



**Krishna Chaitanya Institute of Science & Technology::Kakatur
(AUTONOMOUS)**

(Accredited by NAAC, Recognized by UGC Under 2(f), Approved by AICTE &
Affiliated to VS University, Nellore)



DEPARTMENT OF COMPUTER APPLICATIONS

MINUTES OF THE MEETING 1st BOS

The Board of Studies Meeting was held on 1st Nov 2025 at 3.15 P.M via Zoom Video Conference at Krishna Chaitanya Institute of Science & Technology (Autonomous), Kakatur, Nellore District.

The following Members had attended the Meeting:

Department of Computer Applications

S.No	Category	Name of the Member	Signature
1	In charge of the Department (Chairman)	Dr. R.V. Subrahmanya Prasad Department of Computer Applications, Krishna Chaitanya Institute of Science & Technology, Kakatur, Nellore.	
2	Subject Expert -1 nominated by VC	Prof. M .Padmavatamma Professor, Department Of Computer Science, Sri Venkateswara University, Tirupati	
3	Subject Expert -2 nominated by AC	Prof. N.Geethanjali, Professor, Department Of Computer Science & Technology Sri Krishnadevaraya University, Ananthapur.	
4	Subject Expert -3 nominated by AC	Dr. J. Suresh Babu, Associate Professor, Department Of Computer Science & Engineering , K.L.University, Guntur.	
5	Subject Expert from Industry	Sri Srihari .Munta, Managing Director, Munthasoft Technologies Pvt. Ltd Hyderabad.	
6	Alumni	Sri K. Ananth Kumar, Senior Software Engineer, People Combine Basics Pvt. Ltd, Hyderabad.	

7	Faculty -1	Sri A.V. Phani Kumar	A. Merikur.
8	Faculty -2	Dr.B.Gopi	B. Gopinath
9	Faculty -3	Sri M. Venkatesam	M. Venkatesam
10	Faculty -4	Sri N.Venkata Krishna	N. Venkata Krishna
11	Faculty -5	Smt N. Sumalatha	N. Sumalatha

AGENDA OF THE MEETING:

Item No 1: Approval of MCA I & II Semesters R25 Course Structure & Syllabus.

Item No 2: Approval of BCA/ MCA(Dual Degree) I & II Semesters R25 Course Structure & Syllabus.

Item No 3: Approval of Open Elective Courses offered by other Departments (MOOC's) in MCA R-25.

Item No 4: Approval of the Examination Panel Members.

Item No 5: Other Departmental related matters, if any, with the permission of chair.

Item No 1:

APPROVAL OF MCA R-25, I&II SEMESTER DEPARTMENT OF COMPUTER APPLICATION COURSE STRUCTURE AND SYLLABUS.

Discussion:

Presented R-25 Syllabus, for MCA I & II Semester Course Structure of MCA to be implemented from the Academic year 2025-26 to the members of BOS.

Resolution: After a detailed discussions, with the following suggestions BOS had approved the MCA, I&II semester R-25 Department of Computer Application Course Structure & Syllabus to be implemented from the Academic year: 2025-26 and recommended for consideration and approval of the Academic Council.

S. No	Suggestions	Suggestion given by	Remarks
1	Prof. M. Padmavatamma has suggested better to write minimum two Online Examination through NFTEL / SWAYAM..	Prof. M.Padmavatamma	Rectified and Carried out.

Item No 2:**APPROVAL OF BCA/MCA (DUAL DEGREE) R-25 I & II SEMESTERS DEPARTMENT OF COMPUTER APPLICATION COURSE STRUCTURE AND SYLLABUS.****Discussion:**

Presented R-25 Syllabus, for BCA/MCA(Dual Degree) I & II Semester Course Structure of BCA/MCA (Dual Degree) to be implemented from the Academic year 2025-26 to the members of BOS.

Resolution: After a detailed discussions, with the following suggestions, BOS had approved the BCA/MCA(Dual Degree), I&II semester R-25 Department of Computer Application Course Structure & Syllabus to be implemented from the Academic year: 2025-26 and recommended for consideration and approval of the Academic Council.

Item No 3:**APPROVAL OF OPEN ELECTIVES SYLLABUS FOR OTHER BRANCHES IN I MCA I & II SEMESTERS R-25 OFFERED BY THE DEPARTMENT OF COMPUTER APPLICATIONS.****Discussion:**

Presented the R-25 Open Electives Syllabus for other branches in MCA, I and II Semester offered to the Department of Business Administration to be implemented from the Academic year 2025-26 to the members of BOS.

Resolution: After a detailed discussion, R-25 Open Electives Syllabus for MCA, I and II Semester offered by the Department of Computer Applications to be implemented from the Academic year 2025-2026 and recommended for consideration and approval of the Academic Council.

