

Course Title	Technical Management & Entrepreneurship	Semester	V
Course Code	MVJ19TIM51	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	4 (L : T : P :: 4 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

Describe the importance of management and functions of a manager.

Explain the process of planning and organizing.

Explain the requirements of direction and supervision and Explain the methods of establishing control.

Identify the role of entrepreneurs in the economic development of the nation and recognize the barriers of entrepreneurship.

Explain the importance of Intellectual property protection.

Module-1	L1,L2,L 3	12 Hours
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Syllabus Content:

Management: importance of management, definition, management functions, roles of a manager, levels of management, managerial skills, management and administration, management –a science or art, management – a profession, professional management v/s family management. Development of management thought; Early classical approaches, Neo classical approaches, modern approaches.

Application: Enterprises

Video Link: <https://www.youtube.com/watch?v=mub7Z8FI3ZU>

Module-2	L1,L2,L 3	12 Hours
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Syllabus Content: Planning: Nature, Importance of planning, forms, types of plans , steps in planning , limitations of planning, making planning effective , planning skills, strategic planning in Indian industry.

Organizing: Organization Meaning, process of organizing, span of management principles of organizing, Departmentation, organization structure, committees, teams.

Application: Industry

Video Link: <https://www.youtube.com/watch?v=pCUs3UKwYpc>

Module-3

L1,L2,L
3

12 Hours

Syllabus Content:

Direction and supervision: Requirements of effective direction, giving orders, motivation, job satisfaction, morale , organizational commitment, first level supervision or front line supervision.

Controlling: Meaning and steps in controlling , Essential of a sound control system , Methods of establishing control

Application: Industry

Video Link: <https://www.youtube.com/watch?v=MufenDkIR8E>

Module-4

L1,L2,L
3

12 Hours

Syllabus Content:

Entrepreneurship: Meaning of Entrepreneur; Evolution of the Concept, Functions of an Entrepreneur, Types of Entrepreneur, Entrepreneur – an emerging Class. Concept of Entrepreneurship – Evolution of Entrepreneurship, Development of Entrepreneurship, Stages in entrepreneurial process; Role of entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship – its Barriers.

Application: Industry

Video Link: <https://www.youtube.com/watch?v=aozlwC3XwfY>

Module-5

L1,L2,L
3

12 Hours

Syllabus Content:

Introduction to IPR, origin and concepts of IPR, Concept of property, Forms of IP protection: Patents, copyrights, trademarks, designs, Trade secrets,

Traditional knowledge, Geographical indications. Basic concepts and historical background of patent system and law- National and international scenario (American & European Patent Regimes). International Treaties/Conventions on IPR: Paris Convention, Berne convention, Madrid agreement, Rome convention, World Intellectual Property Organization (WIPO), World Trade Organization, TRIPS Agreement, Patent Co-operation Treaty

Application: Industry

Video Link: <https://www.youtube.com/watch?v=hHQWCFE0J84>

Practical Experiments:	L3	20 Hours
Case study on Enterprises:		
Case study (Microsoft),		
Case study (Captain G R Gopinath),		
Case study (N R Narayana Murthy & Infosys)		
Practical Sessions:		
Idea Generation and Opportunity Recognition		
Strategy and Business Model Analysis		
Formulation of Project		
Course outcomes:		
CO1	Describe the importance of management and functions of a manager.	
CO2	Explain the process of planning and principles of organizing	
CO3	Identify the role of entrepreneurs in the economic development of the nation.	
CO4	Compare the different leadership styles.	
CO5	Apply the ethical principles related to the intellectual property protection	

Text/Reference Books:	
1.	Management and Entrepreneurship, N V R Naidu, T Krishna Rao 4th reprint.
2.	Law relating to Intellectual Property rights , B. L. Wadhwa, 5th edition, Universal Law Publishing, 2011
3.	Principles of Management, P C Tripathi, P N Reddy, 5th edition, TataMcGraw Hill, 2012

4.	Dynamics of Entrepreneurial Development & Management, Vasant Desai, Himalaya publishing house, 2009
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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	2				2	
CO2	2					2	2				2	
CO3	2					2	2				2	
CO4	2					2			2		2	
CO5	2					2		2			2	

High-3, Medium-2, Low-1

Course Title	Computer Network	Semester	V
Course Code	MVJ19IS52	CIE	50
Total No. of Contact Hours	50	SEE	50
No. of Contact Hours/week	5 (L : T : P :: 3 : 2 : 0)	Total	100
Credits	4	Exam. Duration	3 Hours

Course objective is to: *This course will enable students 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

Learn the function of mobile networking and switching

Multimedia data transmission in network

Module-1

L1,L2,L3

12
Hours

Syllabus Content:

Application Layer: Principals of network applications, Network Application Architecture, Processing Communicating. Transport Services Available to Applications, Transport Services provided by the Internet, Application-Layer Protocols.

The Web and HTTP: Overview of HTTP – Non-Persistent and Persistent Connections – HTTP Message Format – User-Server Interaction: Cookies – Web Caching.

Internet's Directory Service: Service Provided by DNS, Overview of How DNS Works, DNS Records and Messages – Peer-to-Peer File Distribution.

Application: Web Programming

Video Link:

<https://www.geeksforgeeks.org/basics-computer-networking/>

Module-2

L1,L2,L3

12
Hours

Syllabus Content:

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, 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.

Application:

Video Link:

<https://www.guru99.com/types-of-computer-network.html>

Module-3	L1,L2,L3	12 Hours
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Syllabus Content:

The Network Layer: What's inside a Router – Input Processing – Switching – Output Processing – Where Does Queuing Occur? – Routing Control plane – Ipv6, A Brief foray into IP Security.

