Progressive Education Society's
Modern College of Arts, Science and Commerce (Autonomous),
Ganeshkhind, Pune 411016

Two Year Degree Program in Computer Science

(Faculty of Science & Technology)

Syllabi for M.Sc. (Computer Science) Part-I

Choice Based Credit System Syllabus

To be implemented from Academic Year 2022-2023

MS Bhatt

Modern College ★ Ganeshkhind, Pune-16 ★

Title of the Course: M.Sc. (Computer Science)

Preamble: This syllabus is credit-based system to be implemented from the academic year 2022-2023. It is believed that the proposed changes as part of the credit-based system will bring a qualitative change in the way M.Sc. (Computer Science) is taught, which will offer a more enriched learning experience. It aims to provide technology-oriented students with the knowledge and ability to develop creative solutions, and better understand the effects of future developments of computer systems and technology on people and society. The syllabus is about developing skills to learn new technology, grasping the concepts and issues behind its use and the use of computers.

Duration: 2 years

Eligibility:

- Bachelor of Computer science (B.C.S) with 50% marks for Unreserved category and 45% marks for Reserved Category
- BSc (Computer Science) with 50% marks
- Bachelor of Engineering in Computer Science/ Information Technology/Electronics/ Telecommunication with 50% marks
- BSc. In IT or BSC in entire Computer science with 50% marks
- B. Voc in software Development/Information Technology with 50% marks
- BSc. Degree with Computer Science as Principal subject or Computer Science as one of the subject at T.Y.BSc. Level for student with general BSC with 50%

M S Bhatt

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Course Structure:

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year I Semester I							
Year/ Sem	**Course Type**	**Course Code**	**Course Name**	**Credit**	**% of Assessment**		
					IA	**CE**	**Total**
I Year Sem-I	Core Compulsory Theory Paper	22-CSUT111	Paradigm of Programming Language	4	30	70	100
		22-CSUT112	Design and Analysis of Algorithms	4	30	70	100
		22-CSUT113	Database Technologies	4	30	70	100
	Choice Based Optional Paper	22-CSDT114A	Cloud computing	2	15	35	50
		22-CSDP114A	Cloud Computing Practical	2	15	35	50
		OR					
		22- CSDT114B	Artificial Intelligence	2	15	35	50
		22-CSDP114B	Artificial Intelligence Practical	2	15	35	50
		OR					
		22- CSDT114C	Web Services	2	15	35	50
		22- CSDP114C	Web Services Practical	2	15	35	50
	Code Compulsory Practical Paper	22- CSUP115	PPL and Database Technologies Practical	4	30	70	100

Extra Credit (Mandatory)			
Course Type	**Course Code**	**Course Name**	**Credit**
Extra Credit Theory Paper	22-191	Human Rights-I	1
	22-192	Introduction to Cyber Security/ Information Security-I	1

IA :- Internal Assessment, CE :- College Examination

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Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year I Semester II							
Year/ Sem	**Course Type**	**Course Code**	**Course Name**	**Credit**	**% of Assessment**		
					IA	**CE**	**Total**
I Year Sem-II	Core Compulsory Theory Paper	22-CSUT121	Advanced Operating System	4	30	70	100
		22-CSUT122	Mobile Technologies	4	30	70	100
		22-CSUT123	Software Project Management	4	30	70	100
	Choice Based Optional Paper	22-CSDT124A	Project	2	15	35	50
		22-CSDP124A	Project related Assignments	2	15	35	50
		OR					
		22- CSDT124B	Human Computer Interaction	2	15	35	50
		22-CSDP124B	Human Computer Interaction Practical	2	15	35	50
		OR					
		22- CSDT124C	Soft Computing	2	15	35	50
		22- CSDP124C	Soft Computing Practical	2	15	35	50
	Core Compulsory Practical Paper	22- CSUP115	Practical on Advanced OS & Mobile Technologies	4	30	70	100

Extra Credit (Mandatory)			
Course Type	**Course Code**	**Course Name**	**Credit**
Extra Credit Theory Paper	22-291	Human Rights-II	1
	22-292	Introduction to Cyber Security/ Information security -II	1

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Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year II Semester III							
Year/ Sem	**Course Type**	**Course Code**	**Course Name**	**Credit**	**% of Assessment**		
					IA	**CE**	**Total**
II Year Sem-III	Core Compulsory Theory Paper	23-CSUT231	Software Architecture and Design Pattern	4	30	70	100
		23-CSUT232	Machine Learning	4	30	70	100
		23-CSUT233	Web Frameworks	4	30	70	100
	Choice Based Optional Paper	23-CSDT234A	Big Data Analytics	2	15	35	50
		23-CSDP234A	Big Data Analytics Practical	2	15	35	50
		OR					
		23- CSDT234B	Web Analytics	2	15	35	50
		23-CSDP234B	Web Analytics Practical	2	15	35	50
		OR					
		23- CSDT234C	Project	2	15	35	50
		23- CSDP234C	Project related Assignments	2	15	35	50
	Core compulsory Practical Paper	23- CSUP235	Practical on CSUT231, CSUT232 and CSUT233	4	30	70	100

Extra Credit (Mandatory)			
Course Type	**Course Code**	**Course Name**	**Credit**
Extra Credit Theory Paper	23-392	Introduction to Cyber Security/ Information security-III	1
	23-394	Skill Development-I	2
	23-395	Introduction to Constitution	2

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Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year II Semester IV							
Year/ Sem	**Course Type**	**Course Code**	**Course Name**	**Credit**	**% of Assessment**		
					IA	**CE**	**Total**
II Year Sem-IV	Core	23-CSUIT241	Industrial Training /Institutional project	20	**150**	**350**	**500**

Extra Credit (Mandatory)			
Course Type	**Course Code**	**Course Name**	**Credit**
Extra Credit Theory Paper	23-492	Introduction to Cyber Security/ Information security-IV	1
	23-494	Skill Development-II	2

IA :- Internal Assessment, CE :- College Examination

Practical paper implementation strategy:

Subject	**Platform**
PPL	Linux
Database Technologies	Linux / Windows
AI	Linux
Web Services	Linux / Windows
Cloud Computing	Linux/ Windows/ AWS

Note : Any version of Linux (Fedora/ Redhat/ Ubuntu etc.) can be used as per your comfort

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Detailed Syllabus:

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year- I Semester- I		
Course Code: **22- CSUT111**	**Course Name:** **Paradigm of Programming Language**	**Total Lectures** **(48 Hours)**
Teaching Scheme: **4 hrs/week**	**Examination Scheme:** **IA: 30 Marks** **CE: 70 Marks**	**No. of Credits:** **4**
Course Prerequisites:	**Student should have basic knowledge** of: • Procedural Language like C • Object-Oriented Languages (C++ and Java) • Concepts of Operating Systems • Basic Data Structures and Algorithms.	
Course Objectives:	• To Prepare student to think about programming languages analytically: • Separate syntax from semantics • Compare programming language designs • Understand their strengths and weaknesses • Learn new languages more quickly • Understand basic language implementation techniques • Learn small programs in different programming Languages	
Course Outcomes:	After successfully completing this course, students will be able to: • learn syntax from semantics of different programming languages, compare them and will be able to find pitfalls of them and think about programming languages analytically. • will understand basic language implementation techniques and learn small programs in different programming languages.	
Chapter	**Course Contents**	**No. of Lectures**
1	**Introduction** • The Art of Language Design • The Programming Language Spectrum • Why Study Programming Languages? • Compilation and Interpretation • Programming Environments	2
2	**Names, Scopes, and Bindings** • The Notion of Binding Time • Object Lifetime and Storage Management • Static Allocation, Stack-Based Allocation, Heap-Based Allocation, Garbage Collection Scope Rules • Static Scoping, Nested Subroutines, Declaration Order, Dynamic Scoping The meaning of Names in a Scope • Aliases, Overloading, Polymorphism and Related Concepts, the Binding of Referencing Environments • First-Class Values and Unlimited Extent, Object Closures Macro Expansion	5

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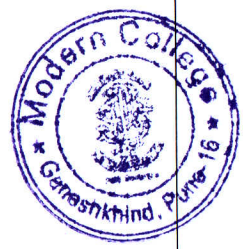
3	**Control Flow** • Expression Evaluation , Precedence and Associativity, Assignments, Initialization, Ordering Within Expressions, Short-Circuit Evaluation • Structured and Unstructured Flow • Sequencing • Selection - Short-Circuited Conditions, Case/Switch Statements Iteration • Iteration - Enumeration-Controlled Loops, Combination Loops, Iterators, Logically Controlled Loops Recursion • Recursion - Iteration and Recursion, Applicative- and Normal-Order Evaluation	5
4	**Data Types** • Introduction • Primitive Data Types • Numeric Types: Integer, Floating point, Complex , Decimal, Boolean Types, Character Types • Character String Types • Design Issues, Strings and Their Operations, String Length Operations, Evaluation, Implementation of Character String Types • User defined Ordinal types of Enumeration types, Designs Evaluation Subrange types, Ada's design Evaluation Implementation of user defined ordinal types • Array types • Arrays and indices, Subscript bindings and array categories, Heterogeneous arrays, Array initialization, Array operations, Rectangular and Jagged arrays, Slices, Evaluation, Implementation of Array Types • Associative Arrays • Structure and operations, Implementing associative arrays, • Union Types • Pointer and Reference Types • Pointer operations, Pointer problems, Dangling pointers, Lost heap dynamic variables, Pointers in C and C++, Reference types, Evaluation • Implementation of pointer and reference types - Representation of pointers and references Solution to dangling pointer problem Heap management	8
5	**Subprograms and Implementing Subprograms** • Introduction • Fundamentals of Subprograms	6