SEMESTER-I

S.No	Course Category	Course Code	Title of the Course	Credits	SEE	IA	Total
1	MOOCs	R25MBA108A	Introduction to C Programming	2	70	30	100
		R25MBA108B	Web Technologies				

SEMESTER-II

S.No	Course Category	Course Code	Title of the Course	Credits	SEE	IA	Total
1	MOOCs	R25MBA207A	Office Automation	2	70	30	100
		R25MBA207B	Data Analysis using SQL				

Item No 4:

APPROVAL OF EXAMINATION PANEL MEMBERS BY THE BOARD OF STUDIES (BOS) FOR MCA I & II SEMESTERS – DEPARTMENT OF COMPUTER APPLICATIONS

Discussion:

A list of Examination Panel Members for MCA I and II Semesters of the Department of Computer Applications was presented for implementation from the Academic Year 2025–2026.

Resolution:

After discussion, the BOS approved the proposed list of Examination Panel Members for MCA I and II Semesters of the Department of Computer Applications to be implemented from the Academic Year 2025–2026. The same was recommended for consideration and approval by the Academic Council.

Item No 5:

OTHER DEPARTMENTAL RELATED MATTERS, IF ANY, WITH THE PERMISSION OF CHAIR:

Approval of the Model Question Paper by the Board of Studies (BOS), for R-25 MCA I and II Semesters – Department of Computer Applications.

Discussion:

The Question Paper Model for MCA I and II Semesters offered by the Department of Computer Applications was presented and to be implementation from the Academic Year 2025–2026.

Resolution:

After a detailed discussion, the BOS approved the Question Paper Model for R-25 MCA I and II Semesters offered by the Department of Computer Applications to be implemented from the Academic Year 2025–2026. The same is recommended for consideration and approval by the Academic Council.

Any other Suggestion(s): Nil


Chairman
Board of Studies

Zoom Link for MBA- Meeting Held on 07th Nov 2025

Topic: 1st Board of Studies-MCA

Time: November 07, 2025, 2 PM Kakatur, SPSR Nellore, AP.

Join Zoom Meeting link: [https://us06web.zoom.us/j/87967763165?pwd=](https://us06web.zoom.us/j/87967763165?pwd=FXcJFbe54aweakbbHgo022bIPAxS3g.1)

FXcJFbe54aweakbbHgo022bIPAxS3g.1

Pass code: 232940.

List of Copies Enclosed:

- I. Master of Computer Applications R-25, I and II Semester Course Structure and Syllabus.
- II. BCA/MCA (Dual Degree) R-25, I and II Semester Course Structure and Syllabus.
- III. List of open Elective Course Structure and Syllabus offered to other departments (MOOC s) by MCA R-25.
- IV. List of the Examination Panel Members
- V. Model Question Paper Structure.



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MCA (Master of Computer Applications)

Course Structure & Syllabus

(2025-26 Academic Year)

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



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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.

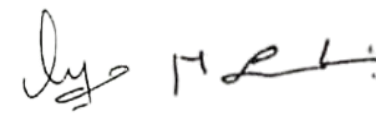
Dr. P. V. Geethanjali  Jy 17 21: K. Ananth Kumar

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 attain the following industry identified Outcome through various teaching 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: Radio Waves, Microwaves, Infrared, Line-of-Sight Transmission, Point-to-Point, Broadcast, Multiplexing: Frequency-Division Multiplexing, Time Division Multiplexing, 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 - IPv4 Address architecture and classification , IPV6 Architecture , differences between IPv4 and IPv6.				
Text Books	1. Data Communication and Networking , Behrouz A. Forouzan, McGraw-Hill Higher Education ISBN-13 978-0073376042. 2. TCP/IP Protocol Suit, Behrouz A. Forouzan : TCP/IP Protocol Suit, McGraw Hill Education ISBN-13 978-0073376042. 3. Computer Networks, A.S. Tanenbaum, PRENTICE HALL ISBN-10: 0-13-212695-8 , ISBN 13: 978-0-13-212695-3.				
Reference Books	1. Data Communication and Networks, Godbole Achyut, McGraw Hill Education ISBN-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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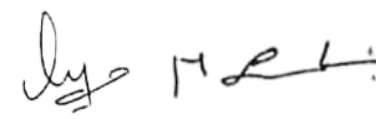
R25MCA 102B	Discrete Mathematical Structures	L	T	P	C
		4	0	0	3
Course Objectives	▪ Introduce the concepts of mathematical logic ▪ Gain knowledge in sets, relations and functions ▪ Solve problems counting techniques and combinatorics. ▪ To introduce generating functions and recurrence relations. ▪ Use 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, Predicate 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, Functions composition of functions, 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. Joe L. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition, Pearson Education. 2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to				



