



JSPM's
RAJARSHI SHAHU COLLEGE OF ENGINEERING
TATHAWADE, PUNE-33
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)



Department of Master of Computer Applications
Structure & Syllabi
S.Y. MCA Patten: 2019-20
w.e.f. Academic Year 2020-2021


Prof. Rinku Dulloo
Chairman BOS


Dr. Seemah Kedar
Academic Dean


Dr. Rakesh Jain
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INDEX

Sr.No	Contents	Page No
1	Vision & Mission	3
2	PO's	4
3	PSO's	5
4	Highlights of the syllabus	6-7
5	Structure for Semester III & Semester IV	8-9
6	Detailed Syllabus	10-51


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Department of Master of Computer Applications

Vision

“To progress as a center of brilliance in computing education producing globally proficient professionals contributing to the betterment of the society.”

Mission

1. To educate students in the basic standards of Software Engineering
2. To educate students to become successful professionals
3. To propel students for research and entrepreneurship




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Department of Master of Computer Applications

Program Outcomes (POs)

- PO1: Computational Knowledge: Apply knowledge of computing fundamentals and domain knowledge.
- PO2: Problem Analysis: Identify, formulate and solve complex computing problems reaching substantiated conclusions.
- PO3: Development of Solutions: Design and evaluate solutions for complex computing problems with appropriate consideration.
- PO4: Investigations of complex Computing problems: Use research-based knowledge and research methods for analysis and interpretation of data, and synthesis of the information to provide valid conclusions
- PO5: Modern Tool Usage: Create, identify and apply appropriate techniques, resources, and modern computing tools to complex computing activities.
- PO6: Professional Ethics: Understand and commit to professional ethics and cyber regulations for professional computing practices.
- PO7: Life-long Learning: Identify the need and have the ability, to engage in independent learning as a computing professional.
- PO8: Project management and finance: Understand and apply computing, management principles to manage multidisciplinary projects
- PO9: Communication Efficacy: Communicate effectively with the computing community, and with society.
- PO10: Societal and Environmental Concern: Understand and assess societal, environmental, health, safety, legal, and cultural issues
- PO11: Individual and Team Work: Function effectively in diverse teams and in multidisciplinary environments.
- PO12: Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursue that opportunity.


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Department of Master of Computer Applications

Program Specific Outcomes (PSOs):

Upon successful completion of PG MCA program, the students will attain following

Program Specific Outcomes:

PSO1: Professional Skills-

To provide an opportunity to work effectively with teams and group with better communication skills in written and oral form. Also, to develop an appreciation of ethics and social awareness needed and with this to develop master for successful career and leadership position

PSO2: Problem-Solving Skills-

To prepare the students for technical and managerial skills necessary to design and implement computer applications to conduct open ended problem solving and applying critical thinking

PSO3: Professional Career and Entrepreneurship-

The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and zest for the higher studies and research and entrepreneurship


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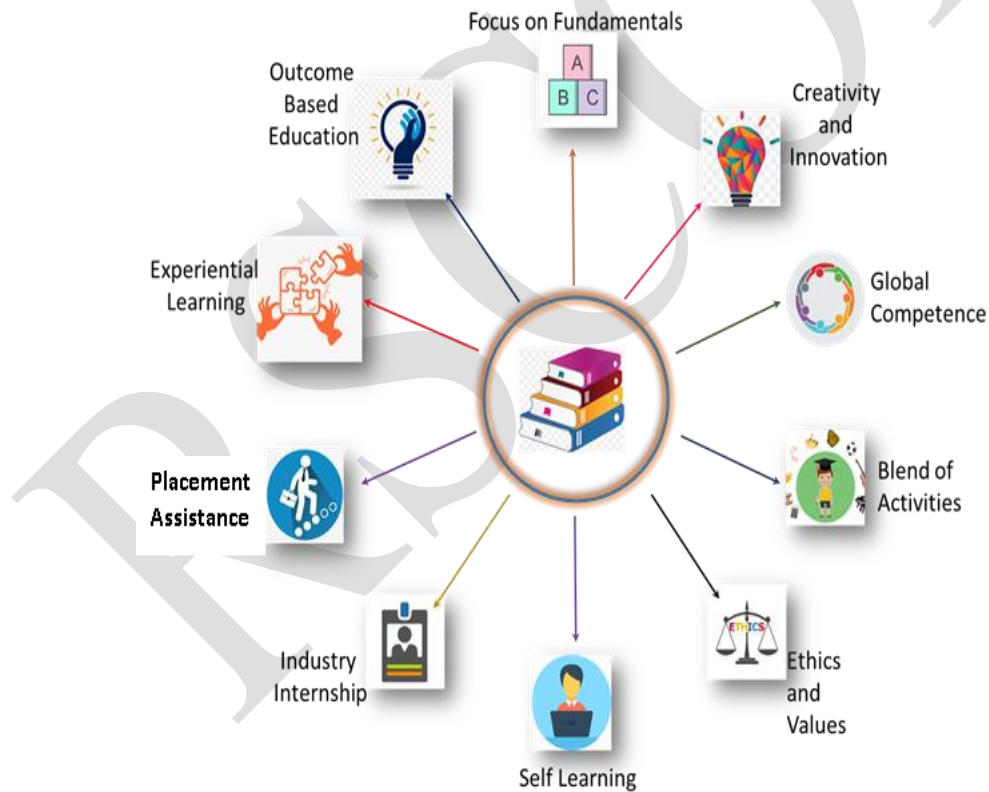
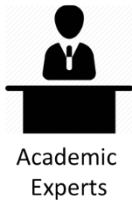

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Highlights of the Syllabus

Curriculum of MCA is designed in consultation with



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Everybody knows Technology but “Application makes a Difference”

- The curriculum of MCA is designed in a way such that, students will get knowledge of most trending and “in use” industrial technologies and practices by the time they complete their post-graduation. Keeping this goal in mind updates the curriculum as and when required.
- S.Y. MCA curriculum is designed to build a strong technical and clear all the fundamental concepts
- Mini Projects- To understand the importance of working in teams and being part of collective success, we have incorporated Mini projects in each semester where student will work together and implement it.
- Human Values Course- RSCOE focus on the all-around development of our students. This includes refining their technical skills as well as their personal development. Human Values courses will teach them how to handle stressful situations, ethics of a professional and how to give back to the society. This will also motivate them to join the various CSR activities conducted by the company they join and help in achieving the different organizational goals of the company they join.
- Electives offered on emerging technologies. Students can opt any one as per his/her choice.
- Online Professional certification courses are enabled curriculum for all students.
- Language Proficiency courses - English, German and Japanese are introduced in curriculum. Student can opt any one of them.
- In order to make students ready for placement, gateway to industry course is given where basic aptitude and technical concepts are introduced.
- Soft skills course help students to develop over all personality and groom them.


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S. Y. MCA AY 2020-21
Semester-III- Syllabus Structure

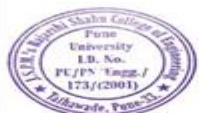
Course Code	Course	Teaching Scheme		Semester Examination Scheme of Marks					Credits
		TH	LAB	ISE (15)	MSE (25)	ESE (60)	LAB	TOTAL	
MCA2101	Optimization Techniques	3	-	15	25	60	-	100	3
MCA2102	Advance Web Programming	3	4	15	25	60	100	200	5
MCA2103	Object Oriented Analysis and Design	3	-	15	25	60	-	100	3
MCA2104	Core Java	3	4	15	25	60	100	200	5
MCA2105	Computer Networks	3	-	15	25	60	-	100	3
MCA2106	Problem Solving Techniques - I	-	2	-	-	-	25	25	1
MCA2107	Online Professional Training Courses (MOOC/NPTEL/SWAYAM)	-	2	-	-	-	25	25	1
Total		15	12	75	125	300	250	750	21

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S. Y. MCA AY 2020-21
Semester-IV- Syllabus Structure

Course Code	Course	Teaching Scheme		Semester Examination Scheme of Marks					Credits
		TH	LAB	ISE (15)	MSE (25)	ESE (60)	LAB	TOTAL	
MCA2108	Advance Database Management System	3	-	15	25	60	-	100	3
MCA2109	Advance Java	3	4	15	25	60	100	200	5
MCA2110	Python Programming	3	4	15	25	60	100	200	5
MCA2111	Cloud Computing	3	-	15	25	60	-	100	3
MCA2112	Elective - I	3	-	15	25	60	-	100	3
MCA2113	Problem Solving	-	2	-	-	-	25	25	1
MCA2114	Technical Seminar	-	2	-	-	-	25	25	1
Total		15	12	75	125	300	250	750	21

Elective-I

Course Code	Course	Course Code	Course
MCA2112A	Internet of Things	MCA2112D	Agile Software Development
MCA2112B	Artificial Intelligence & Machine Learning	MCA2112E	Research Methodology
MCA2112C	Data Mining and Data Warehousing	MCA2112F	Cyber Security

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S. Y. MCA
Academic Year – 2020-2021 Semester-III
[MCA2101]: Optimization Technique