	• Design Issues for subprograms • Local Referencing Environments • Parameter-Passing Methods • Parameters That Are Subprograms & Overloaded Subprograms • Generic Subroutines, Generic Functions in C++, Generic Methods in Java • Design Issues for Functions • User-Defined Overloaded Operators • Coroutines • Implementing Subprograms • Implementing "Simple" Subprograms • Nested Subprograms • Blocks • Implementing Dynamic Scoping	
6	**Data Abstraction and Object Orientation** • Object-Oriented Programming • Encapsulation and Inheritance Modules, Classes, Nesting (Inner Classes), Type Extensions, Extending without Inheritance • Initialization and Finalization Choosing a Constructor, References and Values, Execution Order, Garbage Collection • Dynamic Method Binding • Virtual- and Non-Virtual Methods, Abstract Classes, Member Lookup, Polymorphism, Object Closures • Types of Inheritance	8
7	**Concurrency** • Introduction : Multiprocessor Architecture Categories of concurrency, Motivations for studying concurrency • Semaphores - Introduction Cooperation synchronization, Competition Synchronization, Evaluation • Message Passing Introduction- The concept of Synchronous Message Passing	5
8	**Functional Programming in Scala** • Strings • Numbers • Control Structures • Classes and Properties • Methods • Objects • Functional Programming • List, Array, Map, Set	9

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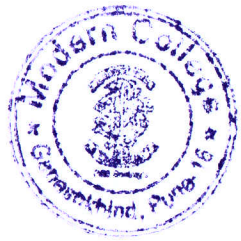
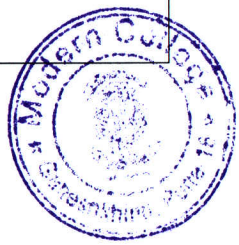
References:

Sr. No.	Title of the Book	Author/s	Publication
1	Programming Language Pragmatics, 3edition	Michel L. Scott	Kaufmann Publishers, An Imprint of Elsevier, USA
2	Concepts of Programming Languages, Eighth Edition	Robert W. Sebesta	Pearson Education
3	Scala Cookbook	Alvin Alexander	O'REILLY publication



Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I		
Course Code: **22- CSUT112**	**Course Name:** **Design and Analysis of Algorithm**	**Total Lectures** **(48 Hours)**
Teaching Scheme: **4 hrs/week**	**Examination Scheme:** **IA: 30 Marks** **CE: 70 Marks**	**No. of Credits:** **4**
Course Prerequisites:	• Basic knowledge of algorithms and programming concepts • Data Structures and Advanced Data Structures • Basic Knowledge of Graphs and Algorithms	
Course Objectives:	• To learn basic Algorithm Analysis techniques and understand the use of asymptotic notation • To understand different design strategies • Understand the use of data structures in improving algorithm performance • Understand classical problem and solutions	
Course Outcomes:	After successful completion of course students will be able to: • learn fundamental concepts of asymptotic notations of an algorithm, Space & Time Complexity, Searching & Sorting Algorithms, Divide and Conquer techniques, greedy algorithms, dynamic programming. • understand the techniques used for designing different graph algorithms. • Learn how to apply backtracking, branch and bound techniques for real time problems.	
Chapter	**Course Contents**	**No. of Lectures**
1	**Basics of Algorithms** • Algorithm definition and characteristics • Space complexity • Time complexity, worst case-best case-average case • complexity, asymptotic notation • Recursive and non-recursive algorithms • Sorting algorithms (insertion sort, heap sort, bubble sort) • Sorting in linear time: counting sort, concept of bucket and radix sort • Searching algorithms: Linear, Binary	8
2	**Divide and conquer strategy** • General method, control abstraction • Binary search • Merge sort, Quick sort • Comparison between Traditional Method of Matrix Multiplication vs. Strassen's Matrix Multiplication	6
3	**Greedy Method** • Knapsack problem • Job sequencing with deadlines • Minimum-cost spanning trees: Kruskal and Prim's algorithm	8



	• Optimal storage on tapes • Optimal merge patterns • Huffman coding • Shortest Path: Dijkstra's Algorithm	
4	**Dynamic Programming** • Principle of optimality • Matrix chain multiplication • 0/1 Knapsack Problem i)Merge & Purge ii) Functional Method • Bellman Ford Algorithm • All pairs Shortest Path Floyd- Warshall Algorithm • Longest common subsequence, • String editing, Travelling Salesperson problem	10
5	**Decrease and Conquer** • Definition of Graph Representation of Graph By Constant - DFS and BFS • Topological sorting • Connected components and spanning trees By Variable Size decrease Euclid's algorithm • Articulation Point and Bridge edge	6
6	**Backtracking** • General method • Fixed Tuple vs. Variable Tuple Formulation • n- Queen's problem • Graph coloring problem • Hamiltonian cycle • Sum of subsets	5
7	**Branch and Bound** • Introduction • FIFO BB Search, LIFO Search • Definitions of LCBB Search • Bounding Function, Ranking Function • Traveling Salesman problem Using Variable tuple • Formulation using LCBB • 0/1 knapsack problem using LCBB	5

References:

Sr. No.	Title of the Book	Author/s	Publication
1	Computer algorithms	Ellis Horowitz, Sartaj Sahni & Sanguthevar Rajasekaran	Galgotia Publication
2	T. Cormen, C. Leiserson, & R. Rivest	Algorithms	MIT Press

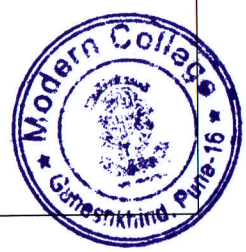
3	A. Aho, J. Hopcroft & J. Ullman	The Design and Analysis of Computer Algorithms	Addison Wesley
4	Donald Knuth	The Art of Computer Programming	Addison Wesley
5	Steven Skiena	The Algorithm Manual	Springer
6	Jungnickel	Graphs, Networks and Algorithms	Springer

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I		
Course Code: **22-CSUT113**	**Course Name:** **Database Technologies**	**Total Lectures:** **(48 Hours)**
Teaching Scheme: **4 hrs/week**	**Examination Scheme:** **IA: 30 Marks** **CE: 70 Marks**	**No. of Credits:** **4**
Course Prerequisites:	• Knowledge of file system concepts • Strong foundation of Related database Concepts (Basic& Advanced) • A firm foundation of any RDBMS package	
Course Objectives:	• Provide an overview of the concept of NoSQL technology. • Make the student capable of making choice of what database technologies to use on their application needs • Provide an insight to the different types of NoSQL databases	
Course Outcomes:	After successful completion of course students will be able to: • differentiate between RDBMS and NOSQL technologies • understand various NOSQL technologies, their need, and applications • learn new concepts of data modelling, clustering, polyglot persistence, version stamps, map reduce, schema migrations • make choice of database technologies based on their needs and applications	
Chapter	**Course Contents**	**No. of Lectures**
1	**Introduction to NOSQL (Core concepts)**	**18**
	Why NoSQL	
	Aggregate Data Models	
	Data modeling details	
	Distribution Models	
	Consistency	
	Version stamps	
	Map-Reduce	
2	**Implementation with NOSQL databases**	**14**
	Document Databases (Mongodb)	
	Graph databases (Neo4j)	
3	**Schema Migrations**	**5**
4	**Polyglot Persistence (Multi model types)**	**5**
5	**Beyond NoSQL**	**3**
6	**Choosing your database**	**3**

References:

Sr. No.	Title of the Book	Author/s	Publication
1	NoSQL Distilled	Pramod Sadalge, Martin Fowler	Pearson
2	NoSQL for Dummies	A Willy Brand	Pearson
3	Multidisciplinary Subjects for Research-XV (implementation of NOSQL document databases – MONGODB)		Redshine

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I		
Course Code: **22-CSDT114A**	**Course Name:** **Cloud Computing**	**Total Lectures:** **(30 Hours)**
Teaching Scheme: **4 hrs/week**	**Examination Scheme:** **IA: 30 Marks** **CE: 70 Marks**	**No. of Credits:** **2**
Course Prerequisites:	• Operating System concepts • Fundamentals of Computer Networks • Good Understanding of Object-Oriented Programming Concepts	
Course Objectives:	• To understand the principles and paradigm of Cloud Computing • To appreciate the role of Virtualization Technologies • Ability to design and deploy Cloud Infrastructure • Understand cloud security issues and solutions	
Course Outcomes:	At the end of the course, the student should be able to: • Appreciate the need for cloud computing and make decisions on using specific cloud service type and deployment models • Identify virtualization technologies of a cloud platform. • Make choices on selection of appropriate cloud service based on application requirement.	
Chapter	**Course Contents**	**No. of Lectures**
1	**Introduction to Cloud Computing** • Overview, Layers and Types of Cloud • Desired Features of a Cloud • Benefits and Disadvantages of Cloud Computing • Cloud Infrastructure Management, ° Infrastructure as a Service Providers ° Platform as a Service Providers Multitenant Technology ° Cloud-Enabling Technology: Broadband Networks and Internet Architecture, Data Center Technology, Virtualization Technology. ° Infrastructure as a Service, Platform as a Service, Software as a Service, Cloud Deployment Models. ° Cloud economics and benefits,	8
2	**Abstraction and Virtualization** • Introduction to Virtualization Technologies • Load Balancing and Virtualization • Understanding Hyper visors, • Virtual Machines -Provisioning and Manageability Virtual Machine • Migration Services • Provisioning in the Cloud Context • Virtualization of CPU, Memory, I/O Devices	7



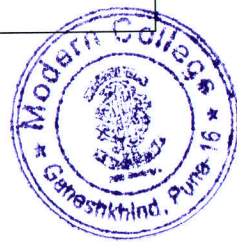
	• Virtual Clusters and Resource management	
3	**Programming, Environments and Applications** • Features of Cloud and Grid Platforms • Programming Support of Google App Engine • Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments • Applications: Moving application to cloud • Microsoft Cloud Services • Google Cloud Applications • Amazon Cloud Services • Mobile Cloud	8
4	**Security In The Cloud Security Overview** • Cloud Security Challenges and Risks • Software-as-a-Service Security • Security Governance Risk Management – Security Monitoring • Security Architecture Design • Data Security • Application Security • Virtual Machine Security • Identity Management and Access Control, Disaster Recovery in Clouds.	7

References:

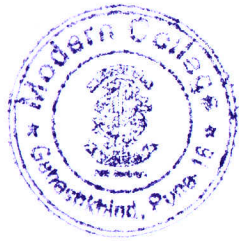
Sr. No.	Title of the Book	Author/s	Publication
1	Cloud Computing: Technologies and Strategies of the Ubiquitous Data Center	Brian J.S. Chee and Curtis Franklin	CRC Press, ISBN :9781439806128
2	Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi	Mastering Cloud Computing: Foundations and Applications Programming	McGraw Hill, ISBN: 978 1259029950, 1259029956
3	Kai Hwang, Geoffrey C Fox, Jack G Dongarra	Distributed and Cloud Computing, From Parallel Processing to the Internet of Things	Morgan Kaufmann Publishers, 2012.
4	Cloud Computing	Dr. Satish Ambike, Dr. Rajesh K Dhumal	Nirali Publication ISBN: 9789354512520

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I		
Course Code: **22- CSDP114A**	**Course Name:** **Cloud Computing Practical**	**Total Practical's: 10**
Teaching Scheme: **2 hrs/week**	**Examination Scheme:** **IA: 30 Marks** **CE: 70 Marks**	**No. of Credits:** **2**
Course Prerequisites:	• Basic knowledge of distributed computing system • Knowledge of virtualization concept	
Course Objectives:	• To Obtain knowledge of cloud computing fundamentals and benefits of cloud computing • To Understand the various virtualization technologies in detail • To Understand data center and cloud storage concept	
Course Outcomes:	After successful completion of course students will be able to: • Understand core issues in cloud computing such as security, privacy, and interoperability. • provide the appropriate cloud computing solutions and recommendations according to the applications used. • identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc. • identify problems, and explain, analyze, and evaluate various cloud computing solutions.	

Assignment Number	**Assignment Name**	**Number of Sessions**
1	Working and Implementation of Infrastructure as a service 1. Launching EC2 Instance(windows)- AWS Platform Prepare Screenshots file 2. Write down the steps to launch EC2 instance(windows)	1
2	Working and Implementation of Infrastructure as a service Launching EC2 Instance(Linux)- AWS Platform .Prepare Screenshots file Write down the steps to launch EC2 instance(Linux)	1
3	Working and Implementation of Infrastructure as a service Create an EC2 Linux Instance and Install an Apache Web Server and run hello World page (Use AWS Platform) Prepare Screen shots file and also write down the steps and commands used.	1
4	Practical Implementation of Storage as a Service Create an S3 Bucket, Upload a file to S3 Bucket, Retrieve a File from S3 Bucket, and Delete a File from S3 Bucket using AWS.	1
5	Implementation of Storage as a Service Hosting a static website in AWS using S3.	1

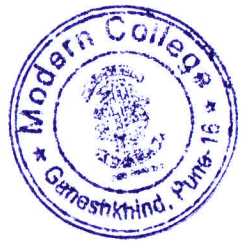


6	Working and Implementation of identity management.	1
7	Write a program for web feed. Using EC2 Service install Red-hat Linux instance and install python and run python program	1
8	Working and Implementation of Platform as a services . AWS Elastic Beanstalk: Use this tool to upload sample code for web apps. (AWS handles the deployment, provisioning and load balancing)	1
9	Virtual Private Cloud	1
10	Launch RDS Instance (AWS).	1



Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I		
Course Code: **22-CSDT114B**	**Course Name: Artificial Intelligence**	**Total Lectures:** **(30 Hours)**
Teaching Scheme : **4 hrs/week**	**Examination Scheme:** **IA: 15 Marks** **CE: 35 Marks**	**No. of Credits:** **2**
Course Prerequisites:	• Concepts of Data structures and Design and Analysis of algorithms. • Strong data analytics skills. • Strong will to learn machine learning languages.	
Course Objectives:	• To learn various types of algorithms useful in ArtificialIntelligence (AI). • To convey the ideas in AI research and programminglanguage related to emerging technology. • To understand the numerous applications and huge possibilities • in the field of AI that goes beyond the normal human imagination.	
Course Outcomes:	After successful completion of course students will be able to: • Learn the applications of A* and AO* algorithms. • Learn different knowledge representation techniques. • Learn machine learning basics using Python	
Chapter	**Course Contents**	**No. of Lectures**
1	**Introduction to Artificial Intelligence:** • Introduction and Intelligent systems • What Is AI,The Foundations of Artificial Intelligence, • The History of Artificial Intelligence • Applications ofAI • Early work in AI and related fields • AI problems and Techniques.	**2**
2	**Searching:** • Defining AI problems as a State Space Search: example, Search and Control Strategies, ProblemCharacteristics, Issues in Design of Search Programs, Production System. • Blind Search Techniques :-BFS, DFS, DLS, Iterative Deepening, Search,Bidirectional Search, Uniform cost Search. • Heuristic search techniques: • -Generate and test ,Hill Climbing, Best Firstsearch, Constraint Satisfaction, Mean-End Analysis, A*,AO*.	**8**

3	**Knowledge Representation:** • Representations and Mappings • Approaches to Knowledge representation, Knowledge • Representation method • Propositional Logic, Predicate logic • Representing Simple facts in Logic • Resolution, Forward and backward chaining • Game Playing- Minimax Search Procedures • Adding alpha-beta cutoffs.	8
4	**Introduction to AI with Python:** • Introduction to Python • why python with AI • Features of Python, Basics of Python • Python statements • Methods & Functions using python • Basic and advanced modules &Packages • PythonDecorators and generators • Advanced Objects & Data structures.	6
5	**Machine Learning:** • Why Machine learning • Types of Machine Learning • Supervised learning- Classification & Regression.Random Forest, KNN Algorithm. • Unsupervised learning-Clustering & Association.Reinforcement learning.	6

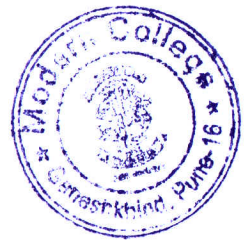


References:

Sr. No.	Title of the Book	Author/s	Publication
1	Computational Intelligence	Eberhart	Elsevier Publication
2	Artificial Intelligence: A New Synthesis	Nilsson	Elsevier Publication
3	Artificial Intelligence with Python	PrateekJoshi	Packt Publishing Ltd
4	Reinforcement and Systematic Machine Learning for Decision Making,	Parag Kulkarni	Wiley-IEEE Press Edition
5	Artificial Intelligence	Saroj Kausik	Cengage Learning
6	Introduction to Machine Learning	EthemAlpaydin	PHI 2nd Edition
7	Artificial Intelligence	Meenal Jabde, Charushila Patil	Nirali Publication

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I		
Course Code: **22- CSDP114B**	**Course Name:** **Artificial Intelligence Practical**	**Total Practical's:** **10**
Teaching Scheme: 2 hrs/week	**Examination Scheme:** **IA: 30 Marks** **CE: 70 Marks**	**No. of Credits:** **2**
Course Prerequisites	• Basic knowledge of Design and Analysis of algorithms • Basic knowledge of data structure concepts and programming languages	
Course Objectives:	• To understand working of different AI algorithms • To understand basic machine learning concepts	
Course Outcomes:	After successful completion of course students will be able to: • Implement different AI algorithms using Python • Implement basic machine learning algorithms using Python	
Assignment Number	**Assignment Name**	**Number of Sessions**
1	Subject teacher should conduct first lab practical on basic programs using python forintroducing and using python environment such as, a) Program to print multiplication table for given no. b) Program to check whether the given no is prime or not. Program to find factorial of the given noand similar programs.	1
2	Write a program to implement List Operations (Nested list, Length, Concatenation, Membership, Iteration, Indexing and Slicing), List Methods (Add, Append, Extend &Delete)	1
3	Write a program to Illustrate Different Set Operations.	1
4	Write a program to implement Simple Chatbot.	1
5	Write a program to implement Breadth First Search Traversal.	1
6	Write a program to implement Depth First Search Traversal.	1
7	Write a program to implement Water Jug Problem.	1
8	Write aprogram to implement K -Nearest Neighbor algorithm.	1
9	Write a program to implement Regression algorithm.	1
10	Write a program to implement Random Forest Algorithm.	1

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I		
Course Code: **22-CSDT 114C**	**Course Name: Web Services**	**Total Lectures:** **(30 Hours)**
Teaching Scheme: **4 hrs/week**	**Examination Scheme:IA: 15 Marks** **CE: 35 Marks**	**No. of Credits:** **2**
Course Prerequisites:	• Strong knowledge about Java programming. • Good Understanding of Object-Oriented Programmingconcepts. • Must be familiar with XML.	
Course Objectives:	• To understand the details of web services technologies likeWSDL, UDDI, SOAP • To learn how to implement and deploy web service client andserver • To explore interoperability between different frameworks • To understand the concept of RESTful system.	
Course Outcomes:	After successful completion of course students will be able to: • Learn different web service architectures • Learn SOAP protocol • Learn WSDL and REST architectural styles	
Chapter	**Course Contents**	**No. of Lectures**
1	**Web Service and SOA fundamentals Introduction to Web Services** — The definitionof web services, basic operational model of webservices, tools and technologies enabling webservices, benefits and challenges of using web services. **Web Services Architecture** — Web servicesArchitecture and its characteristics, core buildingblocks of web services, standards and technologiesavailable for implementing web services, web services communication models, basic steps of implementing web services.	6
2	**SOAP: Simple Object Access Protocol** Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP communication model, Building SOAP Web Services, developing SOAP Web Services usingJava, Error handling in SOAP, Advantages and disadvantages of SOAP.	8



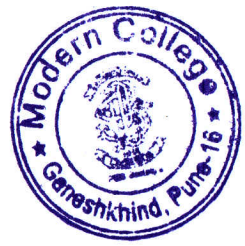
3	**Unit III : Describing and Discovering WebServices** **WSDL -** WSDL in the world of Web Services, Web Services life cycle, anatomy of WSDL definition document, WSDL bindings, WSDL Tools, limitations of WSDL, Service discovery,role of service discovery in a SOA, service discovery mechanisms, **UDDI** – UDDI Registries, uses of UDDI Registry,Programming with UDDI, UDDI data structures, support for categorization in UDDI Registries, Publishing API, Publishing information to a UDDIRegistry, searching information in a UDDI Registry, deleting information in a UDDI Registry,limitations of UDDI.	8
4	**Unit IV: The REST Architectural style** Introducing HTTP, The core architecturalelements of a RESTful system, Description and discovery of RESTful web services, Java tools andframeworks for building RESTful web services, JSON message format and tools and frameworks around JSON, Build RESTful web services with JAX-RS APIs, The Description and Discovery of RESTful Web Services, Design guidelines for building RESTful web services, Secure RESTfulweb services	8

