

Course Title	Artificial Intelligence	Semester	VI
Course Code	MVJ20CD61	CIE	50
Total No. of Contact Hours	50	SEE	50
No. of Contact Hours/week	4 (L : T : P :: 4 : 0 : 0)	Total	100
Credits	4	Exam. Duration	3hrs

Course objective is to:

- Identify the problems where AI is required and the different methods available
- Compare and contrast different AI techniques available.
- Define and explain learning algorithms

Module-1	L1,L2	10Hrs.
-----------------	-------	--------

Introduction: What is AI? Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem-solving: Problem-solving agents; Example problems;

Knowledge representation issues: Representations and mappings Approaches to knowledge representation, Issues in knowledge representation.

Module-2	L2,L3	10 Hrs.
-----------------	-------	---------

Game Playing: Minimax search procedure, Adding alpha-beta cutoffs, additional refinement. Iterative Deepening and references on specific games

Natural Language Processing: Syntactic Processing, Semantic Analysis, Discourse and Pragmatic processing, Statistical Natural language processing and Spell checking

Module-3	L3,L4	10Hrs.
-----------------	-------	--------

Logical Agents: Knowledge based agents, The Wumpus world, Logic-Propositional logic Propositional theorem proving, Effective propositional model checking, Agents based on propositional logic. Using predicate logic: Representing simple facts in logic.

Module-4	L3,L4,L5	10 Hrs.
-----------------	----------	---------

Resolution, Natural Deduction, Learning: What is learning?, Forms of learning, Rote learning, learning by taking advice, Learning in problem solving, Induction leaning, Explanation based learning, Discovery, Analogy, Formal learning Theory.

Module-5	L3,L4,L5	10 Hrs.
-----------------	----------	---------

Neural Network Learning and Genetic Learning, Statistical learning, Maximum likelihood parameter learning, Bayesian parameter learning, passive reinforcement learning, active reinforcement learning

Course outcomes:

CO1	Prolog programming.
CO2	List data structure in Prolog.
CO3	Prolog programming constructs.
CO4	Arithmetic expressions in Prolog.
CO5	Understanding the under the hood workings of Prolog interpreter.

Text Books:

1.	Stuart Russel, Peter Norvig, "Artificial Intelligence: A Modern Approach Pearson Education, 2nd Edition, 2003.
2.	Elaine Rich, Kevin Knight, Shivashankar B Nair, "Artificial Intelligence 2013", Tata MCGraw Hill ,3rd edition.

Reference Books:

1.	George F Luger, "Artificial Intelligence Pearson Education, 5th Edition, 2009
2.	D W Rolston, Artificial Intelligence and Expert Systems Development, Mc Graw hill.

CIE Assessment:

CIE is based on quizzes, tests, assignments/seminars and any other form of evaluation. Generally, there will be: Three Internal Assessment (IA) tests during the semester (30 marks each), the final IA marks to be awarded will be the average of three tests

Quizzes/mini tests (10 marks)

Assignments (10 marks)

SEE Assessment:

Question paper for the SEE consists two parts i.e. Part A and Part B. Part A is compulsory and consists of objective type or short answer type questions of 1 or 2 marks each for total of 20 marks covering the whole syllabus.

Part B also covers the entire syllabus consisting of five questions having choices and may contain sub-divisions, each carrying 16 marks. Students have to answer five full questions. One question must be set from each unit. The duration of examination is 3 hours.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	0	3	0	0	0	0	0	0	1	1
CO2	2	3	0	3	0	0	0	0	0	0	1	1
CO3	2	2	0	2	0	0	0	0	0	0	1	0
CO4	3	2	0	3	0	0	0	0	0	0	0	1
CO5	3	3	0	2	0	0	0	0	0	0	0	0

High-3, Medium-2, Low-1

Course Title	Machine Learning	Semester	VI
Course Code	MVJ20CD62	CIE	50
Total No. of Contact Hours	50	SEE	50
No. of Contact Hours/week	4 (L : T : P :: 4: 0 : 0)	Total	100
Credits	4	Exam. Duration	3 Hours

Course objective is to:

- Define machine learning and problems relevant to machine learning.
- Differentiate supervised, unsupervised and reinforcement learning
- Apply neural networks, Bayes classifier and k nearest neighbour, for problems appear in machine learning.

Module-1

L1,L2

10Hours

Introduction: Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.

Module-2

L2, L3

10Hours

Decision Tree Learning: Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning

Module-3

L3,L4

10Hours

Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptrons, Backpropagation algorithm.

Module-4

L3,L4, L5

10Hours

Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks, EM algorithm.

Module-5

L3,L4, L5

10Hours

Evaluating Hypothesis: Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. Instance Based Learning: Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, case-based reasoning, Reinforcement Learning: Introduction, Learning Task, Q Learning

Course outcomes:	
CO1	Identify the problems for machine learning. And select the either supervised, unsupervised or reinforcement learning.
CO2	Explain theory of probability and statistics related to machine learning
CO3	Investigate concept learning, ANN, Bayes classifier, k nearest neighbor, Q, Question
CO4	Identify and apply Machine Learning algorithms to solve real world problems
CO5	Perform statistical analysis of machine learning techniques.

Reference Books:	
1	Tom M. Mitchell, "Machine Learning" McGraw Hill Education, India Edition 2013.
2	Trevor Hastie, Robert Tibshirani, Jerome Friedman, h, "The Elements of Statistical Learning", springer series in statistics,2nd edition
3	EthemAlpaydm, "Introduction to machine learning", MIT press, 2nd edition

CO-PO Mapping												
CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3	3	0	3	0	0	0	0	0	0	0	1
CO2	3	2	0	3	0	0	0	0	0	0	0	0
CO3	3	3	0	2	0	0	0	0	0	0	0	0
CO4	2	3	0	3	0	0	0	0	0	0	0	1
CO5	3	3	0	3	0	0	0	0	0	0	0	1

High-3, Medium-2, Low-1

Course Title	Unix System Programming	Semester	VI
Course Code	MVJ20CD631	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3 (L : T : P :: 3 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

- Explain the fundamental design of the Unix operating system.
- Familiarize with the systems calls provided in the Unix environment.
- Design and build an application/service over the Unix operating system.
- Familiarize with signals and daemon process characteristics.
- Explain inter-process communication.

