumencryptionmethodsfor Cyber Security.
6. WriteaprogramtoimplementanapplicationforFinancialModeling.
7. WriteaprogramtoimplementanapplicationforTrafficOptimization.
8. WriteaprogramtoimplementapplicationforWeatherForecastingandClimateChange.
9. WriteaprogramtoimplementapplicationforArtificialIntelligence.</td></tr>
</table>

R25MCA206	PRACTICAL– 4 User Interface and User Experience (UI & UX) Design	Hours/Week	L	T	P	C
			3	0	0	2

List ofPrograms

1. BuildingasimpleUIdesignandUser flows foramobile application.
2. Creatingwireframesforawebsite inFigma.
3. Designthebasiclayoutforaweatherapplication
4. DesignUI forUniversityDashboard
5. Createtheflowforausertopurchaseanitem,startingfromtheproductpagetothe confirmation screen.
6. Createasimpleprototype(suchasaregistrationform)andconductusabilitytesting. Gather feedback and iterate on your design based on the results.
7. Designa landing page or home page that works wellon bothdesktopand mobile devices. Use Figma's constraints and auto-layout features to make it responsive.
8. DesignUIandUXforExaminationsRegistration

<table>
<tr><td>Programme</td><td>MCA</td><td>Semester</td><td colspan="3">Second</td></tr>
<tr><td>Course Code</td><td>208</td><td>Course Name</td><td colspan="3">MOOCS(NPTEL/SWAYAM)–II
Any 12 Week Course on Management / Mathematics / Applied Mathematics / Statisticsofferedotherthan ComputerScience.</td></tr>
<tr><td rowspan="3">Course Category</td><td rowspan="3">OPEN ONLINE TRANSDISCIPLINARY COURSE - 2</td><td rowspan="2">Hours/Week</td><td>L</td><td>T</td><td>P</td></tr>
<tr><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Credits</td><td colspan="3">2</td></tr>
<tr><td colspan="6">MOOCs for Mandatory Additional Requirements (MAR) is provided for encouraging every student to enter in Digital Content form of Education from well-known Universities or organizations.
Students can choose any MOOCs 12 week course in Management / Mathematics / Applied Mathematics / Statistics as per their interest area other than Computer Science. There are 2 credits for MOOCs in MAR as points could be earned as specified in the scheme and the MOOCs courses which are taken for earning credits for MCA degree will not be considered in MAR purpose. The validity of uploaded certificates in the University portal is subject to acceptance of appropriate committee/expert review.
<u>EvaluationoftheMOOCscourse</u>
Evaluation of the MOOCs courses would be done by the organization by whom it is being offered. Inextraordinarycircumstances, the modalityofevaluationthroughcertified personnel, online or offline, will be decided by the appropriate authority.
Every Affiliated Institution has to upload the details of MOOCs data in respect of each student time to time in University’s examinations portal and/or hard/soft copy as per instruction of the Controller of Examinations of the University. This is applicable for University’s In-House Programs also from the University regarding mapping of course for credit transfer/assessment process.</td></tr>
</table>

R25MCA209	Indian Knowledge Systems – 2 Sanskrit and Classical Languages	Hours/Week	L	T	P	C
			4	0	0	0
Course Objectives	1. ThiscoursecreatesinterestinstudenttolearnIndianSanskritMahakavya,Fablesand Basic Sanskrit. 2. ThecourseisintendedtointroducetheSanskritMahakavya,FablesandBasicSanskrit.					
UNIT-1	**IntroductiontoKalidasaandhisworks:**PoetryofKalidasa,MahakavyasofKalidasa, DramasofKalidasa,OtherworksofKalidasa.					
UNIT-2	**Kumarasambhava:**AnintroductiontoSanskritPanchamahakavya,TwoMahakavyaof Kalidasa and the content of those, KumarasambhavaSarga I Slokas 1-10, KumarasambhavaSargaISlokas11-20.					
UNIT-3	**IntroductiontoPanchatantraofVishnusharma:**Periodoffable,Characteristicsoffable, PurposeofPanchatantra,MoralvaluesofPanchatantra.					
UNIT-4	**SimhaShashakaKatha:**Applicationofknowledge,Thoughtlessactionbegetssorrow, TextualstudyofSimhaShashakaKatha,Moralcontentofthestory.					
Text Books	1. Kumarasambhava(1 Canto)ofKalidasa 2. Panchatantram-SimhaShashakaKatha 3. Kalidasanorupathanam–BhashaInstitute 4. Siddharupam 5. AShortHistoryofSanskritLiterature,R.S.Vadhyar&Sons,Palakkad,1989					
ReferenceBooks	1. Samkritasahityetihasa-RamachandraPandey					