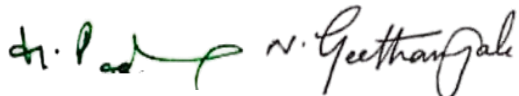



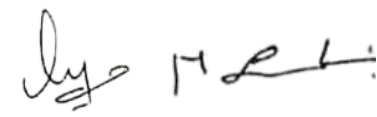

	Computer Science, Tata McGrawHill, 2002.												
Reference Books	1. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7 th Edition, McGraw Hill Education (India) Private Limited. 2. GraphTheorywithApplicationstoEngineeringandComputerSciencebyNarsinghDeo.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




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 ALGORITHMS 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 of Red-Black Trees, Rotations, Insertion, Deletion. B-Trees: Definition of B-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, Longest Common Subsequence. Greedy Algorithms: An Activity-Selection Problem. Elements of the Greedy Strategy, Huffman Codes. NP COMPLETE AND NP HARD: NP-Completeness: Polynomial Time, Polynomial-Time Verification, NP-Completeness and Reducibility, NP-Completeness Proofs. NP-Complete Problems.				
Text Books	-Data Structures and Algorithms, Pearson Education, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman Reprint 2006. 2. Robert Sedgwick and Kevin Wayne, ALGORITHMS, Fourth Edition, Pearson Education.				
Reference Books	1. "Design and Analysis of Algorithms". BY S. Sridhar, First Edition, Oxford University Press. 2014. 2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, -Introduction to Algorithms. Third Edition, Prentice-Hall. 2011				






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

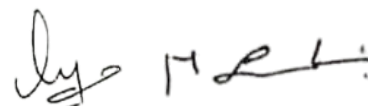
CO3	Identify basic counting techniques to solve combinatorial problems	K4
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K1:Remembering,K2:Understanding,K3:Applying,K4:AnalyzingK5:Evaluating,K6:Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

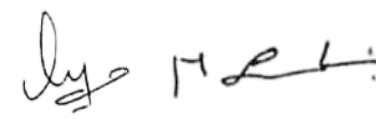
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	-	3	-	-	-	-	-	-	-	1	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-	2
CO3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO4	3	-	-	-	-	-	-	-	-	-	-	2	-

1-Low,2-Medium,3-High

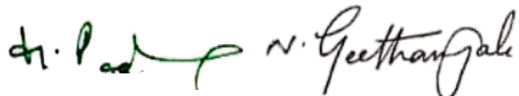
Dr. P. S. V. Geetha Raju   K. Ananth Kumar

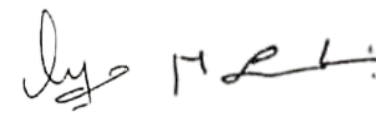
Reference Books	1. Silberschatz, Galvin, Gagne: Operating System Concepts, 8th Edition, Wiley, 2008 2. Andrew S. Tanenbaum, Albert S. Woodhull Operating Systems, Design and implementation, 3rd Edition, Prentice Hall, 2006. 3. Pradeep K Sinha :Distribute Operating Systems, Concept and Design, PHI, 2007												
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													




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 and Las 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, 3rd edition, Prentice Hall. 2. G.Brassard, P.Bratley, Fundamental of Algorithms, PHI.				

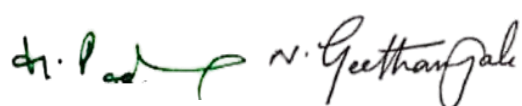


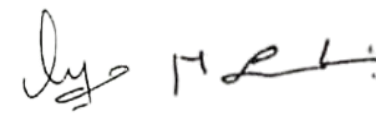



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Dr. P. V. Geethanjali  Date:  K. Ananth Kumar

R25MCA105A	Java Full Stack Development	L	T	P	c
		4	0	0	3
Course Objectives	▪ Learn the basic data structure operation using Java Collection Framework and understand Lambda expressions. ▪ Build web applications using JSP and JSTL. ▪ Understand Spring Framework 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 RESTful 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 DataSource to obtain JDBC Connection, Data Access operations with Jdbc Template and Spring. Spring Boot: Spring Boot and Database, Spring Boot Web Application Development.				
TextBooks	1. Java 6 Programming Black Book, Wiley–Dream tech publications. 2. Beginning Spring, Mert Caliskan and Kenan Sevindik 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.				