Module-1	L1,L2,L3	8 Hours
<p>UNIX and ANSI Standards: The ANSI C Standard, The ANSI/ISO, C++ Standards, Difference between ANSI C and C++, The POSIX Standards, The POSIX.1 FIPS Standard, The X/Open Standards. UNIX and POSIX APIs: The POSIX APIs, The UNIX and POSIX Development Environment, API Common Characteristic.</p> <p>Application: Operating system</p> <p>Video Link: https://www.youtube.com/watch?v=hy40eVCLGZ4</p>		
Module-2	L1,L2,L3	8 Hours
<p>File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, Inodes in UNIX System V, Application Program Interface to Files, UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links. UNIX File APIs: General File APIs, File and Record Locking, Directory File, APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs.</p> <p>Application: Organizing and storing large data</p> <p>Video Link: https://www.youtube.com/watch?v=HIXzJ3Rz9po</p>		
Module-3	L1,L2,L3	8Hours
<p>The Environment of a UNIX Process: Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes. Process Control: Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter Files, system</p>		

Function, Process Accounting, User Identification, Process Times, I/O Redirection. Process Relationships: Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp and tcsetpgrp Functions, Job Control, Shell Execution of Programs, Orphaned Process Groups
 Application: booting of the system
 Video Link: <https://www.youtube.com/watch?v=4bfzEyb4YD0>

Module-4	L1,L2,L3	8 Hours
-----------------	-----------------	----------------

The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm, Interval Timers, POSIX.1b Timers.
 Daemon Processes: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model.
 Application: Communication
 Video Link: <https://www.youtube.com/watch?v=X8VDJHzrHRE>

Module-5	L1,L2,L3	8Hours
-----------------	-----------------	---------------

Overview of IPC Methods, Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores, Shared Memory, Client-Server Properties, Stream Pipes, Passing File Descriptors, An Open Server-Version 1, Client-Server Connection Functions.
 Application: Data flow, Communication
 Video Link: <https://www.youtube.com/watch?v=W0BX6geRCDQ>

Practical Experiments:
 program to demonstrates inter-process communication.
 Programs using mkfifo, open, read, write and close APIs.
 program to check whether the region is locked or not. If the region is locked, print pid of the process which has locked. If the region is not locked, lock the region with an exclusive lock, read the last 50 bytes and unlock the region.
 program to illustrate the race condition.

Course outcomes:

CO1	Understand and reason out the working of Unix system and POSIX standards
CO2	Understand the UNIX file system and build an application/service over the Unix operating system
CO3	Demonstrate the Unix process environment and process control
CO4	Explain signals and daemon process characteristics.

CO5	Understand and write UNIX programs on inter-process communication.
-----	--

Text/Reference Books:

1.	Unix System Programming Using C++ - Terrence Chan, PHI, 1999.
2	Advanced Programming in the UNIX Environment - W.Richard Stevens, Stephen A. Rago, 3rd Edition, Pearson Education / PHI, 2005.
3	Advanced Unix Programming- Marc J. Rochkind, 2nd Edition, Pearson Education, 2005.
4	The Design of the UNIX Operating System - Maurice.J.Bach, Pearson Education / PHI, 1987.
5	Unix Internals - Uresh Vahalia, Pearson Education, 2001.

CIE Assessment:

CIE is based on quizzes, tests, assignments/seminars and any other form of evaluation. Generally, there will be: Three Internal Assessment (IA) tests during the semester (30 marks each), the final IA marks to be awarded will be the average of three tests
 Quizzes/mini tests (4 marks)
 Mini Project / Case Studies (8 Marks)
 Activities/Experimentations related to courses (8 Marks)

SEE Assessment:

Question paper for the SEE consists two parts i.e. Part A and Part B. Part A is compulsory and consists of objective type or short answer type questions of 1 or 2 marks each for total of 20 marks covering the whole syllabus.
 Part B also covers the entire syllabus consisting of five questions having choices and may contain sub-divisions, each carrying 16 marks. Students have to answer five full questions. One question must be set from each unit. The duration of examination is 3 hours.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2									2	
CO2			2									
CO3				2								2
CO4			2									
CO5		2										

High-3, Medium-2, Low-1

Course Title	Data Centre Networking	Semester	VI
Course Code	MVJ20CD632	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3(L : T : P :: 3: 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

- Explain systems and network architecture as well as services.
- Understand data centre services, and trends that might affect data centre designs.
- Understand network security devices available to protect data centres.

Module-1	L1,L2,	8Hours
Cloud networking overview: Networking basics, cloud data center and networking introduction, characteristics of cloud networking, evolution from mainframes to cloud.		
Module-2	L2, L3	8 Hours
Technology: Switch fabric technology – fabric architecture overview, fabric topologies, congestion management. Cloud and data center topologies: traditional multitiered, data center network switch types, flat data center networks, rack scale architectures.		
Module-3	L3, L4	8 Hours
Networking standards, virtualization and networking: ethernet data rate standards, virtual LANs, data center bridging, improving network bandwidth, remote DMA, virtual switching. Network virtualization.		
Module-4	L3,L4, L5	8 Hours
Multi-tenant networks, traditional network tunnelling protocols, VXLAN, NVGRE, Tunnel Locations. Defined networking. Data center software background, OpenFlow, Network Function virtualization, SDN Deployment.		
Module-5	L3,L4, L5	8 Hours
High Performance Computing Networks: HPC System architectures, Multisocket CPU boards, HPC Networking standards.		

Course outcomes:

CO1	Determine a data centre environment's requirement including systems and network architecture as well as services.
-----	---

CO2	Evaluate options for server farms, network designs, high availability, load balancing, data centre services, and trends that might affect data centre designs
CO3	Assess threats, vulnerabilities and common attacks, and network security devices available to protect data centres.
CO4	Design a data centre infrastructure integrating features that address security, performance, and availability.
CO5	Measure data centre traffic patterns and performance metrics.

Reference Books:	
1.	Greg Lee, Morgan Kaufmann, "Cloud Networking: Understanding Cloud Based Data Center Networks", 2015
2.	Patricia Morreale and James Anderson, "Software Defined Networking: Design and Deployment" CRC Press, 2014

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	0	0	0	0	2	0	0
CO2	3	3	3	2	3	0	0	0	0	2	0	0
CO3	3	3	2	2	3	0	0	0	0	2	0	0
CO4	3	3	2	2	3	0	0	0	0	2	0	0
CO5	3	3	3	2	3	0	0	0	0	2	0	0

High-3, Medium-2, Low-1

Course Title	Information Storage and Management	Semester	VI
Course Code	MVJ20CD633	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3 (L : T : P :: 3 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

- To understand data creation, the amount of data being created, the value of data to a business, challenges in data storage and data management
- To understand solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities
- To understand the storage architecture and available technologies.

Module-1

L1,L2

8 Hours

Introduction to Information Storage Management, Evolution of Storage Technology. Data Centre Infrastructure, Key challenges in managing information. Data Center Environment: Application, Database Management System (DBMS) - Host : Connectivity, Storage, Disk Drive Components.

Module-2

L2,L3

8 Hours

Fiber Channel: Overview ,SAN and its Evolution, Components of FC SAN, FC Connectivity FC Architecture, IPSAN-iSCSI components, iSCSI Topologies, iSCSI Protocol Stack,iSCSI Names NAS: General Purpose Servers versus NAS Devices ,Benefits of NAS- File Systems and Network File Sharing, Components of NAS, NAS I/O Operation

Module-3

L3,L4

8 Hours

Business Continuity: Information Availability ,BC Terminology, BC Planning life cycle. Failure Analysis, Business Impact Analysis Backup and Archive: Backup Purpose ,Backup Considerations, Backup Granularity

Module-4

L3,L4,L5

8 Hours

Storage Security Framework and Domain Monitoring the Storage Infrastructure: Monitoring Parameters , Components Monitored Storage Infrastructure Management Activities Storage Management Examples: Storage Allocation to a New Server/Host , File System Space Management.