Teaching Scheme: TH: -Hours/Week : 03	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks
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- Course Objective:**
1. To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems
 2. To develop and promote research interest in applying optimization techniques in problems of technology
 3. To apply the mathematical results and numerical techniques of optimization theory to concrete technical problems.
 4. To introduce linear programming, dynamic programming and related optimization theories to solve real life / simulated problems

- Course Outcome:**
 After successful completion of the course, students will able to:
- CO1. Apply linear programming techniques to solve optimization problem
 - CO2. Optimize the given objective function under specified resource constraints
 - CO3. Perform sensitivity analysis to study the effect of variation in resource constraints
 - CO4. Apply PERT/CPM techniques to manage a project
 - CO5. Analyze project management techniques and propose a mathematical model for time
 - CO6. minimization in project crashing
 - CO7. Apply the appropriate queuing models for real world problem

Course Contents		
UNIT-I	Linear Programming	10 Hours
Linear Programming model, Application areas of Linear programming, Linear Programming – The Graphical method – Graphical Solution methods of Linear Programming problem , Two Phase Simplex Method and problems , Dual Simplex Method and problems, Big –M method and problems.		
UNIT-II	Special Cases in LP	07 Hours
Transportation Problem, Optimization Technique for TP (MODI Method), Assignment Problem and its solutions by Hungarian Method.		
UNIT-III	Sequential Model and Replacement Theory	08 Hours

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Introduction and general notations, Algorithm for solving Sequence Problem, Processing n jobs through 1 machine and 2 machines, Replacement of items that deteriorates with time, when money value is considered & Problems, Individuals and Group Replacement

UNIT-IV	Network Analysis including PERT and CPM - I	08 Hours
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Basic differences between PERT and CPM., Arrow Networks, time estimates, Earliest expected time Latest – allowable occurrences time Forward Pass Computation Backward Pass Computation Representation in Tabular Form, Critical Path, Probability of meeting scheduled date of completion, Calculation on CPM network.

UNIT-V	Network Analysis including PERT and CPM - II	06 Hours
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Critical Path , Crashing the network, Resource leveling and recourse loading

UNIT-VI	Inventory Theory and Queuing Theory	06 Hours
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Inventory Model Building, Single item deterministic Model, Inventory Control Models without strategies Inventory Control Models with shortages , Introduction and classification of queues Solution of Queuing models.

Text Books:

T1. J.K Sharma, Operation Theory and Applications, MacMillan India Ltd.

Reference Books:

- R1.** Taha, Hamdy A. Operations Research: An Introduction. Pearson Education India, 1982.
- R2.** Kedarnath Ramnath and Co, Operations Research-S.D. Sharma Vohra, N. D. Quantitative Techniques in Management, Tata McGraw-Hill Education, 2006.
- R3.** Hillier, Frederick S. Introduction to operations research. Tata McGraw-Hill Education, 2012
- R4.** Kanti Swarup, Gupta P.K., Man Mohan, Operations Research, 12th Edition; Sultan Chand & Sons, New Dehli.
- R5.** R. Panneerselvam, Operations Research, 2nd Edition, PHI Learning Private Ltd New Delhi.
- R6.** J K Sharma, Operations Research Theory and Applications, MacMillan India Ltd.


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S. Y. MCA

Academic Year – 2020-2021 Semester-III

[MCA2102]: Advance Web Programming

Teaching Scheme: TH: -Hours/Week : 03 LAB: -Hours/Week : 04	Credit TH: 03 LAB: 02	Examination Scheme: In Sem. Evaluation:15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks LAB Evaluation : 100 Marks
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Course Objective:

1. Describe the need of UI/UX design processes and user experience design in application development.
2. Describe the core syntax and semantics of JavaScript, Operators, control statements and functions
3. Discover the need for working with the JavaScript events, objects and form validation Infer the cookies concepts in JavaScript.
4. Create Asynchronous request through XML HttpRequest object and JSON.
5. Learning the MVC based applications using Angular JS components like directives, filters, expressions and form events.

Course Outcome:

- CO1. After successful completion of the course, students will able to:
- CO2. Analyze an interaction design problem and propose of a user-centered process.
- CO3. Identify common use of expressions and operators and know flow control, functions
- CO4. Express proficiency in the handling of events and demonstrate usage of objects, cookies, form
- CO5. Validation using JavaScript.
- CO6. Proficiency to create dynamic web pages using AJAX and JSON.
- CO7. Design MVC based application with use of Angular JS concepts like, model, controller, Directives etc.
- CO8. Building a form and setting pages to implement single page applications (SPA).

Course Contents

UNIT-I	Introduction to UI/UX design	07 Hours
Introduction to UI/UX design process, difference between UX/UI design, good and bad UX, Role of UI and UX designer, UI/UX design principals, user research methods, introduction to UI/UX design tools, UX design phases: research, design, testing, and implementation.		
UNIT-II	Introduction to JavaScript	08 Hours
JavaScript Introduction, JavaScript data types, Variable declaration and scope, Operators, JavaScript Reserved Words, loops, control statements, break and continue statements. Functions: _Function Declaration, Calling a Function, Function Parameter, return Statement, Nested Functions, Function () Constructor, Built In Functions, Standard Date and Time Functions, JavaScript Arrays, JavaScript objects		

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UNIT-III	JavaScript Events, Form Validation, Objects and classes	8 Hours
<p>JavaScript <u>Events</u>: What is an event, onClick Event Type, onSubmit Event Type, Mouse events, HTML 5 Standard Events, What is Page Redirection?</p> <p><u>Form validation</u>: Basic Form validation, data format validation, regular expression.</p> <p><u>Objects and Classes</u>: object properties, object methods, User-Defined Objects, Defining Methods for an Object, Inheritance in JavaScript using prototype. <u>Cookies</u>: storing, reading and deleting cookies</p>		
UNIT-IV	AJAX and JSON	07 Hours
<p>Managing Web Page Styles using JavaScript and CSS</p> <p>Introduction to AJAX: What is AJAX? XML Http Request Object, AJAX components, jQuery Ajax Methods, Ajax UI Tags, Ajax get() and post() methods, AJAX Examples</p> <p>JSON: JSON overview, syntax, data types, JSON objects, JSON with JavaScript and AJAX</p>		
UNIT-V	Introduction to Angular JS	07 Hours
<p>Angular JS introduction, Architecture & Features, AngularJS Expressions: Numbers, Strings, Objects, Arrays, Expressions using {{ }} and ng-bind. MVC architecture (Model, Controller).</p> <p>Directives: Data Binding, ng-init, ng-repeat, ng-app & ng-model directives, custom directives.</p> <p>Scope: \$scope, understanding the scope, \$rootScope. Filters: Adding filters to directives, Currency filter, Array filter, Custom filters.</p>		
UNIT-VI	Angular JS Data Binding, Events and Bootstrap	08 Hours
<p>Data Binding: Synchronization between model and view.</p> <p>Model: Two way binding, Validating User Input, Status, ng-empty, ng-touched, ng-valid, ng-pending.</p> <p>Angular JS Controllers: ng-controller, Controller Methods, External Files.</p> <p>Angular JS \$http: Methods, get(), post(), Properties, .config, .data, JSON format. Events: Working with events, Mouse events, ng-click, Toggle, \$event object. Creating dropdown lists, ng-options and ng-repeat, Objects. Forms: Working with Forms, Checkbox, Radiobuttons, Select, formCtrl, reset(), Client side form validation Bootstrap: Bootstrap Overview, Features, Using bootstrap, Grid, Navigation, Layout.</p>		
Lab Contents		
Guidelines for Assessment		
<p>Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.</p>		
List of Laboratory Assignments/Experiments (minimum -- to be covered)		
1	Analyze an interaction design problem	
2	Use of expressions and operators and know flow control, functions	
3	Express proficiency in the handling of events and demonstrate usage of objects, cookies, form Validation using JavaScript	
4	Create dynamic web pages using AJAX and JSON	
5	Design MVC based application with use of Angular JS concepts like, model, controller, Directives etc	


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Test Books:**T1.** Complete Reference wrox publication**T2.** HTML, DHTML CSS AND XML by PBP Publication**Reference Books:****R1.** 101 UX Principles A definitive Design Guide-Packt Publishing Ltd,Will Grant**R2.** Smashing UX Design-Jesmond Allen and James chudley**R3.** JavaScript Bible, Wiley Pub.**R4.** HTML, DHTML, JavaScript, Perl & CGI Ivan Bayross, BPB Pub**R5.** Programming the World Wide Web by Robert W. Sebesta**R6.** Professional Ajax, 2nd Edition Wrox Press**R7.** AngularJS - Brad Green, ShyamSeshadri Learning Python By Mark Lutz,O'Reilly

AngularJS Web Application Development Cookbook-Packt Publishing Ltd, Matt Frisbie

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S. Y. MCA

Academic Year – 2020-2021 Semester -III

[MCA2103]: Object Oriented Analysis and Design

Teaching Scheme: TH: - 3 Hours/Week	Credit TH: 3	Examination Scheme: In Sem. Evaluation: 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks
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Course Objective:

1. To learn UML diagrams that will help in developing understanding in the area of system analysis and design concepts using object-oriented approach
2. To learn design patterns to provide solutions to real world software design problems.
3. To learn to design flexible and reusable software components.