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

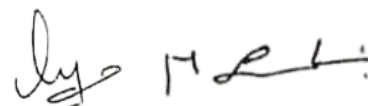
	Course outcomes description	knowledge level
CO1	UnderstandingonJ2EEArchitectures,clientandserver communication process ,servlets and JSP	K2
CO2	Handle errors and exception sin Web Applications	K3
CO3	Analyse effectiveness of creating dynamic webpages using servlet and JSP	K4

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

Dr. P. S. V. Geetha Raju   K. Ananth Kumar

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 injection detection, Types of SQL injection, SQL injection methodology, SQL Injection prevention and counter measures.
	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, Pen Testing, need for pen testing, types and techniques of pen testing, 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 Belapure and Nina Godbole, 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 Guide v9, Study Guide Edition, 2016. 3. Emmett Duley and Chuck Easttom, CompTia Security+ Study Guide. 4. Tutorials Point Professionals, Ethical Hacking by Tutorials Point.

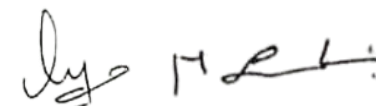
Course Outcomes :After completion of the course students are able to

CO1	Recall the networking ,sql,and encryption algorithm Concepts' of further study ethical hacking techniques, 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

COURSE AND PROGRAMME OUTCOMES MAPPING

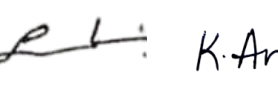
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	2	-	-	1	-	-	3	-	-	1	-	-
CO2	-	2	-	-	2	-	-	3	-	-	1	-	-
CO3	-	-	-	2	-	-	-	3	-	-	-	1	-
CO4	-	2	-	1	-	-	-	3	-	-	-	-	1
1-Low,2-Medium,3-High													

Dr. P. S. V. Geetha Raju   K. Aranth Kumar

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”, 6 th 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		








	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													

Dr. P. V. Geethanjali  Date:  17/2/24: K. Ananth Kumar

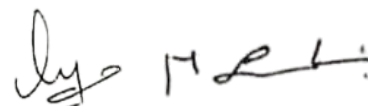
R25MCA106A	Advanced Python Programming	L	T	P	C
		4	0	0	3
Course Objectives	▪ To learn how to design object-oriented programs with Python classes. ▪ To learn about reading, writing and implementing other operation on files in Python. ▪ To implement the reading concept and multithreading on Python ▪ To 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, WesleyJ.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.				

Dr. P. S. V. Geethanjali   K. Aranth Kumar

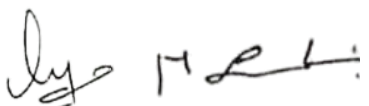
Course Outcomes: After completion of the course students are able to

	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													

Dr. P. S. V. Geetha Raju   K. Ananth Kumar

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					

 Dr. P. S. V. Geetha
 Dr. S. S. S. S. S.
 Dr. S. S. S. S. S.
 K. Ananth Kumar

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. Write a program in Spring JDBC to demonstrate ResultSetExtractor Interface
11. Write a program to demonstrate RowMapper interface to fetch the records from the database.

Spring Boot and RESTful Web 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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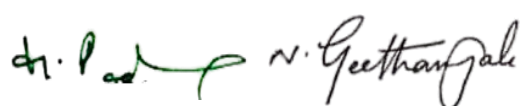
Spring Boot and RESTful Web Services

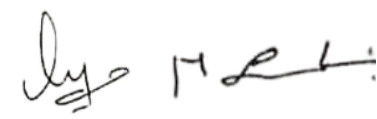
12. Write a program to create a simple Spring Boot application that prints a message.
13. Write a program to demonstrate RESTful Web Services with spring boot.

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

List of Programs

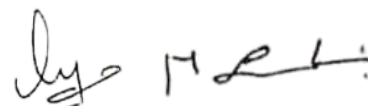
- Create Student (HTNO, Surname, First Name, Last Name, Percentage_of_Marks, Data_of_Joining, Department_ID) and Department(Department_ID, Dept_Name, HOD, Contact No, E-Mail) tables with relevant Primary Key, Foreign Key and other constraints. Perform the following
 - Insert five student details in five departments.
 - Display all students order by department no.
 - Display all students in each department who has highest percentage.
- Design a database for the University Library which includes tables 1) Student 2) books 3) Issue. Perform the following queries.
 - Display all the books in the Library.
 - Display the titles of only computer books in the Library.
 - Display the book title which was most issued.
 - Display the book title which was not read by any student.
- Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
- Write a PL/SQL block to obtain factorial of a number and program for Fibonacci numbers in PL/SQL.
- Write PL/SQL procedure for exception handling.
- Write PL/SQL procedure for an implicit cursors and explicit cursor.
- Create a trigger in PL/SQL such that on Sunday and Saturday after 1 PM no transactions should take place on the Account table.
- Design ER-diagram for the following scenario, convert the same into a relational model and then solve the following queries. Consider a Cricket Tournament "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, Address (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.
 - Display the youngest player (in terms of age) Name, Team name, age in which he belongs of the tournament.
 - List the details of the stadium where the maximum number of matches were played.
 - List the details of the player who is not a captain but got the man_of_the match award at least in two matches.
 - Display the Team details who won the maximum matches.
 - Display the team name where all its won matches played in the stadium.