Module-5

L3,L4,L5

8 Hours

Cloud Enabling Technologies : Characteristics of Cloud Computing , Benefits of Cloud Computing Cloud Service Models, Cloud Deployment models Cloud computing Infrastructure, Cloud Challenges.

Course outcomes:

CO1	Select from various storage technologies to suit for required application
CO2	Apply security measures to safeguard storage & farm
CO3	Analyse QoS on Storage.
CO4	Describe the different role in providing disaster recovery and business continuity capabilities.
CO5	Distinguish different remote replication technologies.

Text/Reference Books:

1.	EMC Corporation, "Information Storage and Management" ,Wiley India, ISBN13: 978-1118094839, 2nd edition.
2.	UifTropfen Rainer Wolfgang Muller , "Storage Networks Explained", India, Wiley ISBN13: 978-0470741436, 2010
3.	Robert Spalding, Storage Networks: " The Complete Reference Osborne", Tata McGraw Hill, ISBN-13: 978-0072224764, 2003
4.	Farley , "Building Storage Networks "Osborne, Tata McGraw Hill, ISBN-13: 978-0072130720, 2009.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3									2		
CO3	3	3								2		
CO4	3	3								2		2
CO5	3	3								2		2

High-3, Medium-2, Low-1

Course Title	Storage Area Network	Semester	VI
Course Code	MVJ20CD634	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3 (L : T : P :: 3 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to: This course will enable students to

- Understand Storage Area Networks characteristics and components.
- Become familiar with the SAN vendors and their products Learn Fibre Channel protocols
- Become familiar with Cisco MDS 9000 Multilayer Directors and Fabric Switches Thoroughly learn Cisco SAN-OS features.
- Understand SAN components use them to communicate with each other
- Understand the use of all SAN-OS commands. Practice variations of SANOS features

Module-1

L1,L2,L3

8 Hours

Syllabus Content:

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities Hardware and software components of the host environment, Key protocols and concepts used by each component, Physical and logical components of a connectivity environment.

Application: To create, maintain the storage section of a data center, these basic terms and their concept need to know.

Video Link: <https://www.youtube.com/watch?v=akEr8cUAd5g&t=1729s>

Module-2

L1,L2,L3

8Hours

Syllabus Content:

Concept of RAID and its components , Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contrast integrated and modular storage systems ,High-level architecture and working of an intelligent storage system Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN

Application: storing data across multiple hard drives.

Video Link: <https://www.youtube.com/watch?v=U-OCdTeZLac>

Module-3

L1,L2,L3

8Hours

Syllabus Content:

Types of DAS, DAS Benefits and Limitations, Disk Drive Interfaces, Introduction to Parallel SCSI, Overview of Fibre Channel, The SAN and Its Evolution, Components of SAN, FC Connectivity, Fibre Channel Ports, Fibre Channel Architecture, Zoning, Fibre Channel Login Types, FC Topologies.

Application: to access storage devices

Video Link: <https://www.youtube.com/watch?v=-NkhKMRtCeo>

Module-4

L1,L2,L3

8Hours

Syllabus Content:

Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Life Cycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions, Backup and Archive: Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Architecture, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments

Application: to create a copy of data that can be recovered in the event of a primary data failure.

Video Link: https://www.youtube.com/watch?v=B9WKfdc_07k

Module-5

L1,L2,L3

8Hours

Syllabus Content:

Local Replication: Replication Terminology, Uses of Local Replicas, Replica Consistency, Local Replication Technologies, Tracking Changes to Source and Replica, Restore and Restart Considerations, Creating Multiple Replicas. Remote Replication: Modes of Remote Replication, Remote Replication Technologies. Securing the Storage Infrastructure: Information Security Framework, Risk Triad, Storage Security Domains. Security Implementations in Storage Networking

Application:

to ensure it stays operational even after an attack or threatening incident.

Business continuity.

Video Link: https://www.youtube.com/watch?v=VCdX-wm3_4A

CASE STUDY

Disaster recovery

Business continuity

CAS

Performance Analysis of Cluster Server based on Storage Area Network

Best Practices for Storage Area Networks

Course outcomes:

CO1	Analyse different storage networking technologies and virtualization
CO2	Identify key challenges in managing information
CO3	Explain components and the implementation of NAS
CO4	Illustrate the storage infrastructure and management activities
CO5	Describe architecture and types of archives and forms of virtualization

Text/Reference Books:

1.	Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, Osborne, 2003.
2.	EMC Education Services, "Information Storage and Management", Wiley India Publications, 2009.

CIE Assessment:

CIE is based on quizzes, tests, assignments/seminars and any other form of evaluation. Generally, there will be: Three Internal Assessment (IA) tests during the semester (30 marks each), the final IA marks to be awarded will be the average of three tests

Quizzes/mini tests (4 marks)

Mini Project / Case Studies (8 Marks)

Activities/Experimentations related to courses (8 Marks)

SEE Assessment:

Question paper for the SEE consists two parts i.e. Part A and Part B. Part A is compulsory and consists of objective type or short answer type questions of 1 or 2 marks each for total of 20 marks covering the whole syllabus.

Part B also covers the entire syllabus consisting of five questions having choices and may contain sub-divisions, each carrying 16 marks. Students have to answer five full questions. One question must be set from each unit. The duration of examination is 3 hours.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3	2	2	2		2				1	2
CO2	3	3	2	2	2		2				2	2
CO3	3	3	2	2	2		2				3	2
CO4	3	3	2	2	2		2				2	2
CO5	3	3	2	2	2		2				3	2

High-3, Medium-2, Low-1

Course Title	Object Oriented Analysis & Design	Semester	VI
Course Code	MVJ20CD641	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3 (L : T : P :: 3 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to: This course will enable students to

- Understand Object Oriented Programming, Object Oriented Analysis and Modeling using the Unified Modeling Language (UML).
- Familiarize themselves with the models used in UML, including static as well as dynamic (behavioural) models.
- Understand the importance of system architecture and system design in product development.

Module-1

L1,L2

8Hours

Syllabus Content:

Introduction, Use Cases and Class Models: Introduction to Object Oriented Programming – OOP Principles, Class Fundamentals , Structure of Complex Systems, Decomposing Complexity - Elements of Analysis and Design, Object Modeling - Unified Process - Phases of Unified Process. Benefits and Risks of Object Oriented Development,

Module-2

L2,L3

8Hours

Syllabus Content:

Class Models and Dynamic Models: Class Modeling, Object Constraint Language, Advanced Class Modeling, Activity Models, Sequence Models, , Macro and Micro Process Development, Object Interoperability- Designing Interface Objects.Object Oriented Methodologies- Rumbaugh et al.'s object modeling technique-The Booch Methodology-The Jacobson et al. Methodologies

Module-3

L3,L4

8Hours

Discussion on few Examples of OOAD Application Scenarios-Choosing a case study for OOAD.Elements of Analysis – Requirements Workflow – Analysis Workflow, E System and Class Design: System Design, Class Design, Implementation Models, Object Oriented Languages, Database Design.