Course Outcome:

CO1. After successful completion of the course, students will able to:

CO2. Learn the knowledge of how to model the object oriented applications through UML.

CO3. To describe the activities in the object-oriented design process and various models that can be used to describe an object-oriented design.

CO4. Learn about the structural and dynamic modeling.

CO5. Apply the concepts of Architectural modeling and to learn the concepts of nine UML diagrams.

CO6. To explain how a software design may be represented as a set of interacting objects that manage their own state and operations

CO7. To implement design patterns to provide solutions to real world software design problems and to learn to design flexible and reusable software components.

Course Contents

UNIT-I	Basics of Object oriented Modeling	05 Hours
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Introduction: Object oriented themes, modeling as a design technique, Object Modeling: Object, classes, Link & association, advanced link & Association concepts, generalization & Inheritance, grouping constructs, aggregation, abstract classes, generalization as extension & restriction, multiple inheritance, metadata, candidate key & constraints.

Overview of Prominent OO Methodologies a. The Rumbaugh OMT. b. The Booch methodology. c. Jacobson's OOSE methodologies. d. Unified Process. e. Introduction to UML. f. Important views & diagram to be modeled for system by UML.

UNIT-II	Factional view(models)	10 Hours
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Use case diagram a. Requirement Capture with Use case. b. Building blocks of Use Case diagram - actors, use case guidelines for use case models. c. Relationships between use cases - extend, include, generalize. • Activity diagram a. Elements of Activity Diagram - Action state, Activity state, Object, node, Control and Object flow, Transition (Fork, Merge, Join) b. Guidelines for Creating Activity Diagrams. c. Activity Diagram - Action Decomposition (Rake). d. Partition - Swim Lane.

UNIT-III	Static structural view (Models)	08 Hours
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Classes, values and attributes, operations and methods, responsibilities for classes, abstract classes, access specification(visibility of attributes and operations). b. Relationships among classes: Associations, Dependencies., Inheritance - Generalizations, Aggregation. c. Adornments on Association: association names, association classes, qualified association, n-ary associations, ternary and reflexive association. d. Dependency relationships among classes, notations e. Notes in class diagram, Extension mechanisms, Metadata, Refinements, Derived , data, constraint, stereotypes, Package & interface notation. f. Object diagram notations and modeling, relations among objects (links).

UNIT-IV	Class Modeling and Design Approaches	10 Hours
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a. Three approaches for identifying classes - using Noun phrases, Abstraction, Use Case Diagram. b. Comparison of approaches. c. Using combination of approaches. d. Flexibility guidelines for class diagram: Cohesion, Coupling, Forms of coupling (identity, representational, subclass, inheritance), class Generalization, class specialization versus aggregation.

UNIT-V	Behavioral (Dynamic structural view)	06 Hours
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State diagram a. State Diagram Notations, events (signal events, change events, Time events). b. State Diagram states (composite states, parallel states, History states), transition and condition, state diagram behavior(activity effect, do-activity, entry and exit activity), completion transition, sending signals. • Interaction diagrams: a. Sequence diagram - Sequence diagram notations and examples, iterations, conditional messaging, branching, object creation and destruction, time constraints, origin of links, Activations in sequence diagram. b. Collaboration diagram - Collaboration diagram notations and examples, iterations, conditional messaging, branching, object creation and destruction, time constraints, origin of links, activations in sequence diagram

UNIT-VI	Approaches for Developing Dynamic Systems	6 Hours
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Top - down approach for dynamic systems. b. Bottom - up approach for dynamic systems. c. Flexibility Guidelines for Behavioral Design - guidelines for allocating and designing behaviors that lead to more flexible design. Reusability: a. Reuse of classes. b. Reuse of components. c. Reuse of frameworks, black box framework, white box frame. d. Reuse of patterns: Architectural pattern and Design pattern. Architectural view: a. Logical architecture: dependency, class visibility, sub systems. b. Hardware architecture: deployment diagram notations, nodes, object migration between node c. Process architecture: what are process and threads and their notations in UML, object synchronization, invocation schemes for threads (UML notations for different types of invocations). d. Implementation architecture: component diagram notations and examples

Text Books:

T1. Object Oriented Analysis & Design – Ali Bahrami

T2. Object oriented Modeling and Design with UML - James Rumbaugh. Micheal Blaha (second edition)


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T3. The Unified Modeling Language User Guide - Grady Booch, James Rumbaugh, Ivar Jacobson

Reference Books:

- R1. Designing Flexible Object Oriented systems with UML - Charles Ritcher
- R2. Object Oriented Analysis & Design, Sat/.inger. Jackson, Burd Thomson
- R3. Object oriented Modeling and Design with UML - James Rumbaugh. MichealBlaha (second edition)
- R4. The Unified Modeling Language User Guide - Grady Booch, James Rumbaugh, Ivar Jacobson.
- R5. Object Oriented Modeling and Design - James Rumbaugh
- R6. Teach Yourself UML in 24 Hours - Joseph Schmuilers
- R7. Object-Oriented Analysis and Design: using UML Mike O'Docherty Wiley Publication

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S. Y. MCA
Academic Year – 2020-2021 Semester -III
[MCA2104]: Core JAVA

Teaching Scheme: TH: -Hours/Week : 03 LAB: -Hours/Week : 04	Credit TH: 03 LAB: 02	Examination Scheme: In Sem. Evaluation:15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks LAB Evaluation : 100 Marks
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Course Prerequisites: Object Oriented Programming

Course Objective:

1. Introduces Object-oriented programming concepts using the Java language.
2. Introduces the principles of inheritance and polymorphism; and demonstrates how they relate to the design of abstract classes
3. Introduces the implementation of packages and interfaces
4. Introduces exception handling, event handling and multithreading
5. Introduces the design of Graphical User Interface using applets and swings

Course Outcome:

After successful completion of the course, students will able to:

- CO1:** Develop applications for a range of problems using object-oriented programming techniques.
CO2: Application of inheritance and polymorphism and of packages and interfaces.
CO3: Can implement exception handling, event handling and multithreading.
CO4: Design simple Graphical User Interface applications using AWT and Swing.
CO5: Developing Applet Programming.
CO6: Will have hands on using framework classes

Course Contents

UNIT-I	Object oriented thinking and Java Basics	08 Hours
Need for oop paradigm, summary of oop concepts, History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, using final with variables, garbage collection, overloading methods and constructors, recursion, nested and inner classes, exploring string class.		
UNIT-II	Inheritance, Packages & Interfaces	08 Hours
Inheritance: Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance and methods, polymorphism- method overriding, abstract classes, the Object class.		

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Packages: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.
 Interfaces: differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT-III	Exception handling	05 Hours
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Exception handling: Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. String handling, Exploring java.util

UNIT-IV	Event Handling & Swing	08 Hours
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Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

Swing: Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing-JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables. Handling menus, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

UNIT-V	Applets	05 Hours
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Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Multithreading: Differences between multi-threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter-thread communication, thread groups.

UNIT-VI	Java Collection Framework	11 Hours
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Collections Overview: The Collection Interfaces
 a. Collection Interface, List Interface, Set Interface,
 b. Sorted Set Interface
 c. The Collection Classes
 d. Array List Class, Linked List Class, Hash Set Class, Tree Set Class
 e. Accessing a Collection via an Iterator The Map Interfaces
 f. Map Interface, Sorted Map Interface
 g. The Map Classes
 h. Hash Map, Tree Map The Legacy Interfaces
 i. Enumeration Interface
 j. The Legacy Classes Vector, Stack Hash table

Lab Contents

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

List of Laboratory Assignments/Experiments (minimum to be covered)

1	Fundamental JAVA Programming assignments based on class,
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2	Implementation of various Inheritance types.
3	Abstraction feature demonstration,
4	Achieving the functionality of Encapsulation.
5	Demonstrate the feature of Dynamic binding,
6	Polymorphism feature implementation,
7	Handling the feature of streams related to I/O systems,

Text Books:

T1. Programming with Java, A Primer E. Balguruswami, McGraw-Hill, 4th Ed.