References:

Sr. No.	Title of the Book	Author/s	Publication
1	Building Web Services with Java,2nd Edition	S. Graham and others	Pearson Edn., 2008.
2	J2EE Web Services	Richard Monson-Haefel	Pearson Education.
3	Java Web Services Programming,	R.Mogha,V.V.Preetham	Wiley India Pvt.Ltd.
4	XML, Web Services, and theData Revolution	F.P.Coyle	Pearson Education

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I		
Course Code: **22- CSDP114C**	**Course Name:** **Web Services Practical**	**Total Practical's:** **10**
Teaching Scheme: 2 hrs/week	**Examination Scheme:** **IA: 30 Marks** **CE: 70 Marks**	**No. of Credits:** **2**
Course Prerequisites	• Strong knowledge about Java programming / PHP / .Net Framework • Good Understanding of Object-Oriented Programming concepts. • Basic knowledge of XML.	
Course Objectives:	• To understand how to develop web services using Java/PHP/.Net	
Course Outcomes:	After successful completion of course students will be able to: • Create dynamic web projects • Create client-based web applications	
Assignment Number	**Assignment Name**	**Number of Sessions**
1	Create 'Dynamic Web Project', which will host your web service functionalityto greet the user according to server time and create 'Dynamic Web Project', which will host the client application that will send username and test the webservice.	1
2	Create 'Dynamic Web Project', which will host your web service functionalityto convert Celsius to Fahrenheit and create 'Dynamic Web Project', which willhost the client application that will send Celsius and test the web service.	1
3	Create 'Dynamic Web Project', which will host your web service functionalityto find the factorial of given number and create 'Dynamic Web Project', which will host the client application that will send positive integer number and testthe web service.	1
4	Create 'Dynamic Web Project', which will host your web service functionalityto validate email id (use regular expression) and create 'Dynamic Web Project', which will host the client application that will send email id and test the webservice.	1
5	Create 'Dynamic Web Project', which will host your web service functionalityto validate user name and password (use database for storing username and password) and create 'Dynamic Web Project', which will host the client application that will send user name and password and test the web service.	1
6	Create 'Dynamic Web Project', which will host your web service functionalityto select employee details (use database for storing emp details (eno, ename, designation, salary)) and create 'Dynamic Web Project', which will host theclient application that will send employee name and display the details.	1

7	Create 'Dynamic Web Project', which will host your web service functionality to select Movie details (Movie(mno, mname,release_year) and Actor(ano,aname), 1 : M cardinality) and create 'Dynamic Web Project', which will host the client application that will send actor name and display thedetails.	1
8	Create 'Dynamic Web Project', which will host your web service functionalityto validate mobile no (use regular expression: should contain only 10 numeric no) and create 'Dynamic Web Project', which will host the client application that will send mobile no and test the web service.	1
9	Create 'Dynamic Web Project', which will host your web service functionalityto convert Rupees to Dollar, Pound, Euro,..... and create 'Dynamic Web Project', which will host the client application that will send amount in Rupees& type of conversion and tests the web service.	1
10	Create 'Dynamic Web Project', which will host your web service functionalityto give the suggestion for given key word and create 'Dynamic Web Project', which will host the client application that tests the web service.	1



Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I		
Course Code: **22-CSUP115**	**Course Name:** **PPL and Database Technologies Practical**	**Total Practical's:** **10 +10=20**
Teaching Scheme: **2 hrs/week**	**Examination Scheme:** **IA: 30 Marks** **CE: 70 Marks**	**No. of Credits:** **4**
Course Prerequisites:	• Knowledge of file system concepts • Knowledge of C and CPP programming concepts • Strong foundation of Relational database Concepts (Basic& Advanced)	
Course Objectives:	• To Provide an overview of the concept of NoSQL technology. • To Make the student capable of making choice of what database technologies to use on their application needs • To Provide an insight to the MongoDB (Document database) and Neo4j(Graph Database)	
Course Outcomes:	After successfully completing this course, students will be able to: • Provide an insight to the different types of NoSQL databases used to real life applications. • Understand control structures, arrays, lists, maps, sets and static and dynamic memory allocation concepts and their implementation. • Create and handle databases and queries using various NQSQL technologies like MongoDB and Neo4j. • Handle graphical queries using Neo4j	
	PPL Practical	**Number of Sessions**
	Control Structures 1. Write a program to calculate average of all numbers between n1 and n2(eg.100 to 300 Read values of n1 and n2 from user) 2. Write a program to read five random numbers and check that random numbers are perfectnumber or not.	1
	Arrays Write a program to find maximum and minimum of an array Write a program to calculate transpose of a matrix and calculate determinant of a matrix	2
	Write a program to check if the matrix is upper triangular or not. String Write a program to count uppercase letters in a string and convert it to lowercase and displaythe new string. Write a program to read a character from user and count the number of occurrences of thatcharacter.	2

	Display all the elements ofarray containing given string. Classes and Objects Define a class CurrentAccount (accNo, name, balance, minBalance). Define appropriateconstructors and operations withdraw(), deposit(), viewBalance(). Create an object and perform operations. Create abstract class Shape with abstract functions volume() and display(). Extend two classesCube and Cylinder from it. Calculate volume of each and display it. 3. Create class Project (id, name, location). Define parameterized constructor. Keep a count ofeach object created and display the details of each project. List Create Lists using five different methods(Lisp style , Java style, fill, range and tabulatemethods) Create two Lists and Merge it and store the sorted in ascending order. Create a list of even numbers up to 10 and calculate its product. Write a program to create a list of 1 to 50 numbers. Map & Set 1. Write a user defined functions to convert lowercase letter to uppercase and call thefunctionusing Map. 2. Write a program to create map with Rollno and FirstName. Print all student information withsame FirstName. 3. Write a program to create two sets and find common elements between them and merge two sets.	2 1 2
Database technologies Practical		
	MongoDB Practical	**Number of Sessions**
	Assignment 1: Movie Database 1. Create a database with the name 'Movie'. 2. A 'Film' is a collection of documents with the following fields: a. Film Id b. Title of the film c. Year of release d. Genre / Category (like adventure,	2

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action, sci-fi, romantic etc.) A filmcan belong to more than one genre.

e. Actors (First name and Last name)
A film can have more than one actor.

f. Director (First name and Last name)
A film can have more than one director.

g. Release details (It consists of places of release, dates of release and rating ofthe film.)

3. An 'Actor' is a collection of documents with the following fields:
   a. Actor Id
   b. First name
   c. Last Name
   d. Address (Street, City, State, Country, Pin-code)
   e. Contact Details (Email Id and Phone No)
   f. Age of an actor.

Queries:

1. Insert at least 10 documents in the collection Film –
   a. Insert at least one document with film belonging to two genres.
   b. Insert at least one document with film that is released at more than one placeand on two different dates.
   c. Insert at least three documents with the films released in the same year.
   d. Insert at least two documents with the films directed by one director.
   e. Insert at least two documents with films those are acted by a pair 'MadhuriDixit' and 'Shahrukh Khan'.
2. Insert at least 10 documents in the collection Actor.

   Make sure, you are inserting the names of actors who have acted in films,given in the 'Film' collection.
3. Display all the documents inserted in both the collections.
4. Add a value to the rating of the film whose title starts with 'T'.
5. Add an actor named "_____" in the 'Actor' collection. Also addthe details of the film in 'Film' collection in which this actor has acted in.
6. Delete the film "_____".
7. Delete an actor named "_____".
8. Delete all actors from an 'Actor' collection who

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	have age greater than " " 9. Update the actor's address where Actor Id is " ___". 10.Update the genre of the film directed by " ___	
	Assignment 2: Company database 1. Create a database with name 'Company'. 2. An 'Employee' is a collection of documents with the following fields: a. Employee ID b. First Name c. Last Name d. Email e. Phone No. f. Address (House No, Street, City, State, Country, Pin-code) g. Salary h. Designation i. Experience j. Date of Joining k. Birthdate 3. A 'Transaction' is a collection of documents with the following fields: a. Transaction Id, b. Transaction Date c. Name (First Name of employee who processed the transaction) d. Transaction Details (Item Id, Item Name, Quantity, Price) e. Payment (Type of Payment (Debit/Credit/Cash), Total amount paid, PaymentSuccessful) f. Remark (Remark field can be empty.) **Queries:** 1. Insert at least 5 documents in 'Employee' collection. 2. Insert multiple documents (at least 10) into the 'Transaction' collection by passingan array of documents to the db.collection.insert () method. 3. Display all the documents of both the collections in a formatted manner. 4. Update salary of all employees by giving an increment of Rs. 4000. 5. Update the remark for transaction id 201. 6. Update designation of an employee named "_ " from supervisor tomanager. 7. Update designation of an employee having Employee	3