Module-4

L3,L4,L5

8Hours

Syllabus Content:

Elements of Design – O-O Design Workflow – Mapping of Elements onto Phases of Unified Process – UML Diagrams for Design – Iterations – Case Study. Introduction to UML as an Analysis and Design Tool, Class Diagrams, Object Oriented Design Principles: GRASP (General Responsibility Assignment Software Patterns) and SOLID (Single Responsibility, Open-Closed, Liskov Substitution, Interface Segregation, Dependency Inversion).

Module-5	L3,L4,L5	8Hours
-----------------	-----------------	---------------

Syllabus Content:

State Transition Diagrams, Object Diagrams, Interaction Diagrams, Use case Diagrams, Activity Diagrams, Collaboration Diagrams and Module Diagrams. Component Diagram, Deployment Diagrams – Mapping of Diagrams to Analysis and Design Components, Design Patterns: What Design Patterns Are, How Design Patterns Solve Problems, How to Select a Design Pattern, How to Implement a Design Pattern

Course outcomes:

CO1	Use the concepts of classes and objects in Object Oriented Programming. Use UML to model a complex system by defining actors and use cases.
CO2	Construct Class Models and analyze the dynamics of a system using Activity, Sequence, State and Process models.
CO3	Depict the architecture of a software system by using component and deployment models and design a database based on a class model.
CO4	Use GRASP and SOLID principles in the design of software.
CO5	Apply software design patterns in a variety of situations.

Text/Reference Books:

1.	Grady Booch, Robert A. Maksimchuk , Michael W. Engle, Bobbi J. Young, Jim Conallen Kelli A. Houston: "Object Oriented Analysis and Design with Application", Addison Wesley, 3rd edition, 2012.
2.	Morris Mano: Digital logic and Computer design, Pearson, 4th Edition, 2008.
3.	Ali Bahrami, "Object Oriented System Development", Tata McGraw-Hill, 2012.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			3	2	2	2		2				1
CO2		3	3	2	2	2		2				2
CO3		3	3	2	2	2		2				3
CO4		3	3	2	2	2		2				2
CO5		3	3	2	2	2		2				3

High-3, Medium-2, Low-1

Course Title	Cloud Computing	Semester	VI
Course Code	MVJ20CD642	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3(L : T : P :: 3 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

- To provide students with the fundamentals and essentials of Cloud Computing.
- To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.
- To enable students exploring some important cloud computing driven commercial systems and applications.

Module-1

L1,L2

8Hours

Introduction to Networking, Data communication, Cloud Computing, Origin of Cloud Computing, Basic Concepts and Terminology.

Goals and Benefits, Risks and Challenges, Roles and Boundaries, Cloud Characteristics .Cloud Delivery Models, Cloud Deployment Models

Module-2

L2,L3

8 Hours

Broadband Networks and Internet Architecture, Data Center Technology, Virtualization Technology.

Web Technology, Multitenant Technology, Service Technology .

Applications, Cloud computing for Healthcare, Energy Systems, Transportation Systems, Manufacturing Industry

Module-3

L3,L4

8Hours

Cloud Infrastructure Mechanisms: Logical Network Perimeter, Virtual Server: Cloud Storage Device, Cloud Usage Monitor, Resource Replication, Ready-Made Environment .

Specialized Cloud Mechanisms: Automated Scaling Listener, Load Balancer, SLA Monitor, Pay Per Use Monitor: Audit Monitor, Failover System, Hypervisor, Resource Cluster, Multi:Device Broker

Module-4

L3,L4,L5

8 Hours

Cloud Management Mechanisms: Remote Administration System, Resource Management System, SLA Management System, Billing Management System .

Cost Metrics and Pricing Models: Business Cost Metrics, Cloud Usage Cost Metrics, Cost Management Considerations . Service Quality Metrics and SLAs: Service Quality Metrics, SLA Guidelines.

Module-5

L3,L4,L5

8Hours

Fundamental Cloud Architectures: Illustration with Case Study

Fundamental Cloud Security: Basic Terms and Concepts, Threat Agents, Cloud Security Threats .

Cloud Security Mechanisms: Encryption, Hashing: Digital Signature, Public Key Infrastructure, Identity and Access Management

Experimental Part:

1. Apriori Algorithm for market Basket Analysis
2. Bayesian Classification
3. Decision Tree Induction Algorithm
4. Frequent Pattern-Growth Algorithm

Course outcomes:

CO1	Use the concepts of classes and objects in Object Oriented Programming. Use UML to model a complex system by defining actors and use cases.
CO2	Construct Class Models and analyze the dynamics of a system using Activity, Sequence, State and Process models.
CO3	Depict the architecture of a software system by using component and deployment models and design a database based on a class model.
CO4	Use GRASP and SOLID principles in the design of software.
CO5	Apply software design patterns in a variety of situations.

Text/Reference Books:

1.	Thomas Erl, ZaighamMahmood,RichardoPuttini, "Cloud Computing:Concepts", Prentice Hall/PearsonPTR, ISBN: 9780133387520,Fourth Printing, 2014
2.	ArshdeepBahga, Vijay Madiseti:"Cloud Computing: A Hands-On Approach", University Press, ISBN: 9780996025508,2016
3.	K.Chandrasekaran,"Essentials of Cloud Computing ",Chapman and Hall/CRC Press, ISBN 9781482205435,2014
4.	Thomas Erl, Robert Cope, Amin Naserpour,Cloud Computing Design Patterns, Prentice Hall/Service Tech Press, Pearson, ISBN: 978-0133858563,2015

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3		2					
CO2	3	3	3	3	3		2					
CO3	3	3	3	3	3	3						3
CO4	3	3	3	3	3	3		3				3
CO5	3	3	3	3	3	3						3

High-3, Medum-2, Low-1

Course Title	OPEN ELECTIVE I-Mobile Application Development	Semester	VI
Course Code	MVJ20CD643	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3 (L : T : P :: 3 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

- Learning about data transmission standards
- Learning about systems for mobile application distribution
- Preparing for mobile application development

Module-1	L1,L2	8 Hours
<p>Introduction: Introduction to mobile application development, trends, introduction to various platforms, introduction to smart phones</p> <p>Android platform: Android platform features and architecture, versions, comparison added features in each versions. ART(Android Runtime),ADB(Android Debug Bridge).</p> <p>Development environment/IDE: Android studio and its working environment, gradle build system, emulator setup Application anatomy.</p>		
Module-2	L2,L3	8Hours
<p>Application framework basics: resources layout, values, asset XML representation and generated R.Javafile ,Android manifest file. Creating a simple application., GUI for Android: Introduction to activities, activities life-cycle, Android v7 support library form API21 for lower version support</p> <p>Intent :intent object, intent filters ,adding categories, linking activities, user interface design components</p>		
Module-3	L3,L4	8Hours
<p>Views and View Groups: Basic views, picker views, adapter views, Menu, App Bar etc, basics of screen design; different layouts. App widgets.Lollipop Material design: new themes, new widgets, Card layouts. Recycler View</p> <p>Fragments: Introduction to activities, activities life-cycle.Different Data persistence schemes: Shared preferences, File Handling, Managing data using SQLite database</p> <p>Content providers: user content provider, Android in build content providers.</p>		
Module-4	L3,L4,L5	8hours

Services :introduction to services – local service, remote service and binding the service, the communication between service and activity, Intent Service.