T2. Object oriented programming with java, Essentials and applications, McGraw Hill publications,

Reference Books:

R1. Just Java by Peter Van der Linden

R2. OOP with Java An ultimate Tutorial by Jaffry A Borrer,

R3. Java 6 Programming Black Book By Kogent Solution Inc, dreamTech Pub

R4. Core Java 2 Volume - I Cay S Horstmann, Fary Cornell, Sun Microsystems Press

R5. Core Java 2 Volume - II Cay S Horstmann, Fary Cornell, Sun Microsystems Press

R6. Rajkumar Buyya, S Thamarai Selvi, Xingchen Chu

R7. A programmer's Guide to java SCJP certification, Pearson, Khalid A. Mughal, Rolf W. A Rasmussen


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S. Y. MCA
Academic Year – 2020-2021 Semester-III
[MCA2105]: Computer Networks

Teaching Scheme: TH: -Hours/Week : 03	Credit TH: 03	Examination Scheme: In Sem. Evaluation: 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks
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- Course Objective:**
1. To get familiar with basics of networking concepts, functions of various layers in networking architecture.
 2. To know the basics of transmission techniques and media used in networking environments
 3. To Understand the components used in networking and different protocols
 4. It explains about DNS and network management protocols
 5. To acquire the knowledge about network security

- Course Outcome:**
 After successful completion of the course, students will able to:
- CO1.** Gain the basic knowledge of transmission media, modes, network topologies and working of various layers in ISO/OSI, TCP/IP reference model
 - CO2.** Describes/summarizes different network architectures
 - CO3.** Obtain the skills of sub-netting and routing mechanism
 - CO4.** Formulate Transport layer protocols
 - CO5.** Having knowledge of application protocol standards
 - CO6.** Describes various network security mechanism

Course Contents		
UNIT-I	Introduction	10 Hours
What is computer communication, Goals of communication system/Networking, Transmission Modes: Synchronous and Asynchronous transmission, Transmission Media: Guided: Twisted Pair, Coaxial and Fiber-Optic Cables, Unguided Media: Radio, VHF, Micro Waves and Satellite, Topologies: Star, Mesh, Bus etc., Multichannel Data Communication: Message, Circuits, Packets (Connection Oriented vs Connectionless Services) Components of LAN, WAN, MAN, Multiplexing: FDM, TDM, CDM and WDM Protocol Layering: ISO/OSI Reference Model, TCP/IP Reference Model, OSI vs TCP/IP		
UNIT-II	Common Network Architecture	06 Hours
X.25 Networks, Ethernet (Standard and Fast): frame format and specifications, Wireless LAN's – 802.11x, 802.3 Bluetooth etc.		
UNIT-III	IP Addressing and Routing	08 Hours

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IPv4 addresses – Network and Host part, Network Masks, Network addresses and Broadcast addresses, Sub-net Masking, Super Net Masking, Address Classes, Loop Back Address, IPv4 Structure, IP routing concept, Routing Table, Stream & Packets (Distance Vector, RIP), IPv6 Structure, Addresses

UNIT-IV

Transport Layer Services

08 Hours

Transport Services, Elements of Transport Protocols, Connection Management, TCP and UDP Protocols

UNIT-V

Application Layer

06 Hours

DNS and DNS Servers, Electronic Mail: Architecture and Services, Message Format, MIME, Message transfer, SMTP, Mail Gateways, FTP, WWW: Introduction, Static and Dynamic web pages, www pages and browsing, HTTP request and response

UNIT-VI

Network Security

07 Hours

Threat: Active and Passive Attacks, Cryptography: Symmetric and Asymmetric Key Cryptography, Digital Signature, VPN and VPN Protocols, Firewall


Text Books:

- T1.** Dr. Kumar Saurabh, Cloud Computing – Insight into New Era Infrastructure, Wiley India. Gautam Shroff, (2011) Enterprise Cloud Computing, Cambridge University Press
T2. Roger Jennings, Cloud Computing, , Wiley India

Reference Books:

- R1.** Computer Networks by Andrew S. Tanenbaum 4ed
R2. Data Communication and Networking by Behroz A. Forouzan, TMH, 4 ed.
R3. Cryptography and Network Security by AtulKahate, TMH 2 ed.
R4. Cryptography and Network Security by William Stallings
R5. Computer Networks and Internets with Internet Applications by Douglas E. Comer
R6. Data and Computer Communication by William Stallings 9 ed., Pearson Education, 2007
Network Security by Ankit Fadia


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S. Y. MCA

Academic Year – 2020-2021 Semester -III

[MCA2106]: Problem Solving Techniques - I

Teaching Scheme: LAB: -Hours/Week :02	Credit LAB: 02	Examination Scheme: LAB Evaluation : 25 Marks
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Course Objective:

1. Enhance the problem-solving skills
2. Improve the basic mathematical skills and to help students who are preparing for any type of quantitative examinations.

Course Outcome:
 After successful completion of the course, students will able to:

CO1: Determine the methods to solve the number system problems, Ratio, Percentage etc.

CO2: Express proficiency problem solving like Mixtures & Allegations, Profit & Loss, Simple Interest & Compound Interest, Sequence & Series and Mensuration.

Course Contents

UNIT-I	Number System	04 Hours
Number Systems, Ratio & Proportion, Percentage & Averages		
UNIT-II	Time And Distance	05 Hours
Mixtures & Allegations, Surds & Indices, Time & Distance		
UNIT-III	Profit and Loss	05 Hours
Profit & Loss, Simple Interest & Compound Interest		
UNIT-IV	Probability and Combinations	05 Hours
Sequence & Series, Permutation Combination & Probability		
UNIT-V	Mensuration	05 Hours
Mensuration - Cylinder, Cone, Sphere, Quadratic Equations, Data Interpretation, Problems and testing on the aptitude skills		

Lab Contents

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks

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based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Reference Books:

R1. Quantitative Aptitude by Dr. R. S. Aggrawal

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Academic Year – 2020-2021 Semester-III

[MCA2107]: Online Professional Training Courses

Teaching Scheme: TH: -Hours/Week : 02	Credit TH: 01	Examination Scheme: LAB Evaluation : 50 Marks
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Course Objective:

1. Certification of Students for knowledge and employability skills development.

Course Outcome:

After successful completion of the course, students will able to:

- CO1.** Have a knowledge of different certification platforms/resources
- CO2.** Getting the Certification from the professional organization such as MOOC/
- CO3.** NPTEL/SWAYAM/ Coursera, Udemy, Spoken Tutorials
- CO4.** Enhance the Employability.

Course Contents

MOOC:

A massive open online course (MOOC) is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials, such as filmed lectures, readings, and problem sets, many MOOCs provide interactive courses with user forums or social media discussions. The MOOC contains the organization like NPTEL/SWAYAM, Spoken Tutorials, Coursera, Udemy etc. These organizations contain many online course.

NPTEL/SWAYAM: It contains courses from different areas Such as Engineering, Management, Enterprenureship etc and soon. Under Computer engineering it contains courses like Scalable Data Science, Deep Learning, Cloud computing, Introduction to internet of things, Software Testing, Big Data Computing and So on,

Spoken Tutorials: It also contains the courses like courses from different areas Such as Engineering, Management etc. Under Computer engineering it contains courses like PHP, Python, R, CAD etc and soon.

Coursera: It contains courses from different areas Such as Engineering, Management, Enterprenureship etc and soon. Under Computer engineering it contains courses like Java, C++, IOT, Linux, Block chain, Big Data etc.

Udemy: It contains courses from different areas Such as Engineering, Management, Enterprenureship etc and soon. Under Computer engineering it contains courses like Java, C++, IOt, Linux, Block chain, Big Data etc

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Lab Contents

Guidelines for Instructor's Manual

Students are expected to choose one subject for certification. Self-learning Courses to be done as per the own choice from the different reputed organizations such as MOOC/NPTEL/SWAYAM/Coursera/Udemy/Spoken Tutorials etc.

Guidelines for Assessment

Certificate to be submitted to the concern faculty.

References:

- R1. <https://www.udemy.com>
- R2. <https://www.coursera.org>
- R3. <https://swayam.gov.in>
- R4. <https://spoken-tutorial.org/accounts/login/>

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Academic Year – 2020-2021 Semester -IV

[MCA2108]: Advanced Database Management System

Teaching Scheme: TH: - 3 Hours/Week	Credit TH:3	Examination Scheme: In Sem. Evaluation: 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks
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Course Objective:

1. Giving insights on text database, graph database, semi- structured data.
2. Understanding the application and its benefits of data and databases.

Course Outcome:

On completion of the course, student will be able to–

- CO1.** Identify information retrieval and associated processes from text database.
- CO2.** Differentiate Graph based database from relational database.
- CO3.** Describe semi-structured data and XML.
- CO4.** Review object-oriented databases.
- CO5.** Learn object-relational databases concept and its applications.
- CO6.** Characterize Parallel databases and its usage.