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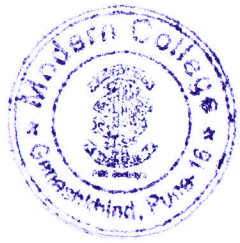
	Id as 8. Change the address of an employee having Employee Id as ___Delete transaction made by " ___" employee on the given date.10.Delete all the employees whose first name starts with 'K'.	
	Neo4j Practical	**Number of Sessions**
	Assignment 3: Song Database Consider a Song database, with labels as Artists, Song, Recording_company,Recoding_studio, song author etc. Relationships can be as follows Artist ⟶ [Performs] ⟶ Song ⟶ [Written by] ⟶ Song_author. Song ⟶ [Recorded in] ⟶ Recording Studio ⟶ [managed by] ⟶ recordingCompany Recording Company ⟶ [Finances] ⟶ Song You may add more labels and relationship and their properties, as per assumptions. a) List the names of songs written by ":….." b) List the names of record companies who have financed for the song "…." c) List the names of artist performing the song "….." d) Name the songs recorded by the studio " ……." e) List the names of artists who have sung only songs written by " " f) List the names of artists who have sung the maximum number of songs recorded by "……"studio g) List the names of songs financed by "…..", and sung by " "	2
	Assignment 4: Employee database Consider an employee database, with a minimal set of labels as follows Employee: denotes a person as an employee of the organization Department: denotes the different departments, in which employees work. Skillset: A list of skills acquired byan employee Projects: A list of projects in which an employee works.A minimal set of relationships can be as follows: Works_in :employee works in a department Has_acquired: employee hasacquired a skill Assigned_to : employee assigned to a project Controlled_by: A project is controlled by a department Project_manager :Employee is a project_manager of a Project a) List the names of employees in department "…" b) List the projects along with their properties, controlled by department "……". c) List the departments along with the count of employees in it. d) List the skillset for an employee "……."	3

	e) List the names of employees having the same skills as employee ".." f) List the projects controlled by a department "…" and have employees of the same department working in it. g) List the names of the projects belonging to departments managed by employee " …"	



Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I Extra Credit Syllabus		
Course Code: **22-191**	**Course Name: Human Rights-I**	**Total Lectures (14 Hours)**
Teaching Scheme: **2 hrs/week**	**Examination Scheme:** **IA: 10 Marks** **CE: 15 Marks**	**No. of Credits:** **1**
Course Objectives:	To acquaint students with the concept of Human Rights that develops the knowledge, skills, and values of human rights	
Curse Outcomes:	• Identify and understand Human values • Analyse the concept of Human Rights • Compare Rights and Duties • Enumerate legal instruments related to Human Rights • Differentiate between different types of rights	
Chapter	**Course Contents**	**No. of Lectures**
Module 1: Introduction to Human Rights and Duties		
1	**Basic Concept** a) Human Values- Dignity, Liberty, Equality, Justice, Unity in Diversity, Ethics and Morals b) Meaning and significance of Human Rights Education	3
2	**Perspectives of Rights and Duties** a) Rights: Inherent-Inalienable-Universal- Individual and Groups b) Nature and concept of Duties c) Interrelationship of Rights and Duties	2
3	**Introduction to Terminology of Various Legal Instruments** a) Meaning of Legal Instrument- Binding Nature b) Types of Instruments: Covenant-Charter-Declaration-Treaty-Convention-ProtocolExecutive Orders and Statutes	4
4	**United Nations And Human Rights** a) Brief History of Human Rights- International and National Perspectives b) Provision of the charters of United Nations c) Universal Declaration of Human Rights-Significance-Preamble d) Civil and Political Rights-(Art. 1-21) e) Economic, Social and Cultural Rights-(Art.22-28) f) Duties and Limitations-(Art. 29) g) Final Provision (Art. 30)	5

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I		
Course Code: **22-192**	**Course Name: Introduction to Cyber Security / Information Security- I**	**Total Lectures (14 Hours)**
Teaching Scheme: **2 hrs/week**	**Examination Scheme:** **IA: 10 Marks** **CE: 15 Marks**	**No. of Credits:** **1**
Course Prerequisites:	• Basic Knowledge of Computer Science Subjects • Basic knowledge of computer networks	
Course Objectives:	• To understand networking concepts • To learn cryptography, security concepts in networking	
Course Outcomes:	• After successful completion of course students will be able to: • Learn various computer networking concepts • Understand need and applications of information security • Learn different security threats and vulnerabilities • Learn different cryptographic techniques in computer networks	
Chapter	**Course Contents**	**No. of Lectures**
Module 1: Pre-requisites in Information and Network Security		
1	**Overview of Networking Concepts** 1. Basics of Communication Systems 2. Transmission Media 3. Topology and Types of Networks 4. TCP/IP Protocol Stacks 5. Wireless Networks 6. The Internet	3
2	**Information Security Concepts** 1. Information Security Overview: Background and Current Scenario 2. Types of Attacks 3. Goals for Security 4. E-commerce Security 5. Computer Forensics 6. Steganography	3
3	**Security Threats and Vulnerabilities** 1. Overview of Security threats 2. Weak / Strong Passwords and Password Cracking 3. Insecure Network connections 4. Malicious Code 5. Programming Bugs 6. Cybercrime and Cyber terrorism 7. Information Warfare and Surveillance	5
4	**Cryptography / Encryption** 1. Introduction to Cryptography / Encryption 2. Digital Signatures 3. Public Key infrastructure 4. Applications of Cryptography	3

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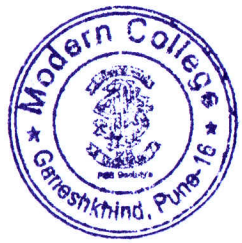
	5. Tools and techniques of Cryptography	



Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- II		
Course Code: **22-CSUT121**	**Course Name: Advanced Operating System**	**Total Lectures (48 Hours)**
Teaching Scheme: **4 hrs/week**	**Examination Scheme:** **IA: 30 Marks** **CE: 70 Marks**	**No. of Credits: 4**
Course Prerequisites:	• Working knowledge of C programming. • Basic Computer Architecture concepts. • Basic algorithms and data structure concepts.	
Course Objectives:	This course teaches Advanced Operating Systems Concepts using Unix/Linux. This course strikes a delicate balance between theory and practical applications In fact, most Units start with the theory and then switches focus on how the concepts are implemented in a C program. This course describes the programming interface to the Unix/Linux system - the system call interface. It is intended for anyone writing C programs that run under Unix/Linux. This course provides an understanding of the functions of Operating Systems. It also provides provide an insight into functional modules of Operating Systems. It discusses the concepts underlying in the design andimplementation of Operating Systems.	
Course Outcomes:	After successfully completing this course, students will be able to: • Understand Advanced Operating Systems Concepts using Unix/Linux • Study the understanding of the functions of Operating Systems. • Discuss the concepts underlying in the design and implementation of Operating Systems • Learn programming interface to the Unix/Linux system - the system call interface.	
Chapter	**Course Contents**	**No. of Lectures**
1	**Introduction to UNIX/Linux Kernel** • System Structure, User Perspective, Assumptions about Hardware, Architecture of UNIX Operating System (TextBook-1: Chapter Topics: 1.2, 1.3, 1.5, 2.1) • Concepts of Linux Programming- Files and theFilesystem, Processes, Users and Groups, Permissions,Signals, Interprocess Communication (TextBook-3: Chapter 1- relevant topics)	04
2	**File and Directory I/O** • Buffer headers, structure of the buffer pool, scenarios for retrieval of a buffer, reading and writing disk blocks, inodes, structure of regular file, open, read, write, lseek, close, pipes, dup (TextBook- 1: Chapter Topics: 3.1-3.4, 4.1, 4.2, 5.1-5.3, 5.5-5.7, 5.12, 5.13) • open, creat, file sharing, atomic operations, dup2,	15

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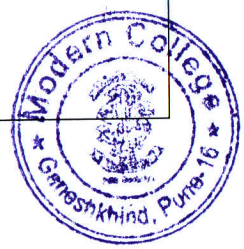
	sync, fsync, and fdatasync, fcntl, /dev/fd, stat, fstat, lstat, file types, Set-User-ID and Set-Group-ID, file access permissions, ownership of new files and directories, access function, umask function, chmod and fchmod,sticky bit, chown, fchown, and lchown, file size, filetruncation, file systems, link, unlink, remove, andrename functions, symbolic links, symlink and readlink functions, file times, utime, mkdir and rmdir, reading directories, chdir, fchdir, and getcwd, device special files(TextBook-2: Chapter Topics: 3.3, 3.4, 3.10-3.14, 3.16, 4.2-4.23)	
3	**Process Environment, Process Control and ProcessRelationships** • Process states and transitions, layout of system memory, the context of a process, saving the context of a process, sleep, process creation, signals, process termination, awaiting process termination, invoking other programs, the user id of a process, changing the size of the process, The Shell, Process Scheduling (TextBook-1: Chapter Topics: 6.1-6.4, 6.6, 7.1-7.8, 8.1) • Process termination, environment list, memory layout of a C program, shared libraries, environment variables, setjmp and longjmp, getrlimit and setrlimit, process identifiers, fork, vfork, exit, wait and waitpid, waitid, wait3 and wait4, race conditions, exec, changing userIDs and group IDs,system function, user identification, process times (TextBook-2: Chapter Topics: 7.3, 7.5-7.7,7.9-7.11, 8.2-8.11, 8.13, 8.15, 8.16)	15
4	**Memory Management** • The Process Address Space, Allocating Dynamic Memory, Managing Data Segment, Anonymous Memory Mappings, Advanced Memory Allocation, Debugging Memory Allocations, Stack-Based Allocations, Choosing a Memory Allocation Mechanism, Manipulating Memory, Locking Memory, Opportunistic Allocation (TextBook-3: Chapter 8) • Swapping, Demand Paging (TextBook-1: Chapter Topics:9.1, 9.2)	06



5	**Signal Handling** • Signal concepts, signal function, unreliable signals,interrupted system calls, reentrant functions, SIGCLDsemantics, reliable-signal technology, kill and raise,alarm and pause, signal sets, sigprocmask, sigpending,sigsetjmp and siglongjmp, sigsuspend, abort, system function revisited, sleep (TextBook-2: Topics: 10.2- 10.13, 10.15-10.19)	08

References:

Sr. No.	Title of the Book	Author/s	Publication
1	The Design of the UNIX Operating System	Maurice J. Bach.	PHI
2	Advanced Programming in the UNIX Environment	Richard Stevens	Addison-Wesley
3	Linux System Programming	Robert Love	O'Reilly