MultiThreading: Handlers ,AsyncTask

Android network programming :URLConnection, Connecting to REST-based and SOAP based Web services

Broad cast receivers:LocalBroadcastManager, Dynamic broadcast receiver, System Broadcast. PendingIntent,

Module-5	L3,L4,L5	8 Hours
-----------------	-----------------	----------------

Notifications Telephony Manager:Sending SMS and making calls., Location based services: Google maps V2 services using Google API, Animations and Graphics: Property Animation ,View Animations, Drawable Animations Media and Camera API: Working with video and audio inputs, camera API

Course outcomes:

CO1	Recognize and setup a mobile device and application runtimeenvironment
CO2	setup programming tools for a mobile application developer (for selected modern mobile platforms)
CO3	select appropriate data transmission standards in terms of social competence
CO4	understand the need for continuous improvement of his/her skills due to the rapidly changing environment of mobile devices.

Text/Reference Books:

1	Dawn Griffiths, David Griffiths, Head First: Android Development, OReilly,ISBN: 9781449362188, 2015
2	Greg Milette,Adam Stroud, "PROFESSIONALAndroid™ Sensor Programming", John Wiley and Sons, Inc, ISBN/978111265055,9781280678943,978111227459, 2012
3	Paul Deital,HarveyDeital, Alexander Wald , "Android 6 for Programmers ,App Driven approach",Prentice Hall ,ISBN: 9780134289366, 2015

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	2						1	2	2
CO2	2	2	2	1						1		
CO3	2	1	1	1		1	1	1	1			1
CO4	3	2	1	1		1	1	1	1			2
CO5	1	1	1	2						1	1	

High-3, Medium-2, Low-1

Course Title	Information & Network Security	Semester	VI
Course Code	MVJ20CD644	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3(L : T : P :: 3 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to: This course viz., aims to prepare the students:

- To understand the fundamentals of Cryptography
- To acquire knowledge on standard algorithms used to provide confidentiality integrity and authenticity.
- To understand the various key distribution and management schemes

Module-1

L1,L2

8Hrs.

Definitions & challenges of security, OSI security architecture, attacks & services. Cryptography & cryptanalysis. Classical encryption techniques, substitution techniques, transposition techniques. Block ciphers, DES, AES structure, multiple encryption-triple DES.

Module-2

L2,L3

8 Hrs.

Number theory fundamentals, principles of public key crypto systems, RSA algorithm, Strength of RSA, Diffie-Hellman key exchange, Elliptic curve cryptography. Symmetric key distribution using symmetric and asymmetric encryptions, distribution of public keys, X.509 Certificates, PKI.

Module-3

L3,L4

8Hrs.

Cryptographic hash functions, applications, security requirements, hash function based on block chaining, SHA-512. MAC, security requirements, HMAC, CMAC, key wrapping, Digital signatures.

Module-4

L3,L4,L5

8 Hrs.

Remote user authentication, symmetric and asymmetric encryptions for user authentications, Kerberos, identity management & verification. Web security, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Shell (SSH), HTTPS, E-mail security, PGP, S/MIME

Module-5

L3,L4,L5

8 Hrs.

IP Security, Policy, encapsulating security payload, combining security association, internet key exchange. Wireless security, Security, IEEE 802.11i services, IEEE 802.11i phases of operation, discovery phase, Authentication phase, key

management phase, and protected data transfer phase

Course outcomes:

CO1	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
CO2	Identify the security issues in the network and resolve it.
CO3	Evaluate security mechanisms using rigorous approaches, including theoretical
CO4	Compare and Contrast different IEEE standards and electronic mail security
CO5	Design security applications in the field of Information technology

Text Books:

1	"Cryptography & Network Security- Principles and Practices" William Stallings ,Pearson Publishers Sixth Edition,2014
2	"Understanding cryptography" Christof Paar& Jan Pelz,Heidelberg [u.a.] Springer ,2014

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	0	2	0	0	0	0	0	0	1	1
CO2	3	3	0	2	0	0	0	0	0	0	1	1
CO3	3	3	0	3	0	0	0	0	0	0	0	1
CO4	2	2	0	3	0	0	0	0	0	0	1	1
CO5	2	2	0	2	0	0	0	0	0	0	0	1

High-3, Medium-2, Low-1

Course Title	OPEN ELECTIVE I- Computer Network	Semester	VI
Course Code	MVJ20CD651	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3 (L : T : P :: 3 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

- Understand the Computer Networks and Data Transmissions
- Learn Functions of different protocols in networked computers
- Get details about Functions of Network layer, Router and deliver of data to host network

Module-1	L1,L2	8 Hours
<p>Data Communication – Networks – The Internet – Protocols and Standards. Network Model: OSI model -TCP/IP Protocol Suit – Addressing. Transmission Media: Guided Media – Unguided Media. Data Link Control: Framing – Flow and Error Control – Protocols – Noiseless & Noisy Channels – HDLC – Point-to-Point Protocol. Connecting Devices – Backbone Networks</p> <p>Application Layer: The Web and HTTP: Overview of HTTP – Non-Persistent and Persistent Connections – HTTP Message Format – User-Server Interaction: Cookies – Web Caching.</p>		
Module-2	L2,L3	8Hours
<p>IPv4 Public and Private Address Subnetting VLSM-CIDR Network Devices: Router, Switch, HUB, Bridge, Internet’s Directory Service: Service Provided by DNS, Overview of How DNS Works, DNS Records and Messages – Peer-to-Peer File Distribution – Distributed Hash Tables.</p>		
Module-3	L3,L4	8Hours
<p>Introduction and Transport-Layer Services: Relationship Between Transport and Network Layers. Overview of the Transport Layer in the Internet – Multiplexing and Demultiplexing: Connectionless Transport: UDP, UDP segment Structure, UDP Checksum, Principles of Reliable Data Transfer: Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N, Selective Repeat.</p>		
Module-4	L3,L4,L5	8 Hours
<p>Connection-Oriented Transport TCP: The TCP Connection, TCP Segment Structure, Round-Trip Time Estimation and Time out, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control: The Causes and the Costs of Congestion Approaches to Congestion Control., Medium Access Control Techniques</p>		

Random, Round Robin, Reservation, ALOHA Pure and Slotted, CSMA/CD CSMA/CA

Module-5	L1,L2,L3	8Hours
-----------------	-----------------	---------------

Ethernet, Token Ring, Token Bus, ARQ 3 Types, Error Detection Codes, Parity Check, Checksum Error Correction Codes, Hamming codes, Physical Layer overview, Latency, Bandwidth, Delay, Wireless: 802.11, Transmission Media : Twisted pair, Coaxial, Fibre, 802.15, 802.15.4, 802.16.