CourseOutcomes:After completionofthecoursestudentableto

	CourseOutcomeDescription	Knowledge Level
CO1	FamiliarisetheMahakavyasinSanskrit.	K1
CO2	AttainageneralawarenessofKalidasa	K2
CO3	EnjoythepoeticbeautyofKumarasambhava	K2
CO4	IntroducestoryliteratureandPanchatantra	K2

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating

COURSEANDPROGRAMMEOUTCOMESMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	-	-	-	-	-	-	-
CO2	-	-	-	-	-	2	3	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	1	-	-	-	-	-
CO4	-	-	-	-	-	-	-	2	3	-	-	-	-

1-Low,2-Medium,3-High

Dr. P... N. Geethanjali ... K. Aranth Kumar

R25MCA209	Indian Knowledge Systems – 2 VedicMathematics	Hours/Week	L	T	P	C
			4	0	0	0
Course Objectives	• FosterloveformathʼsandremoveitsfearthroughVedicMathematics • EnhancecomputationskillsinstudentsthroughVedicMathematics· • Developlogicalandanalyticalthinking • Promotejoyfullearningofmathematics • DiscusstherichheritageofmathematicaltemperofAncientIndia					
UNIT-1	**Introduction:**History of Vedic mathʼs, why Vedic mathʼs, salient features of Vedicmathʼs, Vedic mathʼs formulas, 16 sutras and 13 sub sutras, terms and operations, Beejank,Vinculum Operations, High speed addition by using the concept of completing the whole andsuperfast subtraction by NikhilamSutram from basis 100,1000,10,000…andwithanysubbaselike200,300,400 ,500…,Subtractionusing Vinculum.					
UNIT-2	SutrasofMultiplication: Multiplication byNikhilamSutra, multiplicationof numbers nearest to the bases 10,100,1000,10000, and multiplication ofnumbers near subbases 20,30,40,50,60,70,80,90,500,5000…. fast multiplication by 11,12,13….,19, Multiplication with multiples of 111 and 1111, multiplication of numbers consisting of all 9sby Eknuyena and Nikhilam Sutra, multiplication of Numbers ending with 9, MultiplicationbyAnatyodarshkeyapi,MultiplicationbyUrdhavtriyaghbhyamsutram, (two,threeandfourdigits), FormationofanyTwoDigittable.					
UNIT-3	**Sutras of Squares, Square Roots, Cube and Cube Roots:** Meaning of EkadhikenSutram and its applications in finding squaring of numbers ending in 5, squaring by Anurupeyana Sutra, squaring by Yavdunamthavadunikrityavargamchayojyet sutra, squaring by Dwandvayoga sutra (General method of squaring), Verification by Beejank Method, squaring numbers nearest50andanyothersubbase,squarerootsofperfectsquares(upto5digits)by Viloknam Sutra, general method of square roots, cubes by Anurupeyana sutra, Cube Roots of Exact Cubes (upto 6digits).					
UNIT-4	**Sutras of Factorization and Division:**HCF AND LCM, Divisibility test, Divisionby NikhilamNavatascaramamDasatah Sutra, division by ParavartyaYojayet, division by Anurupeyana, Division by Dwazank Sutra (Straight division), Conversion of vulgar fractions 1/19,1/29,1/39,1/49…..into decimals by EkadhikenPurven Sutra, Recurring Decimals of fractions 1/13,1/23,5/33,9/11….by Anurupyen, Auxiliary fractionsanditsapplicationinfindingoutrecurringdecimalsofVulgarfractions, Ratio and proportions Percentage, Profit and Loss, Simple interest, Compound Interest.					
Text Books	1. S.B.Tirthaji,VedicMathematics,MotilalBanarsidassPrivateLimited,Revised Edition,1992.					
Reference Books	1. K.R.Williams,VedicMathematicsTeacherʼsManual,InspirationBooks,RevisedEdition, 2009. 2. M.Tyra, MagicalBookOnQuickerMaths,ESCPublications, 5thEdition, 2018.					
CourseOutcomes:After completionofthecoursestudentableto						

Dr. P and N. Geethanjali K. Aranth Kumar

	CourseOutcomeDescription	Knowledge Level
CO1	Developtheunderstanding ofobjectivesandfeaturesofVedicArithmetic.	K2
CO2	RecognizethemeaningofmathematicalsutrasofvedicarithmeticinSanskrit.	K2
CO3	Understandtheconceptofadditionusingcompletingthewhole Method.	K2
CO4	Manage to solve the multiplication using vertically and crosswise and one morethanthepreviousonemethodanddemonstratemultiplicationby11, 12and13byusingVedicsutrasofmultiplication.	K3

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating

COURSEANDPROGRAMMEOUTCOMESMAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	2	-	-	-	-	-	-
CO2	-	-	-	-	-	-	2	-	-	-	-	-	-
CO3	-	-	-	-	-	-	2	-	-	-	-	-	-
CO4	-	-	-	-	-	-	2	-	-	-	-	-	-

1-Low,2-Medium,3-High

N. Geethanjali K. Ananth Kumar