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- II		
Course Code: **22-CSUT122**	**Course Name: Mobile Technologies**	**Total Lectures:** **(48 Hours)**
Teaching Scheme: **4 hrs/week**	**Examination Scheme:** **IA: 30 Marks** **CE: 70 Marks**	**No. of Credits:** **4**
Course Prerequisites:	• Concepts of Networking Conversant with OS internals • Familiar with the network Protocol stack • Gain knowledge about different mobile platform and application development • Brief History of wireless communication	
Course Objectives:	• To impart basic understanding of the wireless communication systems. • To expose students to various aspects of mobile and ad-hoc networks. • To understand the issues relating to Wireless applications Understand the Mobile security	
Course Outcomes:	After successfully completing this course, students will be able to: • familiarize with technology of mobile communication and mobile ad-hoc networks • Understand the GSM architecture • Understand the issues relating to Wireless applications • Introduce wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices • Appreciate the social and ethical issues of mobile computing, including privacy	
Chapter	**Course Contents**	**No. of Lectures**
1	**Introduction to Mobile Computing** • Introduction and need for Mobile computing • Mobility and portability • Mobile and Wireless devices • Mobile Applications • Mobile Operating system – IOS, BlackBery, Windows phone, Plam OS, Symbian OS, PhoneGap	03
2	**Android Fundamentals** • Introduction to Android - Overview and evolution of Android, Features of Android, Android architecture • Components of an Android Application, Manifest file • Android Activity • Service Lifecycle	07

3	**Android UI Design** • Basic UI Designing (Form widgets,Text Fields , Layouts ,[dip, dp, sip, sp] versus px) • Intent(in detail) • All components (e.g Button , Slider, Image view, Toast) Event Handling • Adapters and Widgets • Menu	07
4	**Android Thread and Notification** • Threads running on UI thread (runOnUiThread) • Worker thread • Handlers & Runnable • AsynTask (in detail) • Broadcast Receivers • Services and notifications • Toast • Alarms	07
5	**Advanced Android Programming** • Content Providers – SQLite Programming • JSON Parsing • Accessing Phone Service(Call, SMS, MMS) • Location based services	05
6	**PhoneGap Programming** • Why Use PhoneGap? • How PhoneGap Works • Designing for the Container • Writing PhoneGap Applications • Building PhoneGap Applications • PhoneGap Limitations • PhoneGap Plug-Ins • Hello, World! Program • PhoneGap APIs –1 **Accelerometer:** • Querying Device Orientation, • Watching a Device's Orientation, • Creating a Contact, Searching for Contacts, Cloning Contacts, Removing Contacts.	12

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7	**iOS Fundamentals** • **Introduction** - What is IOS ,IOS Architecture, Frameworks, Application Life Cycle, Features • **Swift** - Introduction to Swift ,General Concepts of Swift • **Xcode** - Introduction to Xcode , Navigator, Editor Utility, Tools, Console, Document, Simulator, Instruments • **Startup** - Application Templates, Introduction to Storyboard , Hello World Application, How 'Hello World' Working, Debugging Database, Plist, Preference, Sqlite Web Service, Restful Web Service (JSON & XML)	08

References:

Sr. No.	Title of the Book	Author/s	Publication
1	A Course in Machine Learning	Hal Daumé III	
2	IOS Apprentice	Matthijs Hollemans	
3	PhoneGap: Beginner's Guide	Giorgio Natili, Purusothaman Ramanujam	PACKT Publication
4	Beginning Android Application Development	Wei-Meng Lee Wiley	

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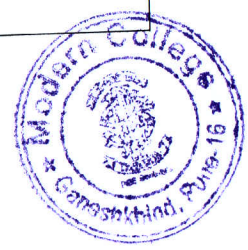
Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- II		
Course Code: **22-CSUT123**	**Course Name: Software Project Management**	**Total Lectures (48 Hours)**
Teaching Scheme: **4 hrs/week**	**Examination Scheme:** **IA: 30 Marks** **CE: 70 Marks**	**No. of Credits** **4**
Course Prerequisites:	• Basic knowledge of Software Engineering • Basic testing concepts	
Course Objectives:	• Software Metrics and Project Management covers skills that are required to ensure successful medium and large scale software projects. • It examines Requirements Elicitation, Project Management, Verification &Validation and Management of Large Software Engineering Projects. • Students learn to select and apply project management techniques for process modeling, planning, estimation, processmetrics and risk management; perform software verification and validation using inspections, design and execution of system test cases.	
Course Outcomes:	After successfully completing this course, students will be able to: • understand Software Engineering and basic testing Concepts. • know skills that are required to ensure successful medium and largescale software projects. • Learn to select and apply project management techniques for process modeling, planning, estimation, risk management. • Student will learn software verification. • Understand design and execution of system test cases.	
Chapter	**Course Contents**	**No. of Lectures**
1	**Introduction to Project Management** What is a Project? What is Project management? Project phases and project life cycleOrganizational structure Qualities of Project Manager WBS	6
2	**Project Management Components** Project Integration Management-Project plandevelopment and execution Change controlsCCB Configuration management	8
3	**Scope Management** Strategic planning Scope planning, definitionVerification	6

	and control	
4	**Time management** Activity planning Schedule development and controlGANTT Chart	2
5	**Cost Management** Cost estimation and ControlCOCOMO model BASIC COCOMO NUMERICALS	2
6	**Quality Management** •Quality planning and assurance	2
7	**Human Resource Management** • Organizational planning Staff acquisition	2
8	**Communication Management** • Information distribution Reporting	2
9	**Risk Management** • Risk identification Quantification and control	2
10	**Procurement Management** • Solicitation management and control Contract administration	2
11	**Software Metrics** • The scope of software metrics • Size- oriented metrics • Function oriented • Software metrics data collection Analyzing software data	3
12	**Software Reliability** • Measurement and prediction • Resource measurement Productivity, teams and tools	3
13	**Planning a measurement program** • What is metrics plan? • Developing goals, questions and metrics • Where and When: Mapping measures toactivities • How: Measurement tools Who: Measurers , analyst, tools revision plans	4
14	**Quality Standards** • CMM levels • KPA's • PSP/TSP	4



References:

Sr. No.	Title of the Book	Author/s	Publication
1.	Software Engineering	Roger Pressman	McGraw-Hill
2.	Software Metrics for Project Management andprocess improvement	Robert B. Grady	Prentice hill

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- II		
Course Code: **22-CSDT124A**	**Course Name:** **Project**	**Total Lectures (30 Hours)**
Teaching Scheme: **4 hrs/week**	**Examination Scheme:IA: 30 Marks** **CE: 70 Marks**	**No. of Credits:** **2**
Course Prerequisites:	• OOSE concepts • Knowledge of Programming languages, software Tools and techniques	
Course Objectives:	Development of application software	
Course Outcomes:	After successfully completing this course, students will be: • Undertake problem identification, formulation and solution for any software project. • Design computer science solutions to complex problems utilizing a systems approach. • Prepare students to work as part of teams on multi-disciplinary projects.	
Guidelines	Project can be done on any platform and independent of any language.	
Chapter	**Course Contents**	**Number of Sessions**
1	**Introduction** 1.1 Motivation 1.2 Problem statement 1.3 Purpose/objective and goals 1.4 Literature /Survey 1.5 Project scope and limitations	2
2	**System Analysis** 2.1 Existing systems 2.2 Scope and limitations of existing systems 2.3 Project perspective, features 2.4 Stakeholders 2.5 Requirement analysis 2.6 Functional requirements, performance requirements, security requirements etc.	3
3	**System design** 3.1 Design constraints 3.2 System Model: UML diagrams 3.3 Data Model	6

	3.4 User interfaces	
4	**Implementation Details** 4.1 Software/hardware specifications	8
5	**Outputs and Reports**	5
6	**Testing** Test Plan, Black Box Testing or Data Validation Test Cases, White Box Testing or Functional Validation Test cases and results	3
7	**Conclusion and Recommendations Future Scope**	2
8	**Bibliography and References**	1

References:

Sr. No.	Title of the Book	Author/s	Publication
1.	Software Engineering	Roger Pressman	McGraw-Hill
2.	Software Metrics for Project Management andprocess improvement	Robert B. Grady	Prentice hill

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- II		
Course Code: **22-CSDP124A**	**Course Name:** **Project and Project Related Assignments**	**Total Lectures (48 Hours)**
Teaching Scheme: 2 hrs/week	**Examination Scheme:IA: 30 Marks** **CE: 70 Marks**	**No. of Credits: 2**
Course Prerequisites:	**OOSE concepts** **Knowledge of Programming languages, software Tools and techniques**	
Course Objectives:	Development of application software	
Course Outcomes:	After successfully completing this course, students will be: • Undertake problem identification, formulation and solution for any software project. • Design computer science solutions to complex problems utilizing a systems approach. • Prepare students to work as part of teams on multi-disciplinary projects.	
Guidelines	The project assignments are a compulsory part of the project course and should be carried out by each project group. Project assignments are to be given by the guide for continuous internal evaluation. The project assignments are to be allotted to each group separately by the project guide on the basis of the implementation technology. Each student within the group must work actively and contribute to the assignments, project work and report writing.	