Course outcomes:

CO1	Establish LAN and assigning IP address to each node
CO2	Can apply different protocols to transfer data between computers
CO3	Know how the network deliver the packets to destination network
CO4	Know how switch hopping between mobile towers and Functions of mobile networks
CO5	Guess the problems in audio/video transfer through network

Text/Reference Books:

1.	Behrouz A. Forouzan, Data Communications and Networking, ISBN: 9780073376226, 5th edition, July 1, 2010
2..	Todd Lammle, CCNA Study Guide, ISB: 10:0470901071 ISBN:13: 9780470901076, Edition7, Publication Date: April 5, 2011
3	William Stallings, Data and Computer Communications, Edition 9, 2010

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	2						1	2	2
CO2	2	2	2	1						1		
CO3	2	1	1	1		1	1	1	1			1
CO4	3	2	1	1		1	1	1	1			2
CO5	1	1	1	2						1	1	

High-3, Medium-2, Low-1

Course Title	Data Warehousing and Data mining	Semester	VI
Course Code	MVJ20CD652	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3 (L : T : P :: 3: 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

- Gather and analyze large sets of data to gain useful business understanding
- Understand the data mining functionalities, technologies and steps in pre-processing the data
- Learn data mining algorithms, methods and tools

Module-1

L1, L2, L3

8Hours

Raw data to valuable information-Lifecycle of Data - What is data warehousing - The building Blocks: Defining Features - Data warehouses and data marts - Overview of the components - Metadata in the data warehouse - Basic elements of data warehousing . Identify the potential risk of default and manage and control collections Performance analysis of each product, service, interchange, and exchange rates Store and analyze information about faculty and students-Maintain student portals to facilitate student.activities

Video Link:

<https://www.youtube.com/watch?v=8lHpioyvSng>

Module-2

L1,L2,L3

8Hours

Introduction to Data Mining Systems, Knowledge Discovery Process -Data Objects and attribute types, Statistical description of data, Data Preprocessing- Data Cleaning, Data Integration and Transformation, Data Reduction.

Application:

Financial Analysis

Telecommunication Industry.

Intrusion Detection

Retail Industry

Higher Education

Video Link: https://www.youtube.com/watch?v=QRZIYzxEFDg		
Module-3	L1,L2,L3	8Hours
<p>Market Basket Analysis, Frequent Item sets, Closed Itemsets, Association Rules, Frequent Itemset Mining Methods- Apriori algorithm, Generating Association rules from Frequent Itemsets, A Pattern- Growth Approach for mining frequent Itemsets.</p> <p>Application: Market Basket Analysis Medical Diagnosis: Census Data Protein Sequence</p> <p>Video Link: https://www.youtube.com/watch?v=RiFrbyiYpRs</p>		
Module-4	L1,L2,L3	8Hours
<p>Classification and Prediction ,Basic Concepts, Decision Tree Induction, Bayesian Classification ,Rule Based Classification, Classification by Back propagation , Support Vector Machines.</p> <p>Application: Sentiment Analysis Email Spam Classification Document Classification Image Classification</p> <p>Video Link: https://www.youtube.com/watch?v=gkagE_fe2sk</p>		
Module-5	L1,L2,L3	8 Hours
<p>Types of Data in Cluster Analysis , Data similarity and dissimilarity measures ,A Categorization of Major Clustering Methods -Partitioning Methods-K-means, K-medoids , Hierarchical Methods-Agglomerative vs Divisive, Distance measures, BIRCH.</p> <p>Application: Clustering analysis In the field of biology, it can be used to derive plant and animal taxonomies. Identification of areas of similar land use in an earth observation database.</p> <p>Video Link: https://www.youtube.com/watch?v=2QTeuO0C-fY</p>		

Experimental Part:

Apriori Algorithm for market Basket Analysis

Bayesian Classification

Decision Tree Induction Algorithm

Frequent Pattern-Growth Algorithm

Course outcomes:

CO1	Design data warehouse by applying principles of dimensional modelling and ETL concepts
CO2	Analyze various data pre-processing techniques for efficient data mining.
CO3	Apply association rule mining for finding hidden and interesting patterns in data.
CO4	Apply statistical procedure, machine learning and neural network based classification algorithms for data prediction
CO5	Apply clustering algorithms for the application and generalizations for real time problems

Text/Reference Books:

1.	Jiawei Han, Micheline Kamber and Jian Pei, Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.
2.	Paulraj Ponniah, Data Warehousing Fundamentals: A Comprehensive Guide for IT Professionals, Wiley, 2010
3.	Alex Berson, Stephen J Smith, Data warehousing, Data mining, and OLAP, Tata McGraw Hill edition, 2007
4.	Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining, Pearson Education, 2007
5.	G. K. Gupta ,Introduction to Data Mining with Case Studies, Easter Economy Edition, Prentice Hall of India, 2006

CIE Assessment:

CIE is based on quizzes, tests, assignments/seminars and any other form of evaluation.

Generally, there will be: Three Internal Assessment (IA) tests during the semester (30 marks each), the final IA marks to be awarded will be the average of three tests

Quizzes/mini tests (4 marks)

Mini Project / Case Studies (8 Marks)

Activities/Experimentations related to courses (8 Marks)

SEE Assessment:

i. Question paper for the SEE consists two parts i.e. Part A and Part B. Part A is compulsory and consists of objective type or short answer type questions of 1 or 2 marks each for total of 20 marks covering the whole syllabus.

ii. Part B also covers the entire syllabus consisting of five questions having choices and may contain sub-divisions, each carrying 16 marks. Students have to answer five full questions.

iii. One question must be set from each unit. The duration of examination is 3 hours.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3		2					
CO2	3	3	3	3	3		2					
CO3	3	3	3	3	3	3						3
CO4	3	3	3	3	3	3		3				3
CO5	3	3	3	3	3	3						3

High-3, Medium-2, Low-1

Course Title	Introduction to Artificial Intelligence	Semester	VI
Course Code	MVJ20CD653	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3 (L : T : P :: 3 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to: This course will enable students to

- Identify the problems where AI is required and the different methods available.
- Compare and contrast different AI techniques available.
- Define and explain learning algorithms.
- Design different learning algorithms for improving the performance of AI systems.
- Implement projects using different AI learning techniques.

Module-1

L1,L2,L3

8Hours

Syllabus Content:

What is artificial intelligence, Problems, Problem Spaces and search, Heuristic search technique.

Application:

Solving various AI based problems.