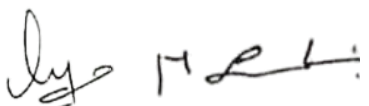



R25MCA106P	PRACTICAL–II Advanced Python Programming	L	T	P	C
		3	0	0	2
List of Programs					
1. Write a Python program about Class variables using Robot Class. 2. Implement Instance variable concept of ATM Machine Class. 3. Write a program to implement Inheritance. 4. Write a program to implement Polymorphism. 5. Write a program to implement Data encapsulation. 6. Write a program to implement String manipulation operations using python library 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. Write a program to draw Bar chart horizontal and vertical bars using python library 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.					




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	• Learn about the changes in society, economy, politics, and culture under various 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 Technology in Gupta Period-Chronology of Various Dynasties that ruled India (6th Century BC to 1206 CE).					
UNIT-2	History and Culture of Medieval India: Delhi Sultanate: Rulers (Brief), Alla-Ud-Din Khilji and Muhammad-Bin-Tuglaq Reforms-Greater Mughals (Brief)-Mugh Administration-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 1857 Revolt-Indian Freedom Struggle: Vande Mataram, Home Rule Movement-Gandhi's Role: Non-Cooperation Movements, Salt Satyagraha and Quit India 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. Religion and Philosophy in India: Ancient Period: Pre-Vedic and Vedic Religion, Buddhism and Jainism, Indian philosophy– Vedanta and Mimamsa a school of Philosophy.					
UNIT-4	Spread of Indian Culture Abroad: Causes, Significance and Modes of Cultural Exchange - Through Traders, Teachers, Emissaries, Missionaries and Gypsies. Indian Culture in South East Asia, India, Central Asia and Western World through 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 of India, Macmillan, 1948. 3. Sumit Sarkar., Modern India, Pearson India, 2014. 4. Kabir, Humayun, Our Heritage, National Information and Publications Ltd Mumbai, 1946. 5. Malik, S. C., And Understanding Indian Civilisation: A Framework of Enquiry, India Institute of Advanced Study, Simla, 1975. 6. Pandey, Govind Chandra, Foundations of Indian Culture, Books and Books, New Delhi, 1984.					

Dr. P. V. Geethanjali   K. Ananth Kumar

UNIT-4		APPRECIATION OF ELECTRONIC EVIDENCE: Concept of Electronic Records and ElectronicEvidence,RecognitionofelectronicrecordsundertheUNCITRALModel Law&ITAct,TypesofElectronicEvidence,Sourcesofelectronicvidence,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, 2 nd 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

Issues in collection of electronic Evidence, Chain of custody of electronic evidence, Admissibility of electronic evidence under Indian laws.

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.

Text Books	1. Chris Reed, Internet Law-Text and Materials, Universal Law Publishing Co., New Delhi, 2nd Edition, 2005. 2. Ian Lloyd, Information Technology Law, Oxford University Press, 7th Edition, 2014.
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Reference Books	1. VakulSharma, InformationTechnologyLawandPractice, UniversalLawPublishing, 2017. 2. RodneyD Ryder&NikhilNaren,InternetLaw-RegulatingCyberspaceand emerging Technologies,Bloomsbury,2020.
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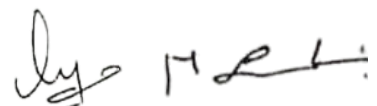
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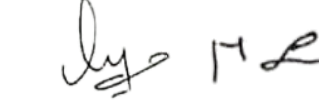
COURSE AND PROGRAMME OUTCOMES MAPPING

	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. S. V. Geetha Raju   K. Ananth Kumar

R25MCA201	Enterprise Software Engineering	Hours/Week	L 4	T 0	P 0	C 4
Course Objectives	1. Understand how large enterprises manage software projects across dozens of engineering teams. 2. Understand the operations and responsibilities of different functional teams within a large technology organization. 3. Learn about different types of enterprise architecture and associated design 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. DevOps Practices, Site Reliability Engineering, Production Support, 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. Message Broker Architecture, Event-Based Architecture, Business Process 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, Serverless Computing, PaaS & IaaS. Information Security: Vulnerability Management, Risk Management, 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'Reilly publications.					
Reference Books	1. Designing Software Architectures by HUMBERTO CERVANTES, Rick Kazman, PEARSON INDIA.					