Assignment No.	**Assignment Name**	**Number of Sessions**
1	Project Time management: plan (schedule table), Gantt chart, Roles and responsibilities, data collection, Implementation	2
2	Simple assignments to evaluate choice of technology	3
3	Assignments on UI elements in chosen technology	4
4	Assignments on User interfaces in the project	8
5	Assignments on event handling in chosen technology	5
6	Assignments on Data handling in chosen technology	3
7	Online and offline connectivity	2
8	Report generation	1
9	Deployment considerations	1
10	Test cases	1

References:

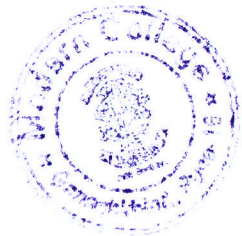
Sr. No.	Title of the Book	Author/s	Publication
1.	Software Engineering	Roger Pressman	McGraw-Hill
2.	Software Metrics for Project Management andprocess improvement	Robert B. Grady	Prentice hill

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- II		
Course Code: **22-CSDT124B**	**Course Name: Human Computer Interaction**	**Total Lectures (30 Hours)**
Teaching Scheme : **4 hrs/week**	**Examination Scheme:** **IA: 15 Marks** **CE: 35 Marks**	**No. of Credits:** **2**
Course Prerequisites:	• Foundations of Human Computer Interaction • Be familiar with the design technologies for individuals and persons with disabilities • Be aware of mobile HCI • Learn the guidelines for user interface.	
Course Objectives:	• Design effective dialog for HCI. • Design effective HCI for individuals and persons with disabilities. • Assess the importance of user feedback. • Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites. • Develop meaningful user interface.	
Course Outcomes:	After successful completion of course students will be able to • Learn foundations of HCI • Design and software process • Models and theories of HCI • Web interface design of HCI	
Chapter	**Course Contents**	**No. of Lectures**
1	**FOUNDATIONS OF HCI** The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.	6
2	**DESIGN & SOFTWARE PROCESS** Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design	7
3	**MODELS AND THEORIES** Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.	5

4	**MOBILE HCI** Mobile Ecosystem: Platforms, Application frameworks Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.	6
5	**WEB INTERFACE DESIGN** Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow, Case Studies.	6

References:

Sr. No.	Title of the Book	Author/s	Publication
1	Human Computer Interaction, (Chapter 1 , 2 & 3)	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale	3rd Edition, Pearson Education, 2004
2	Mobile Design and Development (Chapter 4)	Brian Fling	First Edition O"Reilly Media Inc., 2009
3	Designing Web Interfaces (Chapter 5)	Bill Scott and Theresa Neil	First Edition, O"Reilly, 2009



Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I		
Course Code: 22-CSDP124B	**Course Name:** **Human Computer Interaction Practical**	**Total Practical's: 10**
Teaching Scheme: 3 hrs/week	**Examination Scheme:** **IA: 30 Marks** **CE: 70 Marks**	**No. of Credits: 2**
Course Prerequisites	• Strong knowledge about Java programming / PHP / .Net Framework • Good Understanding of Object-Oriented Programming concepts. • Must be familiar with XML.	
Course Objectives:	• To understand how to develop web services using Java/PHP/.Net	
Course Outcomes:	After successful completion of course students will be able to • Learn foundations of HCI • Design and software process • Models and theories of HCI • Web interface design of HCI	
Assignment Number	**Assignment Name**	**Number of Sessions**
1	Understand the trouble of interacting with Computers - Redesign interfaces of applications. Select any application, like land-line phone application, registration etc and understand the trouble of interacting with that application. Comment on design of that application as good orbad design based on whether interaction principles are matching with users mental model or not. Redesign the interface for mention the change in design and reason.	1
2	Know your client: Select anyone category of user and develop application understanding the user who will be using your system. Comment on the category of user selected and specific features given for the users and identify what kinds of interfaces will they like and why?. Compare with existing system analyze and rate them.Analyze user models and develop user centric interfaces for : a. Children (4-5 years of age): An application to teach math. Perform analysis of children behavior e.g. their preferences, interests etc b. Teenagers: Design a digital diary for young teens to help them overcome various social pressures they deal with during their teen years. The diary should also be like a self help tool which would help them deal with incidents like bullying, peer pressure, etc.. This is an open project and you can think in any direction to make the children sail through their	2

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<td></td>
<td>te4en years while trying to discover life around them.
Perform analysis of teenagers e.g. their problems, interests, needs, etc

c. Older generation: Folks from the older generation has been very wary of using their credit card on the Internet. They have various concerns when it comes to paying their bills. Also because of their old age, it will be beneficial for them to use the internet and pay their phone, electricity, gas, etc. bills
Analysis of old people e.g. their nature, interests, needs, etc

d. Rural people: ATVM for train ticketing in rural area
Perform analysis of rural people e.g. their problems, interests, needs, language etc

e. Mentally disabled: Design the interface of a game for mentally disabled children.
Analysis of mentally disabled e.g. their behavior, problems, interests…
Any tool or technology can be used for implementation e.g., VB, DOTNET, JAVA, PHP, etc.</td>
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<td>3</td>
<td>Identify 5 different websites catering to one specific goal (eg. Goal – on-line shopping and 5 different websites – ebay, amazon, flipkart, zovi, myntra) and perform a competitive analysis on them to understand how each one caters to the goal, the interactions and flow of the payment system and prepare a report on the same. Consider any 8 HCI principles and prepare the following table evaluating the websites.
<table>
<tr><th>Sr. No</th><th>Principles</th><th>Poor</th><th>Average</th><th>Good</th><th>Good Very</th><th>Excellent</th></tr>
<tr><td>1.</td><td>Aesthetically pleasing</td><td></td><td></td><td></td><td></td><td></td></tr>
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<td>To achieve simplicity one needs to optimize the number of elements on a screen, within limitsof clarity. And minimize the alignment points, especially horizontal or columnar
1. Calculate Screen Complexity for existing Graphical User Interface (GUI).
2. Redesign the Screen by applying various guidelines to lower the complexity of selected</td>
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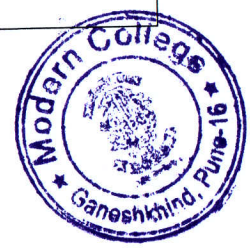
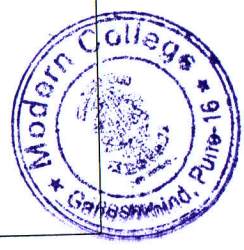
	Graphical User Interface (GUI) to achieve simplicity Method for Measuring Complexity: 1. Draw a rectangle around each element on a screen, including captions, controls, headings, data, title, and so on. 2. Count the number of elements and horizontal alignment points (the number of columns in which a field, inscribed by a rectangle, starts). 3. Count the number of elements and vertical alignment points (the number of rows in whichan element, inscribed by a rectangle, starts). 4. Calculate number of bits required by horizontal (column) alignment points and number of bits required by vertical (row) alignment points by applying following formula for calculating the measure of complexity. $C = -N \sum_{n=1}^{m} p_n \log_2 p_n$ C, complexity of the system in bits N, total number of events (widths or heights) m, number of event classes (number of unique widths or heights) pn, probability of occurrence of the nth event class (based on the frequency of events withinthat class) Calculate overall complexity by adding the number bits required by horizontal alignmentpoints and vertical alignment points	
5	Design/Redesign web user interface based on Gestalt theories and comment on the principle applied and justify. Alsoanalyze one image in which Gestalt principle is applied and comment. Example: Take a look at old IBM logo: IBM® You recognize the letters as an I, a B, and an M, no problem there. But they aren't letters at all; the whole thing is a compilation of bright blue horizontal lines arranged to create the perception of a set of letters. Gestalt Property used here is	2

	Closure. Closure means that we "close" objects that are themselves not complete; not only completing the figure in our perception, but perceiving the figure as having an extra element of aesthetic design; we lookfor a simple, recognizable pattern.	
6	Implement different Kinds of Windows such as message boxes, palette Windows, Pop-up Windows, primary window, secondary window, dialog boxes, message box etc. For every window designed for the application explain: - Purpose - Description - Components - Kind window	**1**
Note: Any tool or technology can be used for implementation e.g., VBDOTNET, JAVA, PHP, etc		

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- II		
Course Code: **22-CSDT124C**	**Course Name: Soft Computing**	**Total Lectures (30 Hours)**
Teaching Scheme : **4 hrs/week**	**Examination Scheme:** **IA: 15 Marks** **CE: 35 Marks**	**No. of Credits:** **2**
Course Prerequisites:	A strong mathematical background Proficiency with algorithms Critical thinking and problem-solving skills	
Course Objectives:	• To introduce the ideas of soft computational techniques based on human experience. • To generate an ability to design, analyze and perform experiments on real life problems using various Neural Learning Algorithms. To conceptualize fuzzy logic and its implementation for various real-world applications. • To apply the process of approximate reasoning using Neuro-Fuzzy Modeling. • To provide the mathematical background to carry out optimization using genetic algorithms.	
Course Outcomes:	After successful completion of course student will be able to • Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory. • Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic • To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations • Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications • Reveal different applications of these models to solve engineering and other problems	
Chapter	**Course Contents**	**No. of Lectures**
1	**Introduction to Soft Computing** • Neural Networks: Definition, Advantages,Applications, Scope. • Fuzzy logic: Definition, Applications. Genetic Algorithms: Definition, Applications.	2



2	• **Neural Network** • Fundamental Concept: Artificial Neural Network,Biological Neural Network, • Brain vs. Computer-Comparison Between Biological Neuron and Artificial Neuron (Brain vs. Computer), Artificial Neurons, Neural Networks andArchitectures: Neuron Abstraction, Neuron Single Functions, Mathematical Preliminaries, Neural Networks Defined, Architectures: Feedforward andFeedback, Salient Properties of Neural Networks Geometry of Binary Threshold Neurons and Their Networks: Pattern Recognition and Data Classification, Convex Sets, Convex Hulls and Linear Separability, Space of Boolean Functions, Binary Neurons are Pattern Dichotomizers, Non-linearlySeparable Problems, Capacity of a Simple Threshold Logic Neuron, Revisiting the XOR Problem,Multilayer Networks, How Many Hidden Nodes areEnough? • Learning and Memory: An Anecodatal Introduction, Long Term Memory, The Behavioral Approach to Learning, The Molecular Problem of Memory, Learning Algorithms, Error Correction and Gradient • Descent Rules, Learning Objective for TLNs, Pattern Space and Weight Space. Linear Seperabilty, Hebb Network, Perceptron Network. α- Least Mean Square Learning.	15
3	**Fuzzy Set Theory** • Brief Review of Conventional Set Theory • Introduction to Fuzzy Sets • Properties of Fuzzy Sets • Operations on Fuzzy Sets • Crisp Relation, Fuzzy Relation • Tolerance and equivalence relation • Fuzzy Tolerance and equivalence relation • Fuzzy Max-Min and Max-Product Composition • Membership Functions • Fuzzification • Defuzzification to crisp sets, λ-Cuts for fuzzy Relations, • Fuzzy (Ruled-Based) system • Graphical technique of inference • Membership value assignment-Intuition	9



	• Inference.	
4	**Genetic Algorithms** • What are Genetic Algorithms? • Why GeneticAlgorithms? • Traditional Optimization and Search Techniques • Simple GA • Terminologies and Operators in GA • Encoding, Selection • Crossover, Mutation • Search Termination • Constraints in GA	4

References:

Sr. No.	Title of the Book	Author/s	Publication
1	Fuzzy Logic With Engineering Applications	Timothy Ross	Wiley Publication
2	Introduction to Soft Computing	Deepa & Shivanandan	Wiley Publication
3	Genetic Algorithms in Search, Optimization and Machine Learning	David E. Goldberg	Pearson Education
4	Fundamentals of Neural Networks – Architectures, Algorithms, And Applications	Laurene Fausett	Pearson Education
5	Neural Networks	Satish Kumar	Tata McGrawHill

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- II		
Course Code: **22-CSDP124C**	**Course Name:** **Soft Computing Practical Assignment**	**Total Lectures:** **(30 Hours)**
Teaching Scheme: **2hrs/week**	**Examination Scheme:** **IA: 15 Marks** **CE: 35 Marks**	**No. of Credits:** **2**
Course Prerequisites:	• Programming language concepts • Basic knowledge of C,CPP, JAVA	
Course Objectives:	• Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory. • Introduce students to artificial neural networks and fuzzy theory from an engineering perspective	
Course Outcomes:	After successful completion of course students will be able to • Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory. • Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic • To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations • Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications • Reveal different applications of these models to solve engineering and other problems	

Implement the programs in C/C++/Java/MATLAB

Assignment Number	Assignment Name	Number of Sessions
1	Write a program to implement Fuzzy Operations Union, Intersection, Complement, Algebraic sum, Algebraic productCartesian product	1
2	Write a program to implement De Morgans law.	1
3	Write a program to implement Max-Min Composition and Max-Product Composition.	1
4	Write a program to implement lambda cut and activation function	1
5	Write a program to implement Perceptron Learning Rule	1
6	Write a program to implement Hebb's Rule	1
7	Write a program to implement Feed Forward Network	1

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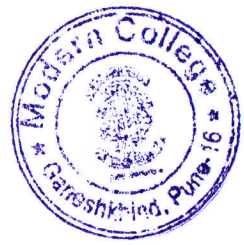
8	Write a program for building an Artificial Neural Network by implementing the Backpropagation Algorithm and test the same using appropriate data sets.	1
9	Write a program to implement Feed Forward Network	1
10	Write a program to develop supervised learning algorithm	1

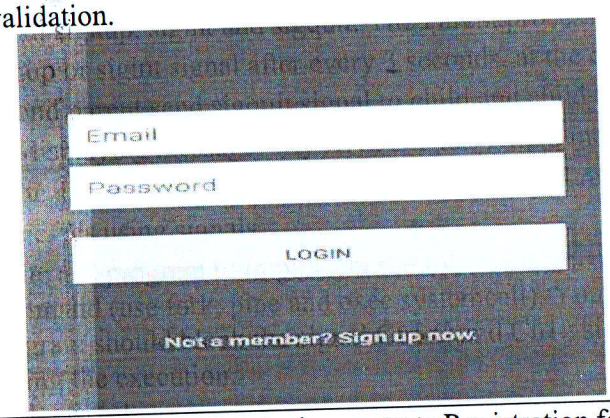


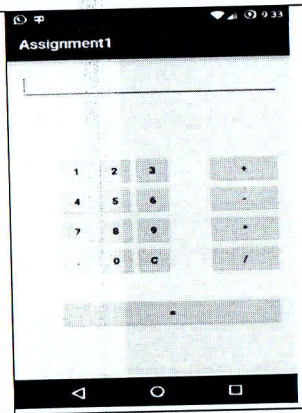
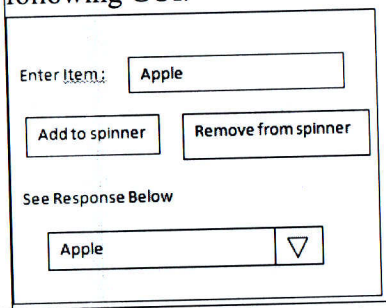
Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- II		
Course Code: **22-CSUP115**	**Course Name:** **Practical on Advanced OS & mobile Technologies**	**Total Lectures:** **(30 Hours)**
Teaching Scheme: **2hrs/week**	**Examination Scheme:IA: 15 Marks** **CE: 35 Marks**	**No. of Credits:** **4**
Course Prerequisites:	Knowledge of C,CPP programming language Data structure concepts	
Course Objectives:	• To understand operating system concepts and process concepts • To develop simple mobile applications using android programming concepts	
Course Outcomes:	After successfully completing this course, students will be able to: • understand and execute basic commands of shell script • apply concept of creating new processes from parent processes and implementation of various system calls. • get ability to develop applications using Mobile Programming Technologies like Android. • understand recent trends and emerging technologies and working of wireless architectures and their applications.	

Assignment Number	Assignment Name	Number of Sessions
1	To create 'n' children. When the children will terminate, display total cumulative time childrenspent in user and kernel mode.	1
2	To generate parent process to write unnamed pipe and will read from it.	1
3	Write a C program to display all the files from current directory which are created in particular month	1
5	Write a C program to implement the following unix/linux command ls –l > output.txt	1
6	Write a C program that behaves like a shell (command interpreter). It has its own prompt say "NewShell$". Any normal shell command is executed from your shell by starting a child process to execute the system program corresponding to the command. It should additionally interpret the following command. i) typeline +10 <filename> - print first 10	1

	lines of file ii) typeline -20 <filename> - print last 20 lines of file iii) typeline a <filename> - print all lines of file	
7	Write a C program to implement the following unix/linux command (use fork, pipe and exec system call) ls –l | wc –l	1
8	Write a C program which create a child process which catch a signal sighup, sigint and sigquit. The Parent process send a sighup or sigint signal after every 3 seconds, at the end of 30 second parent send sigquit signal to child and child terminates my displaying message "My DADDY has Killed me!!!".	1
9	Write a C program that illustrates suspending and resuming processes using signals	1
10	Write a C program to implement the following unix/linux command (use fork, pipe and exec systemcall). Your program should block the signal Ctrl-C and Ctrl-\ signal during the execution. ls –l | wc –l	1

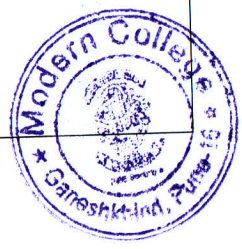
Java Android Assignments

Assignment Number	Assignment Name	Number of sessions
1	Java Android Program to demonstrate login form with validation. 	1
2	Java Android Program to demonstrate Registration formwith validation.	1
3	Create the simple calculator shown below also perform appropriate operation	1

		
4	Create an Android application which examine, that a phone number, which a user has entered is in thegiven format. * Area code should be one of the following: 040, 041, 050, 0400, 044 * There should6- 8 numbers in telephone number (+ area code).	1
5	By using Spinner, Buttons. Write a program to draw following GUI. 	1
6	Create an Android application, which show to the user5-10 quiz questions. All questions have 4 possible options and one right option exactly. Application counts and shows to the user how many right answers were right and shows the result to user.	1
7	Construct an app to display the image on date wise.	1
8	Create an Android application, the user can enter 10 students information and stored it in file and display student information in second view and also search the particular student information.	1
9	Write an application to accept two numbers from the user, and displays them, but reject input if both numbers are greater than 10 and asks for two new numbers.	1
10	Create Following Table: Emp (emp_no,emp_name,address,phone,salary) Dept (dept_no,dept_name,location)	1

	Emp-Dept is related with one-many relationship. Create application for performing the following Operation on the table 1) Add Records into Emp and Dept table. Accept Department name from User and delete employee information which belongs to that department.	

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- II		
Course Code: **22-291**	**Course Name: Human Rights-II**	**Total Lectures (14 Hours)**
Teaching Scheme: **2 hrs/week**	**Examination Scheme:** **IA: 10 Marks** **CE: 15 Marks**	**No. of Credits** **1**
Course Objectives:	To familiarise students with the concept of vulnerable and disadvantaged communities, to enable them to understand challenges faced by these marginalised sections of society	
Course Objectives:	After successful completion students will be able to • Enumerate vulnerable and disadvantaged communities • Illustrate standards of status of women and children • Analyse role of United Nations in addressing Human Rights of vulnerable and disadvantaged communities • Evaluate policies and measures that address socio-economic disadvantaged communities	
Chapter	**Course Contents**	**No. of Lectures**
Module 2: Human rights of vulnerable and disadvantaged groups		
1	**General Introduction** a) Meaning and Concept of Vulnerable and Disadvantaged b) Groups, Customary, Socio-Economic and Cultural Problems of c) Vulnerable and Disadvantaged Groups	2
2	**Social status of women and children in International and national perspective** a) Human Rights and Women's Rights – International and National Standards b) Human Rights of Children-International and National Standards	4
3	**Status of Social and Economically Disadvantaged people** a) Status of Indigenous People and the Role of the UN b) Status of SC/ST and Other Indigenous People in the Indian Scenario c) Human Rights of Aged and Disabled d) The Minorities and Human Rights	5
4	**Human rights of vulnerable groups** a) Stateless Persons b) Sex Workers c) Migrant Workers d) HIV/AIDS Victims	3



Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- II		
Course Code: **22-292**	**Course Name: Introduction to Cyber Security / Information Security-II**	**Total Lectures (13 Hours)**
Teaching Scheme: **2 hrs/week**	**Examination Scheme:** **IA: 10 Marks** **CE: 15 Marks**	**No. of Credits:** **1**
Course Prerequisites:	• Basic Computer Science Concepts	
Course Objectives:	• To understand security laws • To understand IPR concepts	
Course Outcomes:	After successful completion of course students will be able to: • Understand security management practices • Cyber security laws and standards • IPR concepts	
Chapter	**Course Contents**	**No. of Lectures**
	Module 2: Security Management	
1	**Security Management Practices** 1. Overview of Security Management 2. Information Classification Process 3. Security Policy 4. Risk Management 5. Security Procedures and Guidelines 6. Business Continuity and Disaster Recovery 7. Ethics and Best Practices	7
2	**Security Laws and Standards** 1. Security Assurance 2. Security Laws 3. IPR 4. International Standards 5. Security Audit 6. SSE-CMM / COBIT etc	6