Video Link:

<http://www.nptelvideos.in/2012/11/artificial-intelligence.html>

<https://www.cualit.com/artificial-intelligence-practical-use-cases/>

Module-2

L1,L2,L3

8
Hours

Syllabus Content:

Knowledge Representation Issues, Using Predicate Logic, Representing knowledge using Rules.

Application:

Developing information about the objects

Video Link:

<http://www.nptelvideos.in/2012/11/artificial-intelligence.html>
<https://www.cualit.com/artificial-intelligence-practical-use-cases/>

Module-3	L1,L2,L3	8Hours
-----------------	-----------------	---------------

Syllabus Content:
 Symbolic Reasoning under Uncertainty, Statistical reasoning, Weak Slot and Filter Structures.
 Application:
 Connecting one concept to another , combining ideas about data.

Video Link:

<http://www.nptelvideos.in/2012/11/artificial-intelligence.html>
<https://www.cualit.com/artificial-intelligence-practical-use-cases/>

Module-4	L1,L2,L3	8Hours
-----------------	-----------------	---------------

Syllabus Content:
 Strong slot-and-filler structures, Game Playing.
 Application:
 Designing Smart Games

Video Link:

<http://www.nptelvideos.in/2012/11/artificial-intelligence.html>
<https://www.cualit.com/artificial-intelligence-practical-use-cases/>

Module-5	L1,L2,L3	8Hours
-----------------	-----------------	---------------

Syllabus Content:
 Natural Language Processing, Learning, Expert Systems.
 Application:
 Sentiment analysis
 Video Link:
<http://www.nptelvideos.in/2012/11/artificial-intelligence.html>
<https://www.cualit.com/artificial-intelligence-practical-use-cases/>

Course outcomes:

CO1	Identify the AI based problems.
CO2	Apply techniques to solve problems
CO3	Define learning and explain various learning techniques.
CO4	Discuss expert systems

CO5	Implement projects using different AI learning techniques.
-----	--

Text/Reference Books:

1.	E. Rich , K. Knight & S. B. Nair - Artificial Intelligence, 3/e, McGraw Hill.
2.	Stuart Russel, Peter Norvig, "Artificial Intelligence: A Modern Approach" , 2nd Edition, Pearson Education, 2003.
3.	Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems – Prentice Hal of India.
4.	G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem Solving", Fourth Edition, Pearson Education, 2002.

CIE Assessment:

CIE is based on quizzes, tests, assignments/seminars and any other form of evaluation. Generally, there will be: Three Internal Assessment (IA) tests during the semester (30 marks each), the final IA marks to be awarded will be the average of three tests
 Quizzes/mini tests (4 marks)
 Mini Project / Case Studies (8 Marks)
 Activities/Experimentations related to courses (8 Marks)

SEE Assessment:

Question paper for the SEE consists two parts i.e. Part A and Part B. Part A is compulsory and consists of objective type or short answer type questions of 1 or 2 marks each for total of 20 marks covering the whole syllabus. Part B also covers the entire syllabus consisting of five questions having choices and may contain sub-divisions, each carrying 16 marks. Students have to answer five full questions.
 One question must be set from each unit. The duration of examination is 3 hours.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3		2							
CO2	2	3	3	3	2							
CO3		2	2	2								
CO4		2	2	3								
CO5	3	3	3	3	3							

High-3, Medium-2, Low-1

Course Title	Web programming	Semester	VI
Course Code	MVJ20CD654	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	3 (L : T : P :: 3 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

- Teach students HTML and CSS for designing web pages.
- Introduce students to the basics of JavaScript as a programming language.
- Familiarize students with the Document Object Model and enable them to create dynamic web pages that react to user input.
- Teach students about installing and configuring Apache Server and incorporating backend support for their web pages.
- Introduce students to the newer features available as part of the HTML standard

Module -1

L1,L2,L3

8Hours

Introduction, UI Design and UX : Internet, WWW, Web Servers and Browsers, URLs, MIME, HTTP, Basic Markup, Images, Hyperlinks, Lists, Tables, Forms, DataList, Canvas, Audio and Video, Geo-Location, Local Storage, Web Workers, Offline Web Applications, Drag and Drop.HTML Tables and Forms, Introducing Tables, Styling Tables, Introducing Forms, Form Control Elements, Table and Form Accessibility, Microformats

Application: To deliver data (HTML files, image files, query results) on the World Wide Web.

Video Link:

<https://www.freecodecamp.org/>

<https://developer.mozilla.org/en-US/docs/Web/CSS>

Module -2

L1,L2,L3

8Hours

Style Sheets: CSS Introduction to Cascading Style Sheets-Features-Core Syntax-Style Sheets and HTML Style Cascading and Inheritance-Text Properties-Box Model Normal Flow Box Layout-Beyond the Normal Flow-Other Properties-Case Study. Client- Side Programming:

Application: Describing the presentation of Web pages, including colors, layout, and fonts

Video Link:

<https://www.vogella.com/tutorials/CSS/article.html>

<https://nptel.ac.in/courses/106/105/106105084/>

Module - 3	L1,L2,L3	8Hours
<p>JavaScript: Introduction to Client-Side Scripting, JavaScript Basics, Screen Input and Keyboard Output, Functions, Objects, Inheritance, Hoisting, Arrays, JavaScript Objects, Accessing and Modifying DOM, Events and Event Handlers - Load, Mouse, Synthetic Events, Key and Form Related Events, Event Bubbling, Cookies.</p> <p>Application: Web Sites, Web Server Applications, Mobile Apps, Games Platform</p> <p>Video Link: https://www.udemy.com/courses/development/web-development/ https://javascript.info/hello-world#modern-markup</p>		
Module-4	L1,L2,L3	8Hours
<p>PHP Arrays and Superglobals, Arrays, \$_GET and \$_POST Superglobal Arrays, \$_SERVERArray, \$_Files Array, Reading/Writing Files, PHP Classes and Objects, Object-Oriented Overview, Classes and Objects in PHP, Object Oriented Design, Error Handling and Validation, What are Errors and Exceptions, PHP Error Reporting, PHP Error and Exception Handling</p> <p>Application: e-Commerce Applications. Web Pages and Web-Based Applications</p> <p>Video Link: http://www.nptelvideos.com/video.php?id=2142&c=27 http://www.nptelvideos.com/video.php?id=2131&c=27 http://www.nptelvideos.com/video.php?id=2116&c=27</p>		
Module-5	L1,L2,L3	8Hours
<p>Bootstrap: Grid Systems, Layout, Tables and Forms, Buttons and Images, Progress Bar, Navigations. jQuery: Usage, Selecting DOM Elements, Getting and Setting Attributes, Changing Styles, File Handling and System Calls, Arrays, Cookies, Sessions, Database Access.</p> <p>Application: Bootstrap is a front-end framework used to create modern websites and web apps</p> <p>Video Link: https://getbootstrap.com/docs/4.5/examples/ https://www.w3schools.com/bootstrap/bootstrap_buttons.asp</p>		
<p>Practical Experiments:</p> <p>Create a web page with the following. a. Cascading style sheets. b. Embedded style sheets. c. Inline style sheets. Use our college information for the web pages.</p> <p>JavaScript to design a simple calculator</p> <p>Java script to Validate the Registration, user login, user profile and payment by credit card</p>		

pages

PHP program to display a digital clock which displays the current time of the server..