Course Contents

UNIT-I	Text databases	06 Hours
Text databases :Information retrieval - overview, Relevance ranking using terms and hyperlinks, synonyms, homonyms, ontologies, Indexing of documents, measuring retrieval effectiveness, web search engines, Information retrieval and structured data. Implementation issues of Relevance ranking Algorithm. Document Retrieval Strategies for Any-k Queries.		
UNIT-II	Graph based database	09 Hours
Graph based database: What is graph based database, comparison of relational and graph based database. GraphDB vs. NOsql. Overview of open source graph database like Neo4g etc. APIs and graph query-programming languages. Databases on the Web and Semi Structured Data: Introduction, Structure of XML Data, XML Document Schema, DTD, Querying and Transformation: XQuery, FLOWR, XPath, XML validation, Web server, API to XML, Storage of XML Data, XML		
UNIT-III	Object oriented data base	07 Hours
Object oriented data base: Overview of Object–Oriented Concepts. Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods, and Persistence, Type Hierarchies and Inheritance, Type extents and Queries, Complex Objects; Database Schema		


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UNIT-IV	Design for OODBMS	08 Hours
Design for OODBMS; OQL, Persistent Programming Languages; OODBMS Architecture And Storage Issues; Transactions and Concurrency control. Example of ODBMS. Object Relational and Extended Relational Databases: Database Design For An ORDBMS –Storage Issues; Transactions and Concurrency control. Example of ODBMS.		
UNIT-V	Object Relational and Extended Relational Databases	08 Hours
Object Relational and Extended Relational Databases: Database Design For An ORDBMS – Nested Relations and Collections; Storage And Access methods, Query processing and Optimization; An Overview of SQL3, Implementation Issues for Extended Type; Systems Comparison of RDBMS, OODBMS, ORDBMS. Applications of ORDBMS.		
UNIT-VI	Parallel databases	07 Hours
Parallel databases: introduction, Parallel database architecture, speedup, scale-up I/O parallelism, Inter-query and Intra-query parallelism, Inter-operational and Intra-operational parallelism, parallel query evaluation, Design of parallel systems, Implementation issues of Parallel query evaluation, Design of parallel systems, Comparison of Inter-query and Intra-query parallelism.		
List of Practices suggested		
1	Text mining using WEKA software.	
2	Introduction to graphs based query language using neo4j, implementation of graph queries	
3	PL/SQL triggers cursors.	
4	Object oriented database and queries	
Text Books :		
T1. Data Base Management system, Raghu Ramkrishnan, Johanness Gherke, Second edition		
T2. Data Mining the Text Book , Springer , Charu C. Aggarwal		
Reference Books:		
R1. Alexis Leon, Mathews Leon, (leon press), Database Management System.		
R2. AviSilberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Sixth Edition		


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S. Y. MCA
Academic Year – 2020-2021 Semester -IV
[MCA2109]: Advance JAVA

Teaching Scheme: TH: -Hours/Week : 03 LAB: -Hours/Week : 04	Credit TH: 03 LAB: 02	Examination Scheme: In Sem. Evaluation:15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks LAB Evaluation : 100 Marks
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Course Prerequisites: Core JAVA

Course Objective:
 1. Students will be able to do socket programming, develop server-side applications with database
 2. Handling using servlets, JSP, JDBC and Hibernate and Springs framework.

Course Outcome:
After successful completion of the course, students will able to:
CO1: Can do servlet programming
CO2: Develop programming with JSP
CO3: Develop server-side applications with database
CO4: Implementation of beans will be known.
CO5: Acquainted with EJB architecture.
CO6: Application of Frameworks will be made easy in web application development.

Course Contents

UNIT-I	Servlet	09 Hours
J2EE Platform: Enterprise Architecture Styles, Containers and Technologies. Servlet overview: The Java web server – your first servlet – servlet chaining – server side includes- Session management – security – HTML forms – using JDBC in servlets – applet to servlet communication		
UNIT-II	JSP	08 Hours
JSP: Introduction JSP-Examining MVC and JSP -JSP scripting elements & directives-Working with variables scopes-Error Pages - using Java Beans in JSP Working with Java Mail-Understanding Protocols in Javamail-Components-Javamail API-Integrating into J2EE-Understanding Java Messaging Services-Transactions		
UNIT-III	JDBC	07 Hours
JDBC : Introduction to JDBC, JDBC Drivers, Packages related to JDBC, JDBC Data Sources, Retrieving Meta Information from database and Result set, Distributed Transactions and Row Set objects, Accessing a Database through Servlets and JDBC.		

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UNIT-IV	JAVA Beans	05 Hours
Java Beans: The software component assembly model- The java beans development kit- developing beans – notable beans – using infobus - Glasgow developments - Application Builder tool- JAR files- Introspection-Bound Properties-Persistence-customizers - java beans API.		
UNIT-V	EJB	06 Hours
EJB: EJB architecture- EJB requirements – design and implementation – EJB session beans- EJB entity beans-EJB Clients – deployment tips, tricks and traps for building distributed and other systems – implementation and future directions of EJB-Variable in perl- perl control structures and operators – functions and scope.		
UNIT-VI	Frameworks	10 Hours
Spring:What is Spring, How Spring fits into the Enterprise world, Spring Modules What is a Core Container, Introduction to IOC , Types of DI, Setter DI vs Constructor DI		
Lab Contents		
Guidelines for Assessment		
Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.		
List of Laboratory Assignments/Experiments (minimum -- to be covered)		
1	Creation of servlet through the servlet programming concept	
2	Develop JSP pages with programming.	
3	Develop server side applications with database	
4	Implementation of beans will be known.	
5	Acquainted with EJB architecture.	
6	Application of Frameworks will be made easy in web application development.	
Text Books:		
T1. Java Complete Reference PatricNaughton, Herbert Schildt, TMH,7th Ed.		
T2. Java unleashed,; Micheal Morrison		
Reference Books:		
R1. Beginning Java Networking Chad Darby, John Griffin & others		
R2. Complete Reference- J2EE Jim Keogh, TMH.		
R3. Inside Servlets Dustine R. Callway, Pearson pub.		
R4. Developing Java Servlets James Goodwill, Techmedia Pub.		
R5. Professional JSP Wrox press		
R6. Complete reference JSP, TMH.		
R7. Java Server Programming Vol-I Wrox press.		
R8. JDBC, Servlet and JSP, Black Book, Santosh Kumar K. Dremtech publication		
R9. Spring and Hibernate, Santosh Kumar K. Mc.Graw Hill Education		
R10. Spring Persistence with Hibernate, Ahmad Seddighi		


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Academic Year – 2020-2021 Semester -IV

[MCA-2112]: Python Programming

Teaching Scheme: TH: -Hours/Week : 03 LAB: -Hours/Week : 04	Credit TH: 03 LAB: 02	Examination Scheme: In Sem. Evaluation:15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks LAB Evaluation : 100 Marks
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Course Objective:

1. Describe the core syntax and semantics of Python programming language.
2. Describe the process of structuring the data using lists, dictionaries, tuples and sets.
3. Discover the need for working with the strings and functions and Infer the Object-oriented Programming concepts in Python.
4. Indicate the use of regular expressions and built-in functions to navigate the file system.
5. Hands on database operations and the use of python libraries used for data analysis.

Course Outcome:

After successful completion of the course, students will able to:

- CO1: Interpret the fundamental Python syntax and semantics and be fluent in the use of Python Data Structures.
- CO2: Determine the methods to create and manipulate Python programs by utilizing the data structures like dictionaries, sets and Identify the commonly used operations involving file Systems.
- CO3: Express proficiency in the handling of strings, functions and Articulate the Object-Oriented Programming concepts.
- CO4: Identify the commonly used operations involving regular expressions and exception Handling Concepts.
- CO5: Determine the methods to create and manipulate python database transactions.
- CO6: Express proficiency in handling of python libraries used for data manipulation and Analysis.

Course Contents

UNIT-I	Introduction to Python	7 - Hours
What is Python and history of Python? Unique features of Python, Python-2 and Python-3 differences, Install Python and Environment Setup, First Python Program, Python Identifiers, Keywords and Indentation, Comments and document interlude in Python, Command line arguments, Getting User Input, Python Data Types, What are variables? Python Core objects and Functions, Number and Math's.		
List, Ranges & Tuples in Python		

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Lists in Python, List functions and Methods, Understanding Iterators, Generators introduction Comprehensions and Lambda Expressions, Generators and Yield, Next function and use of Range function in for, conditional constructs, Use of compound expression in conditional constructs, tuples-immutable concept, Ordered Sets with tuples, tuple functions.

UNIT-II	Python Dictionaries and Sets, Input and Output in Python	7 - Hours
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Python Dictionaries and Sets
Python Dictionaries: Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, Dictionary functions & Methods
Sets: Python Sets Examples, Sets operation (Membership, union, intersection, difference, and symmetric difference, set method)
Input and Output in Python
 Reading and writing text files, writing Text Files, Appending to Files and Challenge, Writing Binary Files Manually, Using Pickle to Write Binary Files

UNIT-III	Functions and Python Object Oriented	9 - Hours
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Functions: Python user defined functions, Python packages functions, Defining and calling Function, The anonymous Functions, Python Modules & Packages, Packages Importing * From a Package, Intra-package References, Packages in Multiple Directories, random, time and time module, dir() function, Built-In Function, invoking built in functions, python string and string built in functions
Python Object Oriented: Overview of OOPs, Creating Classes and Objects, Class and Instance Variables, Accessing attributes, Built-In Class Attributes, Python Scopes and Namespaces, Destroying Objects, inheritance and its types.

UNIT-IV	Python Regular Expressions and Exceptions Handling	6 - Hours
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Python Regular Expressions: What are regular expressions? The match Function, search Function, Matching vs. searching, Search and Replace, Extended Regular Expressions, Wildcard.
Exceptions Handling: What is Exception? Syntax Errors, Handling an exception, Raising Exceptions, try....except...else, try-finally clause, Argument of an Exception, Python Standard Exceptions, User - Defined Exceptions.

UNIT-V	Databases in Python	8 - Hours
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Python PostgreSQL Database Access, Install the PostgreSQL and other Packages, Create Database Connection, CREATE, INSERT, READ, UPDATE and DELETE Operation, DML and DDL Operation with Databases, Performing Transactions, Handling Database Errors. Web Scrapping in python.