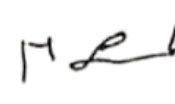



Course Outcomes: After completion of the course student able to													
	Course Outcome Description										Knowledge Level		
CO1	Understand enterprise-levels of tware development challenges										K2		
CO2	Apply appropriate design patterns and architectures										K3		
CO3	Model complex business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

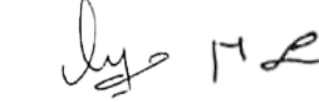







R25MCA202A	Artificial Intelligence	Hours/Week	L 4	T 0	P 0	C 3
Course Objectives	1. Learn the basic AI approaches 2. Develop problem solving agents 3. Perform logical and probabilistic reasoning					
UNIT-1	Intelligent Agents: Introduction to AI, Agents and Environments, concept of rationality, nature of environments, structure of agents. Problem solving agents, Search algorithms, uninformed 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. Probabilistic Reasoning: Acting under uncertainty, Bayesian inference, 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. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 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. Deepak Khemani, “Artificial Intelligence”, Tata McGraw Hill Education, 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						



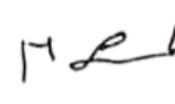




COURSE AND PROGRAMME OUTCOMES MAPPING

	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 4	T 0	P 0	C 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.					

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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.
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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

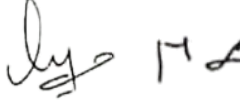
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	-	-	-	2	-	-	-	-	-	-	-	-	3
CO2	3	3	-	-	-	-	--	-	-	-	-	-	2
CO3	3	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	3	3	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-	3

1-Low,2-Medium,3-High

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R25MCA203B	Block Chain Technology	Hours/Week	L 4	T 0	P 0	C 3
Course Objectives	1. To give students an understanding of emerging abstract models for Blockchain Technology 2. To familiarise with the functional/operational aspects of the cryptocurrency eco-system					
UNIT-1	Basics: Distributed Database, Two General Problem, byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature-ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.					
UNIT-2	BlockChain: Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, 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.					
UNIT-3	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					
UNIT-4	Crypto currency Regulation: Stake holders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Block chain.					
Text Books	1 Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steve Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016). 2. Melanie Swan, "Block Chain: Blue print for a New Economy", O'Reilly, first edition – 2015 3. Daniel Drescher, "BlockChain Basics", Apress; 1st edition, 2017 4. Anshul Kaushik, "BlockChain and Cryptocurrencies", Khanna Publishing House, Delhi.					
Reference Books	1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies 2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System 3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger," Yellow paper. 2014. 4. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts					






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

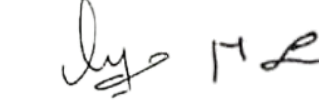
COURSEANDPROGRAMMEOUTCOMESMAPPING

	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													

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R25MCA203A	Data Science	Hours/Week	L	T	P	C
			4	0	0	3
Course Objectives	▪ Tounderstandthedata sciencefundamentalsand process. ▪ Tolearntodescribethedataforthedata scienceprocess. ▪ Tolearntodescribethere relationshipbetween data. ▪ 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,least squaresregressionline,Standarderrorofestimate, interpretationofr ² ,multipleregression equations,regression towardsthe mean.					
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	Definethedata science process				K2	
CO2	Understanddifferenttypesofdatadescriptionfordata science process				K2	
CO3	Gainknowledgeonrelationships between data				K3	
CO4	UsethePythonLibrariesforDataWrangling				K3	
K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6- Creating						




COURSE AND PROGRAMME OUTCOMES MAPPING

	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	-

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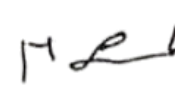
R25MCA204	PRACTICAL– 3 ArtificialIntelligence.	Hours/Week	L 3	T 0	P 0	C 2
List of Programs						
1. WriteaProgramtoImplementTic-Tac-ToegameusingPython. 2. I. WriteaProgramtoImplementDepthFirstSearchusingPython . II.ImplementationofA*Algorithmusing Python. 3. WriteaProgramtoImplementWater-JugproblemusingPython. 4. WriteaProgramtoImplementTravellingSalesmanProblemusing Python. 5. WriteaProgramtoImplementTowerofHanoiusing Python. 6. WriteaProgramtoImplementMonkeyBananaProblemusingPython. 7. WriteaprogramtoimplementAlpha-BetaPruningUsingPython. 8. WriteaProgramtoImplement8-QueensProblemusingPython.						