PHP program to keep track of the number of visitors visiting the web page and to display this count of visitors

Course outcomes:

CO1	Outline the basic concepts of information and web architecture.
CO2	Design solutions for programming questions using JavaScript
CO3	Study Hyper Text markup language and create websites using HTML, CSS Codes.
CO4	Setup a web server and host a website with back end support.
CO5	Incorporate the latest HTML features in the web pages designed by them with fallback options wherever required.

Text/Reference Books:

1.	Jeffrey C.Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.
2.	Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education
3.	Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.
4.	Marty Hall and Larry Brown,"Core Web Programming" Second Edition, Volume I and II, Pearson Education, 2001
5.	Bates, "Developing Web Applications", Wiley, 2006.

CIE Assessment:

CIE is based on quizzes, tests, assignments/seminars and any other form of evaluation. Generally, there will be: Three Internal Assessment (IA) tests during the semester (30 marks each), the final IA marks to be awarded will be the average of three tests

Quizzes/mini tests (4 marks)

Mini Project / Case Studies (8 Marks)

Activities/Experimentations related to courses (8 Marks)

SEE Assessment:

Question paper for the SEE consists two parts i.e. Part A and Part B. Part A is compulsory and consists of objective type or short answer type questions of 1 or 2 marks each for total of 20 marks covering the whole syllabus.

Part B also covers the entire syllabus consisting of five questions having choices and may contain sub-divisions, each carrying 16 marks. Students have to answer five full questions. One question must be set from each unit. The duration of examination is 3 hours.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3					2		2
CO2	3	3	3	2	3					2		2
CO3	3	3	2	2	3					2		2
CO4	3	3	2	2	3					2		3
CO5	3	3	3	2	3					2		2

High-3, Medium-2, Low-1

Course Title	ARTIFICIAL INTELLIGENCE LAB	Semester	VI
Course Code	MVJ20CDL66	CIE	50
Total No. of Contact Hours	30	SEE	50
No. of Contact Hours/week	3 (L : T : P :: 0 : 1 : 2)	Total	100
Credits	2	Exam. Duration	3 Hours

Course objective is to:

- Demonstrate PROLOG in AI
- Compare and contrast different AI techniques available.
- Demonstrate learning algorithms

Sl No	Experiment Name	RBT Level	Hours
1	Implementation of travelling salesman problem	L3	3
2	Implementation of chess problem	L3	3
3	Implementation of Tower of Hanoi problem	L3	3
4	Implementation of Water Jug problem	L3	3
5	Implementation of N-Queen problem	L3	3
6	Implementation of Rock-Paper-Scissor problem	L3	3
7	Implementation of VLSI Layout problem	L3	3
8	Implementation of Sudoku problem	L3	3

Course outcomes:

CO1	Demonstrate PROLOG commands
CO2	Apply AI search Models and Generic search strategies.
CO3	Write Logic for representing Knowledge and Reasoning of AI systems
CO4	Design different learning algorithms for improving the performance of AI systems.
CO5	Implement projects using different AI learning techniques.

CO-PO Mapping												
CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3	3	3	2	3	0	0	0	0	2	0	0
CO2	3	3	3	2	3	0	0	0	0	2	0	0
CO3	3	3	2	2	3	0	0	0	0	2	0	0
CO4	3	3	2	2	3	0	0	0	0	2	0	0
CO5	3	3	3	2	3	0	0	0	0	2	0	0

High-3, Medium-2, Low-1

Course Title	MACHINE LEARNING LAB	Semester	VI
Course Code	MVJ20CDL67	CIE	50
Total No. of Contact Hours	30	SEE	50
No. of Contact Hours/week	3 (L : T : P :: 0 : 1 : 2)	Total	100
Credits	2	Exam. Duration	3 Hours

Course objective is to:

- Make use of data sets in implementing the machine learning algorithms
- Implementing the machine learning concepts and algorithms in any suitable language of choice.

Sl No	Experiment Name	RBT Level	Hours
1	Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.	L3	3
2	For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.	L3	3
3	Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.	L3	3
4	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.	L3	3
5	Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.	L3	3
6	Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.	L3	3
7	Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.	L3	3

8	Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.	L3	3
---	---	----	---

Course outcomes:

CO1	Understand the implementation procedures for the machine learning algorithms.
CO2	Design Java/Python programs for various Learning algorithms
CO3	Apply appropriate data sets to the Machine Learning algorithms
CO4	Identify and apply Machine Learning algorithms to solve real world problems
CO5	Perform statistical analysis of machine learning techniques.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	0	0	0	0	0	0	0	0	0	0	0
CO2	3	2	1	0	0	0	0	0	0	0	0	0
CO3	0	0	2	3	0	0	0	0	0	0	0	0
CO4	0	0	2	3	0	0	0	0	0	0	0	0
CO5	0	0	3	0	0	0	0	0	0	0	0	0

High-3, Medium-2, Low-1

Course Title	Mini-Project	Semester	VI
Course Code	MVJ20CDP68	CIE	50
Total No. of Contact Hours	15	SEE	50
No. of Contact Hours/week	2 (L : T : P :: 2 : 0 : 0)	Total	100
Credits	2	Exam. Duration	3Hrs

Course objective :

- To support independent learning and innovative attitude.
- To guide to select and utilize adequate information from varied resources upholding ethics.
- To guide to organize the work in the appropriate manner and present information (acknowledging the sources) clearly.
- To develop interactive, communication, organisation, time management, and presentation skills.
- To impart flexibility and adaptability.
- To inspire independent and team working.
- To expand intellectual capacity, credibility, judgement, intuition.
- To adhere to punctuality, setting and meeting deadlines.
- To instil responsibilities to oneself and others.
- To train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas

Mini-Project: Each student of the project batch shall involve in carrying out the project work jointly in constant consultation with internal guide, co-guide, and external guide and prepare the project report as per the norms avoiding plagiarism.

Course outcomes:

- At the end of the course the student will be able to:
- Present the mini-project and be able to defend it.
- Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
- Habituated to critical thinking and use problem solving skills.
- Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.
- Work in a team to achieve common goal.
- Learn on their own, reflect on their learning and take appropriate actions to improve it.

CIE procedure for Mini - Project:

- The CIE marks awarded for Mini - Project, shall be based on the evaluation of Mini - Project Report, Project Presentation skill and Question and Answer session in the ratio 50:25:25. The marks awarded for
- Mini - Project report shall be the same for all the batch mates.

Semester End Examination :

- SEE marks for the mini-project shall be awarded based on the evaluation of Mini-Project Report, Presentation skill and Question and Answer session in the ratio 50:25:25 by the examiners appointed by the University.