UNIT-VI	Python For Data Analysis	8 - Hours
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Numpy: Introduction to numpy, Creating arrays, Using arrays and Scalars, Indexing Arrays, Array Transposition.
Pandas: What is pandas? Where it is used? Series in pandas, Index objects, Reindex
Django: Web Framework in Python: Introduction to Django and Full Stack Web Development.

Lab Contents

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks


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based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

List of Laboratory Assignments/Experiments (minimum -- to be covered)

1	Programs on Built-In Function, invoking built in functions, Math Functions
2	Programs on Creating, initializing and accessing the elements of strings and string operators.
3	Demonstration of List, tuples, dictionary and sets using built in methods.
4	Programs on file operations such as reading and writing to text and binary files.
5	Program demonstration on python functions, modules, packages
6	Programs on object oriented concepts using real time examples.
7	Email, mobile, name and different validations programs using regular expression.
8	Programs on exception handling concepts in python
9	CRUD operations using PostgreSQL database.
10	Demonstration on various data analysis libraries.
11	Mini Project using Python and PostgreSQL database

Text Books:

- T1.** Gowrishankar S, Veena A, “Introduction to Python Programming”, 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
T2. Developing Web Applications with Python”, Miguel Grinberg, “Flask WebDevelopment, 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.

Reference Books:

- R1.** Jake VanderPlas, “Python Data Science Handbook: Essential Tools for Working with a Data”, 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
R2. AurelienGeron, Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, A Tools, and Techniques to Build Intelligent Systems”, 1st Edition,O'Reilly Media, 2017. ISBN – 13: 978-1491962299.
R3. Wesley J Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365
R4. Miguel Grinberg, “Flask Web Development: Developing Web Applications with Python”, 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.
R5. Learning Python By Mark Lutz,O'Reilly Publication
R6. Programming with python, A users Book, Michael Dawson, Cengage Learning
R7. Python Essential Reference, David Beazley, Third Edition


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S. Y. MCA
Academic Year – 2020-2021 Semester-IV
[MCA2111]: Cloud Computing

Teaching Scheme: TH: -Hours/Week : 03	Credit TH: 03	Examination Scheme: In Sem. Evaluation: 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks
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Course Objective:

1. Introduce the fundamental aspects of cloud computing
2. To understand the concept of Virtualization and design of cloud Services
3. Understanding the various cloud implementations and migration techniques
4. To understand the different aspects of Cloud Security
5. Demonstrate different features of cloud platforms used in Industry
6. Understand the different Application of Cloud Computing

Course Outcome:

CO1. After successful completion of the course, students will able to:

CO2. Elaborating the basic concepts of cloud computing and defining the basic terms

CO3. Identify the components of cloud computing for service perspective

CO4. Ability to understand various service delivery models of a cloud computing architecture.

CO5. In depth learning of security challenges and preventive measures in cloud computing

CO6. Explore the different cloud service Platforms.

CO7. Uses of cloud computing services in different fields

Course Contents		
UNIT-I	Cloud Computing Fundamentals	05 Hours
Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Open Challenges-Cloud Interoperability and Standards-Scalability and Fault Tolerance		
UNIT-II	Cloud Virtualization	08 Hours
Introduction, Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques- Execution Virtualization- Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples- Xen: Paravirtualization, VMware: Full Virtualization, Microsoft Hyper-V		
UNIT-III	Cloud Computing Architecture	8 Hours

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Introduction, Cloud Reference Model-Architecture-Infrastructure / Hardware as a Service-Platform as a Service, Four Cloud Deployment Models- Public Clouds- Private Clouds- Hybrid Clouds, Community Clouds

UNIT-IV	Security in the Cloud	8 Hours
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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, Autonomic Security.

UNIT-V	Cloud Platforms in Industry	08 Hours
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Amazon web services: Compute services, Storage services, Communication services, Additional services. Google AppEngine: Architecture and core concepts, Application life cycle, Cost model Observations Microsoft Azure: Azure core concepts, SQL Azure, Windows Azure platform appliance , Observations

UNIT-VI	Cloud Applications	05 Hours
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Scientific Applications- Healthcare: ECG Analysis in the Cloud, Biology: Protein Structure Prediction, Geoscience: Satellite Image Processing, Business and Consumer Applications- CRM and ERP, Social Networking, Media Applications

Text Books :

- T1.** Dr. Kumar Saurabh, Cloud Computing – Insight into New Era Infrastructure, Wiley India. GautamShroff,(2011)Enterprise CloudComputing,Cambridge UniversityPress
- T2.** Roger Jennings, Cloud Computing, , Wiley India

Reference Books:

- R1:** Dr. Kumar Saurabh, Cloud Computing – Insight into New Era Infrastructure, Wiley India. GautamShroff,(2011)Enterprise CloudComputing,Cambridge UniversityPress
- R2:** Roger Jennings, Cloud Computing, , Wiley India
- R3:** Rosenberg and Matheos, The Cloud at your service, Manning Publications


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S.Y. MCA
Academic Year – 2020-2021 Semester-IV
[MCA2112A]: Internet of Things

Teaching Scheme: TH: -Hours/Week : 03	Credit TH: 03	Examination Scheme: In Sem. Evaluation: 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks
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Course Objective:

1. Gain vision and Introduction to IoT
2. Acquire IoT Market Perspective
3. Describe IoT standards and Business Processes
4. Gain IoT Architecture
5. Have a knowledge of Real World IoT Design constraints, Industrial Automation and Commercial Building Automation in IoT

Course Outcome:
 After successful completion of the course, students will able to:

CO1. Acquire objective of IoT
CO2. Determine the IoT in Market Perspective
CO3. Gain various devices, Gateways and Data Management through IoT
CO4. Describes architecture of IoT
CO5. Acquire knowledge of various IoT applications through case studies
CO6. Gain the knowledge of AR and future of business

Course Contents		
UNIT-I	Introduction	08 Hours
Introduction of M2M to IoT – The Vision, From M2M to IoT, Global Context of M2M to IoT, Various Characteristics, Needs of IoT, Transformation M2M to IoT as per Market Perspective, Value Chains of M2M, IoT, An evolving Industrial Structure of IoT, The global value chain and global information monopolies at international level		
UNIT-II	IoT Architecture An Overview	07 Hours
M2M to IoT An Architecture Introduction, Building an Architecture, Various Principles, It's Need, and various Capabilities. IoT Architecture Outline, Various Standards to be considered, Fundamentals of M2M to IoT Technology, Various Devices and Gateways, LAN and WAN, Data Management		
UNIT-III	Fundamentals of M2M &IoT	07 Hours

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Fundamentals of M2M to IoT, Various Business Processes in IoT, Everything as a Service (XaaS), Analytics: M2M to IoT, Knowledge Management, Architecture Reference Model- Introduction, Reference Model

UNIT-IV	IoT Reference Architecture	08 Hours
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Introduction to IoT Reference Architecture, Various View like Functional View, Information View, Deployment and Operational View, Other architectural views, Introduction to Real-world Design Constraints, Technical Design Constraints, Data representation and visualization, Interaction and remote control etc.

UNIT-V	IoT based Case Studies	07 Hours
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Commercial Building Automation today, Commercial Building Automation in Future, Healthcare, Transportation, Smart City etc.

UNIT-VI	AR and IoT	07 Hours
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Introduction to AR, Characteristics of AR, It's need for future business, MIXED REALITY, Hardware requirements, Data Visualization via AR, Case Studies: e-Learning, Virtual Classrooms, Training to Disable Persons, Training to Police, School Education

Text Books :

- T1.** DaCosta, Francis. Rethinking the Internet of Things: a scalable approach to connecting everything. Apress, 2013
- T2.** Schwartz, Marco. Internet of Things with the ArduinoYún. Packt Publishing Ltd, 2014

Reference Books:

- R1.** DaCosta, Francis. Rethinking the Internet of Things: a scalable approach to connecting everything. Apress, 2013 Schwartz, Marco. Internet of Things with the ArduinoYún. Packt Publishing Ltd, 2014
- R2.** Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madiseti, Universities Press, 2015, ISBN: 9788173719547
- R3.** Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN:9789350239759
- R4.** Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
- R5.** Vijay Madiseti and ArshdeepBahga, "Internet of Things (A Hands-on- Approach)", 1stEdition, VPT, 2014.
- R6.** Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013
- R7.** HakimaChachi "Internet of Things (Connecting Objects)" Wiley – 2010.