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




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. Write a programme in Python to predict the traffic on a new mode of transport. 5. Write a programme in Python to predict the class of user. 6. Write a programme in Python to identify the tweets which are hate tweets and which are not. 7. Write a programme in Python to predict the age of the actors. 8. Mini project to predict the time taken to solve a problem given the current status of the user.						

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R25MCA205A	Devops	Hours/Week	L	T	P	C
			4	0	0	3
CourseObjectives	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.					
UNIT-1	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.					
UNIT-2	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.					
UNIT-3	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).					
UNIT-4	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.					

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	Introduction to DevOps on Cloud: DevOps on Cloud, Introduction to AWS, Various AWS services, DevOps using AWS.
Text Books	1. DevOps For Beginners: A Complete Guide To DevOps Best Practices by Craig Berg 2. Learning Continuous Integration with Jenkins by Nikhil Pathania Published by Packt Publishing Limited, 2017. 3. Mastering Docker, Fourth Edition by Russ McKendrick, Packt Publishing. 4. Kubernetes Up & Running: Dive into the Future of Infrastructure by Joe Beda, Brendan Burns, and Kelsey Hightower, O'Reilly publications.
Reference Books	1. <i>Practical DevOps: Harness the Power of DevOps to Boost Your Skill Set and Make Your IT Organization Perform Better</i> by Joakim Verona, Packt Publishing. 2. Effective DevOps: Building a Culture of Collaboration, Affinity, and Tooling at Scale by Jennifer Davis & Ray Daniels, O'Reilly publications.

Course Outcomes: After completion of the course student able to

	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-Appling,K4-Analyzing,K5-Evaluating,K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	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

Dr. P. V. Geethanjali Dr. J. M. R. Ananth Kumar

25MCA205B	Web Development using Net Technologies	Hours/Week	L	T	P	C
			4	0	0	3
CourseObjectives	1. To provide a foundational understanding of web technologies such as HTML, CSS, JavaScript, and how they work alongside .NET technologies 2. To provide hands-on experience with ASP.NET Windows Forms, Web Forms for building dynamic web applications 3. To demonstrate the integration of databases with .NET applications using ADO.NET for data querying and manipulation 4. To demonstrate Model-View-Controller (MVC) design pattern to create web applications using MVC architecture					
UNIT-1	Introduction: .NET framework, Namespace, Assemblies, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations Object Oriented Concepts of C#: Classes, Objects, Constructor and Destructors, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Errors and Exceptions					
UNIT-2	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: Introduction to ASP.NET, Working with Web and HTML Controls, Server Controls, Login controls, Validation Controls, Accessing Data using ADO.NET.					
UNIT-3	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 GridView Control, Allow Users to Select from a Drop Down List in the Grid, Add a Hyperlink to the Grid, Deleting a Row and Handling Errors					
UNIT-4	Multithreaded Programming: Thread Class, Life Cycle of a Thread, Steps for Creating a Thread, Thread Synchronization. Web Services: Web Services, Web Service Architecture, WSDL, Building WSDL Web Service. Reports: Need of Reports in applications, Developing a Report, Different ways to Invoke/Deploy Reports					
Text Books	1. Programming in C# A Primer (Fourth Edition), E Balagurusamy, McGraw Hill Education (India) 2. Beginning ASP.NET 2.0 with C# Chris Hart, John Kauffman, David Sussman, and Chris Ullman, Wiley Publishing, Inc.					
Reference Books	1. Andrew Stellman, Jennifer Greene - Head First C# A Learner's Guide to Real-World Programming with C# and .NET-O'Reilly Media (2024) 2. Simon J. Painter Functional Programming with C#-O'Reilly (2024)					







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.
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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

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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.					







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Dr. P. V. Geethanjali Dr. Jyoti R. Ananth Kumar

R25MCA207	PRACTICAL– 4 Devops.	Hours/Week	L	T	P	C
			3	0	0	2
List of Programs						
1. Write code for a simple user registration form for an event. 2. Explore Git and GitHub commands 3. Practice Source code management on GitHub. 4. Jenkins installation and setup, explore the environment. 5. Demonstrate continuous integration and development using Jenkins. 6. Explore Docker commands for content management. 7. Develop a simple containerized application using Docker. 8. Integrate Kubernetes and Docker						

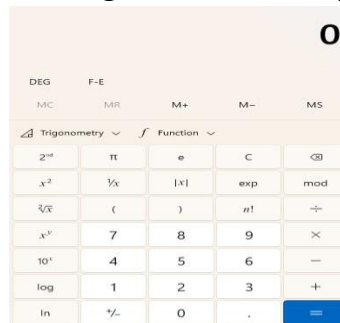
Dr. P.  V. Gethanjal  Jay  17.2.21 K. Ananth Kumar