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Academic Year – 2020-2021 Semester-IV

[MCA2112B]: Artificial Intelligence and Machine Learning

Teaching Scheme: TH: -Hours/Week : 03	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks
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Course Objective:

1. To Learn and understand the concepts of artificial intelligence and Machine Learning
2. Introduce and define the meaning of Intelligence and explore various paradigms for Search and knowledge encoding in computer systems is the basis of this course
3. To appreciate supervised learning and their applications.
4. To appreciate the concepts and algorithms of unsupervised learning

Course Outcome:

After successful completion of the course, students will able to:

- CO1.** Demonstrate fundamental understanding of artificial intelligence (AI) and its foundations
- CO2.** Supervised learning concepts and techniques
- CO3.** Unsupervised learning concepts and techniques
- CO4.** Use of machine learning tools

Course Contents

UNIT-I	Introduction To AI Fundamentals	06 Hours
Defining Artificial Intelligence, History of AI, AI task domains, Defining AI techniques, Turing Test, Intelligent Agents: Agents and Environments, Nature of Environments, Rationality, Performance Measures, Structure of Agents, Problem-Solving Agents,		
UNIT-II	State Space Search And Heuristic Search Techniques	06 Hours
Defining problems as state space search, problem characteristics, production systems and characteristics, heuristics, breadth first and depth first search, Heuristic search, Best first search,		
UNIT-III	Representing Knowledge	08 Hours
Knowledge Representation Techniques: Computable functions and predicates, Backward Chaining, Procedural vs. Declarative Knowledge, Forward vs. Backward Reasoning, Semantic Networks, Partitioned Semantic Networks, Conceptual Dependency, Issues in Knowledge Representation.		
UNIT-IV	Introduction MI	06 Hours

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Machine Learning Process- Preliminaries for Machine, Learning algorithms -Turning data into Probabilities and Statistics for Machine Learning- Probability theory – Probability Distributions – Decision Theory.

UNIT-V

Supervised And Unsupervised Learning

10 Hours

Linear Models for Regression, Linear Models for Classification- Decision Tree Learning – Bayesian Learning, Naïve Bayes, Neural Networks, K-Neural Network model, Support Vector Machines. Clustering- K-means, EM Algorithm

UNIT-VI

Implementation Of AI And ML Algorithms

6 Hours

Implement Non-AI and AI Techniques, Implement any one Technique from the following a. Best First Search & A* algorithm b. AO* algorithm c. Hill Climbing 3. Implement Perceptron learning algorithm Introduction to Weka, a software package for machine learning, Implementing Data cleansing method for a given problem, Classification Trees using WEKA: Decision Trees, Applying various classification methods on a given data set, Implementing K-means clustering algorithm using a data set.

Text Book:

T1: Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B. Nair, 3rd Edition, McGraw Hill

References:

- R1.** Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B. Nair, 3rd Edition, McGraw Hill
- R2.** Artificial Intelligence-A modern Approach, Stuart Russell and Peter Norvig, 3rd Edition, Pearson Education
- R3.** Tom Mitchell, “Machine Learning”, McGraw-Hill, 1997.
- R4.** Ethem Alpaydin, “Introduction to Machine Learning”, MIT Press, Third Edition, 2014
- R5.** Rogers, Simon, and Mark Girolami. A first course in machine learning. CRC Press, 2015.
- R6.** <https://www.cs.waikato.ac.nz/ml/weka/>


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Academic Year – 2020-2021 Semester -IV

[MCA2112C]: Data Mining and Data Warehousing

Teaching Scheme: TH: -3 Hours/Week	Credit TH:3	Examination Scheme: In Sem. Evaluation :15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks
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Course Objective:

1. The design and management of Data Warehouse and Data Mining Process.
2. Giving insights on how the data warehouse collects and integrates data, leading to knowledge discovery.
3. Introducing the core concepts of Data Warehousing and data mining, its techniques, implementation, benefits, and outcome expectations from this new technology.
4. Data Mining process for extracting meaningful information from large volumes of data generated in an organization.
5. Identifying industry branches which most benefit from DM.

Course Outcome:

- CO1. On completion of the course, student will be able to–
- CO2. Identify the operational & transaction processing systems.
- CO3. Identifying facts & dimensions, schemas & schema structures in dimensional modeling.
- CO4. Describe & design the architecture.
- CO5. Knowing the Knowledge discovery process & mining tools.
- CO6. Understanding the statistical techniques & implementing through methods & functionalities.
- CO7. Application of Data mining techniques through case studies.

Course Contents

UNIT-I	Data Warehouse Fundamentals	06 Hours
The Data Warehouse – Introduction, characteristics, its competitive advantages, operational Database Systems and Data warehouse (OLTP& OLAP). Multidimensional Data Models: Types of Data from tables and Spreadsheets to Data Cubes.		
UNIT-II	Principles of dimensional modeling	07 Hours
Identifying Facts and Dimensions, Designing Fact Tables, Designing Dimension table, Data Warehouse schemas, OLAP operations, Data Extraction, Cleanup & Transformation, Star, snowflake and Galaxy schemas for multidimensional databases.		
UNIT-III	Architecture	08 Hours

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Architecture for a warehouse, Steps for construction of Data Warehouse, Data Marts, Metadata, different OLAP operations. OLAP servers: ROLAP, MOLAP and HOLAP.

UNIT-IV

Data Mining

07 Hours

From Data warehousing to Data mining, motivation, knowledge discovery process, objectives of Data mining, the business context for DM, process improvement, marketing and CRM, Tools of data mining.

UNIT-V

Data Mining Functionalities

08 Hours

Data preparation, Data mining techniques: statistical techniques, characterization and discrimination, Association and market basket analysis, classification and prediction, cluster analysis, outlier analysis.

UNIT-VI

Data Mining Applications

09 Hours

Text mining, Spatial databases, Web mining, case studies in building business environment, Applications in telecommunications industry, retail, target marketing, fraud protection, health care, science, ecommerce, banking and finance.

Reference Books:

- R1.** Data Ware housing: Concepts, Techniques, Products and Applications, C.S.R. Prabhu, Prentice Hall of India, 2001.
- R2.** Sam Anahory, Dennis Murray. Data Warehousing in the Real World, Pearson, 2005.
- R3.** David Taniar, Progressive methods in Data Warehousing and Business Intelligence: concepts and competitive analytics, Idea Group Inc, 2009.


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Academic Year – 2020-2021 Semester-IV

[MCA2112D]: Agile Software Development

Teaching Scheme: TH: -Hours/Week : 03	Credit TH: 03	Examination Scheme: In Sem. Evaluation: 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks
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Course Objective:

1. To learn and understand the principles & concept of Agile software development process.
2. To be acquainted with methods of capturing, specifying, visualizing and analyzing Agile Methodology.

Course Outcome:

- CO1. After successful completion of the course, students will able to:
- CO2. Understand Agile Values and Principles in Software
- CO3. Decide on a Agile Methodology for a developing a software
- CO4. Apply Value-Driven Delivery and Prioritizing Value
- CO5. Classify Stakeholders engagement
- CO6. Design tools for sizing and estimating
- CO7. Understand Agile Continuous Improvement in process, people and product

Course Contents

UNIT-I	Agile Principles and Mindset	08 Hours
Why use agile , Knowledge work projects are different Defined versus Empirical Processes The Agile Mindset, Personal, Team and Organizational Agility, The Agile Triangle, The Agile Manifesto, The Four Value, The Twelve Principles		
UNIT-II	Agile Methodologies	07 Hours
Scrum, Extreme Programming (XP), Lean Product Development, Kanban, Feature-Driven Development Method (DSDM) , Crystal		
UNIT-III	Value-Driven Delivery	08 Hours
Value-Driven Delivery, Prioritizing Value, Delivering Incrementally		
UNIT-IV	Stakeholder Engagement	08 Hours
Taking Care of Stakeholders , Establishing a Shared Vision , Working Collaboratively		
UNIT-V	Adaptive Planning	07 Hours
Agile Planning Concepts , Tools for sizing and Estimating		

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UNIT-VI	Continuous Improvement	07 Hours
Continuous Improvement – Process, Continuous Improvement – Product, Continuous Improvement – People		
<p>Reference Books:</p> <p>R1. Agile Project Management for Dummies by Mark C. Layton</p> <p>R2. Scrum Mastery: From Good to Great Servant-Leadership by Geoff Watts</p> <p>R3. The Lean Startup by Eric Ries</p> <p>R4. The Software Project Manager’s Bridge to Agility by Michele Sliger and Stacia Broderick</p> <p>R5. The Agile Enterprise: Building and Running Agile Organizations by Mario E. Moreira</p> <p>R6. Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation by Jez Humble and David Farley</p>		

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Academic Year – 2020-2021 Semester-IV
[MCA2112E]: Research Methodology

Teaching Scheme: TH: -Hours/Week : 03	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks
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Course Objective:

1. Introduction to philosophy of research.
2. Understand process to formulate research questions / idea
3. Understand process of planning of research time, resource
4. Understand different statistical analysis methods
5. Develop thesis and report writing.

Course Outcome:

After successful completion of the course, students will able to:

- CO1.** Knowledge on various kinds of research questions and research designs
- CO2.** Formulate research problems (task) and develop a sufficiently coherent research design
- CO3.** Assess the appropriateness of different kinds of research designs
- CO4.** Knowledge on qualitative, quantitative and mixed methods of research, as well as
- CO5.** Relevant ethical and philosophical considerations
- CO6.** Develop independent thinking for critically analyzing research reports.

Course Contents

UNIT-I	Research Foundation	08 Hours
	What is Research, Objectives of Research, Types of Research, Scientific Research, Research and Theory, Conceptual and theoretical Models, Importance of research Methodology in scientific research	
UNIT-II	Review of Literature	08 Hours
	Need for Reviewing Literature, What to Review and for what purpose, Literature Search Procedure, Sources of Literature, Planning of Review work, Note Taking, Library and Documentation	
UNIT-III	Planning of Research	09 Hours
	The planning process, Selection of a Problem for Research, Formulation of the Selected Problems, Hypothesis formation, Measurement, Research Design/Plan	
UNIT-IV	Processing of Data and Statistical Analysis of Data	09 Hours
	Introduction to Statistical Software, MINITAB, Weka, Measures of Relationship, Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation, Neural Network based optimization, Optimization of fuzzy systems, Error Analysis, Results and their discussions	

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UNIT-V	Supervised And Unsupervised Learning	08Hours
Linear Models for Regression, Linear Models for Classification- Decision Tree Learning – Bayesian Learning, Naïve Bayes, Neural Networks, K-Neural Network model, Support Vector Machines. Clustering- K-means, EM Algorithm		

UNIT-VI	Report and Thesis writing	6 Hours
Types of Reports, Planning of Report Writing, Research Report Format, Principles of Writing, Data and Data Analysis Reporting in a Thesis, Use of Endnote, Bibliography, API , appendix, table, Observations arrangement, Preparation of type script and lay-out of thesis, Use of LATEX Indexing of Journals, Impact factor and social Media for Researchers.		

Text Books:

T1. Research Methodology: Methods and Techniques by C. R. Kothari, New Age

References:

- R1.** Statistical Methods for Research Workers by Fisher R. A., Cosmo Publications, New Delhi ISBN:81-307-0128-6
- R2.** Design and Analysis of Experiments by Montgomery D.C. (2001), John Wiley, ISBN: 0471260088
- R3.** MINITAB online manual
- R4.** Methodology of Research in Social Sciences by O. R. Krishnaswamy and M. Rangnatham
- R5.** Himalaya publication House, 2005, ISBN: 8184880936
- R6.** Weka online manual

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Academic Year – 2020-2021 Semester -IV
[MCA2112F]: Cyber Security

Teaching Scheme: TH: - Hours/Week : 03	Credit TH:03	Examination Scheme: In Sem. Evaluation: 15 Marks Mid Sem. Exam : 25 Marks End Sem. Exam : 60 Marks
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Course Objective: 1. The difference between threat, risk, attack and vulnerability. 2. How threats materialize into attacks. 3. Where to find information about threats, vulnerabilities and attacks. 4. Typical threats, attacks and exploits and the motivations behind them. 5. Cyber Laws and Risks Management
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Course Outcome: After successful completion of the course, students will able to: CO1. Understand concepts of Cyber-attacks, security issues and policies. CO2. Understand and identify cyber vulnerabilities and safeguards. CO3. Identify and learn web security and services. CO4. Cyber laws and international and national security policies and investigations. CO5. Concepts of network security and cryptography CO6. Managing security risks and planning incidents.
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Course Contents		
UNIT-I	Introduction to Cyber Security	04 Hours
Overview of Cyber Security, Internet Governance – Challenges and Constraints, Cyber-Threats:- Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage, Access Control and Cryptography - Web—User Side - Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks, Need for a Comprehensive Cyber Security Policy, Need for a Nodal Authority, Need for an International convention on Cyberspace.		
UNIT-II	Cyber Security Vulnerabilities and Cyber Security Safeguards	10 Hours

Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit,
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Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.

UNIT-III	Securing Web Application, Services and Servers	08 Hours
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Introduction: Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges. Intrusion Detection and Prevention. Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection, Intrusion detection and Prevention Techniques, Anti-Malware software, Network based Intrusion detection Systems, Network based Intrusion Prevention Systems, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation.

UNIT-IV	Cyberspace and the Law	10 Hours
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Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy. Cyber Forensics: Introduction to Cyber Forensics, Handling Preliminary Investigations, Controlling an Investigation, Conducting disk-based analysis, Investigating Information-hiding, Scrutinizing E-mail, Validating E-mail header information, Tracing Internet access, Tracing memory in real-time.

UNIT-V	Cryptography and Network Security	04 Hours
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Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPSec.

UNIT-VI	Management and Incidents Planning	04 Hours
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Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - The Internet of Things - Economics - Electronic Voting - Cyber Warfare- Cyberspace and the Law - International Laws – Cyber-crime - Cyber Warfare and Home Land Security.

Reference Books:

- T1. Cyber Security: A Practitioner’s Guide (Amazon Asia-Pacific Holdings Private Limited, 2017).
- T2. Hacking with Kali Linux (Independently Published, 2018)

Reference Books:

- R1. Security in Computing, Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, 5th Edition , Pearson Education , 2015.
- R2. Cyber Space and Cyber Security, George K.Kostopoulos, CRC Press, 2013
- R3. Cyber Security: Analytics, Technology and Automation edited, Martti Lehto, Pekka Neittaanmäki, Springer International Publishing Switzerland 2015.
- R4. Computer Forensics and Investigations, Nelson Phillips and Enfinger Steuart, Cengage


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Learning, New Delhi, 2009.

- R5.** Cyber Security: A Practitioner's Guide (Amazon Asia-Pacific Holdings Private Limited, 2017).
- R6.** Cyber security and Cyberwar (Oxford University Press India, 2014).
- R7.** Hacking with Kali Linux (Independently Published, 2018)
- R8.** Avoiding the Ransom: Cyber security for Business Owners and Managers (Lulu.com, 2016)

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Academic Year – 2020-2021 Semester-IV
[MCA2113]: Problem Solving Techniques-II

Teaching Scheme: LAB: -Hours/Week : 02	Credit LAB: 01	Examination Scheme: LAB Evaluation : 25 Marks
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Course Objective:

1. Learn to count alphabets and see what we can do with them and Arithmetical Reasoning checks the capacity to adjust to the changing patterns among various arithmetic relations.
2. Exploring the reasoning ability on Calendar and Clock test and coding, decoding
3. Learn building the series or Series Completion and able to draw conclusion from given or assumed propositions (premises)
4. Explore problem solving proficiency in Analogy, Blood Relations and Verbal Reasoning.

Course Outcome:
After successful completion of the course, students will able to:

CO1. Determine the various methods to solve the problems on alphabet test and arithmetical Reasoning.

CO2. Express proficiency problem solving like Calendar, Clock Test and Coding-Decoding and

CO3. Data Sufficiency and Direction Sense Test

CO4. Building ability to solve various series problems and Syllogism

CO5. Efficiency in Detecting different Analogies and builds problem solving ability of blood Relations and verbal reasoning.

Course Contents		
UNIT-I	Alphabet Test and Arithmetical Reasoning	4 - Hours
Alphabetical Order, Letter-Word Test, Word Formation Test, Alphabetical Quibble, Rule-Detection Test, Data Relations, Venn Diagram.		
UNIT-II	Calendar, Clock Test and Coding-Decoding	5 - Hours
Calendar Test, Clock Test, Letter-Letter Coding, Letter-Number Coding, Number-Number Coding, Coding-Decoding Puzzles.		
UNIT-III	Data Sufficiency and Direction Sense Test	5 - Hours
Data Sufficiency, Direction Sense Test, Decision Making Test, Logical Sequence of Words, Coded Operations, Interchange Of Signs And Numbers, Problem-Solving By Substitution		

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UNIT-IV	Series Completion and Syllogism	5 - Hours
Alphabet Series, Alpha-Numeric Series, Letter Repeating Series, Double Lineup, Number Ranking, Ordering and Ranking, Letter & symbol series, Missing Terms in Figures, Number Series, Four Premise Arguments, Three Premise Arguments, Two Premise Arguments.		
UNIT-V	Analogy, Blood Relations and Verbal Reasoning	5 - Hours
Alphabet Analogy, Analogous Pairs, Detecting Analogies, Non-Verbal Analogy, Number Analogy, Coded Relations, Jumbled Relations, Relation Puzzle, Selecting Words, Spotting Errors		
Text Books:		
T1. A Modern Approach to Verbal & Non-Verbal Reasoning by Dr. R. S. Aggrawal		
T2. Analytical Reasoning by M.K Pandey		
T3. Multi-Dimensional Reasoning by Mishra & Kumar Dr. Lal		
T4. A new approach to Reasoning by B.S. Sijwali& S. SijwaliArihant		
Reference Books:		
R1. https://coachingnotes.in/pdf-verbal-non-verbal-reasoning-rs-aggarwal-free-download/		
R2. https://www.sarkarirush.com/rs-aggarwal-reasoning-book-pdf/		
R3. https://www.bank4success.in/p/reasoning-ability-e-books.html		

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Academic Year – 2020-2021 Semester-IV
[MCA2114]: Technical Seminar

Teaching Scheme: LAB: -Hours/Week : 02	Credit LAB: 01	Examination Scheme: LAB Evaluation : 25 Marks
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Course Objective:

1. Finding areas of interest in current IT domain.
2. Increasing awareness in technological development in chosen field.
3. Exploring the application areas on the topic selected
4. Showcase of Presentation skills

Course Outcome:
 After successful completion of the course, students will able to:

CO1. Domain knowledge of the topic selected
CO2. Get an idea about documentation
CO3. Will get an presentation knowledge.

Course Contents

Students are expected to choose one of the topic in area of interest related to current IT/technical domain. Student should prepare the report and PowerPoint presentation on the topic selected. And to be submitted to the concern faculty teacher at the end of the semester for evaluation.


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