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

List of Programs

1. Write a C# program to display the digits of a large integer in words (Upto One Crore)

2. Design the following Simple Calculator using C# Windows Applications



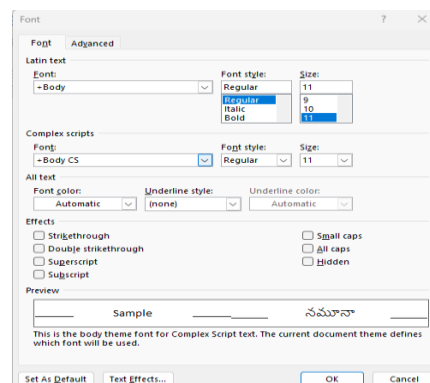
3. Design the following Font Dialog Box using C# Windows Applications (Don't use built-in font Dialog Box)

4. Write a C# program to implement Multithreading and Thread Synchronization

5. Create Windows Application to Add, Update, Search, Delete the Student details (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. Develop Web Application for Registration of Semester End Examinations with all Validation Controls



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

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Programme	MCA	Semester	Second		
Course Code	208	Course Name	MOOCS(NPTEL/SWAYAM)-II Any 12 Week Course on Management / Mathematics / Applied Mathematics / Statistics offered other than Computer Science.		
Course Category	OPEN ONLINE TRANSDISCIPLINARY COURSE - 2	Hours/Week	L	T	P
			0	0	0
		Credits	2		

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.

Evaluation of the MOOCs course

Evaluation of the MOOCs courses would be done by the organization by whom it is being offered. In extraordinary circumstances, the modality of evaluation through certified 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.

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R25MCA209	Indian Knowledge Systems – 2 Sanskrit and Classical Languages	Hours/Week	L	T	P	C							
			4	0	0	0							
Course Objectives	1. This course creates interest in student to learn Indian Sanskrit Mahakavya, Fables and Basic Sanskrit. 2. The course is intended to introduce the Sanskrit Mahakavya, Fables and Basic Sanskrit.												
UNIT-1	Introduction to Kalidasa and his works: Poetry of Kalidasa, Mahakavyas of Kalidasa, Dramas of Kalidasa, Other works of Kalidasa.												
UNIT-2	Kumarasambhava: An introduction to Sanskrit Panchamahakavya, Two Mahakavyas of Kalidasa and the content of those, Kumarasambhava Sarga I Slokas 1-10, Kumarasambhava Sarga I Slokas 11-20.												
UNIT-3	Introduction to Panchatantra of Vishnusharma: Period of fable, Characteristics of fable, Purpose of Panchatantra, Moral values of Panchatantra.												
UNIT-4	Simha Shashaka Katha: Application of knowledge, Thoughtless action begets sorrow, Textual study of Simha Shashaka Katha, Moral content of the story.												
Text Books	1. Kumarasambhava (1 Canto) of Kalidasa 2. Panchatantra - Simha Shashaka Katha 3. Kalidasanorupathanam – Bhasha Institute 4. Siddharupam 5. A Short History of Sanskrit Literature, R.S. Vadhyar & Sons, Palakkad, 1989												
Reference Books	1. Samkritasahityetihasa - Ramachandra Pandey												
Course Outcomes: After completion of the course student able to													
	Course Outcome Description					Knowledge Level							
CO1	Familiarise the Mahakavyas in Sanskrit.					K1							
CO2	Attain a general awareness of Kalidasa					K2							
CO3	Enjoy the poetic beauty of Kumarasambhava					K2							
CO4	Introduce story literature and Panchatantra					K2							
K1-Remembering, K2-Understanding, K3-Applying, K4-Analyzing, K5-Evaluating, K6- Creating													
COURSE AND PROGRAMME OUTCOMES MAPPING													
	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													

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R25MCA209	Indian Knowledge Systems – 2 VedicMathematics	Hours/Week	L 4	T 0	P 0	C 0
Course Objectives	• Fosterloveformath'sandremoveitsfearthroughVedicMathematics • EnhancecomputationskillsinstudentsthroughVedicMathematics· • Developlogicalandanalyticalthinking • Promotejoyfullearningofmathematics • DiscusstherichheritageofmathematicaltemperofAncientIndia					
UNIT-1	Introduction: History of Vedic math's, why Vedic math's, salient features of Vedicmath's, Vedic math's 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,VedicMathematicsTeacher'sManual,InspirationBooks,RevisedEdition, 2009. 2. M.Tyra, MagicalBookOnQuickerMaths,ESCPublications, 5thEdition, 2018.					
CourseOutcomes:After completionofthecoursestudentableto						

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	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													

Dr. P. S. V. Geetha Raju   17/2/24 R. Ananth Kumar