Routing Algorithms: The Link-State (LS) Routing Algorithm – The Distance-Vector (DV) Routing Algorithm, Hierarchical Routing – Routing in the Internet – Intra -AS Routing in the Internet: RIP, Intra-AS Routing in the Internet: OSPF, Inter/AS Routing: BGP, Broadcast Routing Algorithms - Multicast.

Application: Router Programming – Simulation , Hands-on simulation – Sensor Networks (Simulation)

Video Link:

<https://lecturenotes.in/notes/15491-note-for-computer-network-cn-by-vtu-rangers>

Module-4	L1,L2,L3	12 Hours
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Syllabus Content:

An Overview of Cellular Network Architecture – 3G Cellular Data Networks: Extending the Internet to Cellular subscribers, On to 4GLTE, Mobility Management: Principles – Addressing -Routing to a mobile node - Mobile IP - Managing mobility in cellular Networks – Routing calls to a Mobile user – Handoffs in GSM – Wireless and Mobility: Impact on Higher - Layer Protocols.

Application: Ad hoc Networks

Video Link:

<https://www.geeksforgeeks.org/basics-computer-networking/>

Module-5

L1,L2,L3

12
Hours

Syllabus Content:

Multimedia Networking: Types of multimedia Networking Application – streaming stored Video: UDP streaming – Http Streaming – Adaptive Streaming and DASH.

Network support for Multimedia: Quality-of-Service Guarantees: Resource Reservation and Call Admission.

Application:

Video Link:

<https://www.guru99.com/types-of-computer-network.html>

Practical Experiments:

1. Study of LAN cables and other related devices.
2. Establishing LAN by assigning IP Address.
3. Implementation of FTP using java.
4. Implementation of TCP using java.
5. Implementation of UDP using java.

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 happening between mobile towers and Functions of mobile networks
CO5	Guess the problems in audio/video transfer through network

Text/Reference Books:

1. Data Communication and Networking, Forth Edition, Behrouz A. Forouzan, , Mc Graw Hill.

2.	James F. Kurose and Keith W. Ross, Computer Networks A Top Down Approach, Sixth Edition, Pearson
3.	William Stallings, Data and Computer Communication, Tenth Edition, Pearson Education, 2013.
4.	Andrew S. Tanenbaum and David J. Wetherall, Computer Networks, Prentice Hall/Pearson

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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

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CO1		2										
CO2			2								2	
CO3		2										2
CO4			2									
CO5				2								

High-3, Medium-2, Low-1

Course Title	Python Programming	Semester	V
Course Code	MVJ19IS53	CIE	50
Total No. of Contact Hours	50	SEE	50
No. of Contact Hours/week	5 (L : T : P :: 3 : 1 : 1)	Total	100
Credits	4	Exam. Duration	3 Hours

Course objective is to: *This course will enable students to*

Learn fundamental features of object-oriented language

Design, write, debug, run Python Programs

Develop console -based applications using Python

Develop console & windows applications using Python.

Introduce event driven Graphical User Interface (GUI) programming using Python built in functions

Module-1

L1,L2,L3

12
Hours

Syllabus Content:

Why should you learn to write programs, Introduction to Python, Variables, expressions and statements, Conditional execution, Functions.

Application:

In learning and implementing small project process

Video Link:

<https://www.py4e.com/>

<http://greenteapress.com/wp/think-python/>

Module-2

L1,L2,L3

12
Hours

Syllabus Content:

Iteration, Strings, Files.

Application:

Pattern recognition and Reading resultant column in supervised learning data set

Video Link:

<https://www.codecademy.com/learn/learn-python>

<http://www.tutorialspoint.com/python/>

Module-3

L1,L2,L3

12
Hours

Syllabus Content:

Lists, Dictionaries, Tuples, Regular Expressions.

Application:

Handling query languages and Managing Large set of data with respect to database

Video Link:

<https://www.programiz.com/python-programming/class>

<https://www.udemy.com/course/web-scraping-with-python-beautifulsoup/>

Module-4

L1,L2,L3

12
Hours

Syllabus Content:

Classes and objects, Classes and functions, Classes and methods.

Application:

Designing games and puzzles

Video Link:

<https://datatofish.com/json-string-to-csv-python/>

<https://automatetheboringstuff.com/>

Module-5

L1,L2,L3

12
Hours

Syllabus Content:

Networked programs, Using Web Services, Using databases and SQL.

Application:

Music composition and movie development

Video Link:

http://do1.drchuck.com/pythonlearn/EN_us/pythonlearn.pdf

<https://www.datacamp.com/community/tutorials/reading-and-editing-pdfs-and-word-documents-from-python>

Practical Experiments:

Programs related to Basic concepts of Python like Operators, Control flow and Iterations.

Programs related to Functions, Strings, Files, Lists and Multi-Dimension Lists

Installation and use of special Modules like pip, Wiki etc.

Implementation of Python Program with a Database.

Course outcomes:

CO1	Understand Python syntax and semantics and be fluent in the use of Python flow control and functions.
CO2	Demonstrate proficiency in handling Strings and File Systems.
CO3	Implement Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
CO5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

Text/Reference Books:

1.	Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", 1st Edition, CreateSpace Independent Publishing Platform, 2016. (http://do1.drchuck.com/pythonlearn/EN_us/pythonlearn.pdf)
2.	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015. (http://greenteapress.com/thinkpython2/thinkpython2.pdf)

3.	Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014
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CIE Assessment:												
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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							
CO2	2	2	3		2							
CO3	3	2	3		2							
CO4	2	1	3		2							
CO5	2	1	3		2							

High-3, Medium-2, Low-1

Course Title	Database Management System	Semester	V
Course Code	MVJ19IS54	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	4 (L : T : P :: 3 : 1 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

- Provide Key Knowledge in database system concepts, applications and advantages.
- To get knowledge about SQL programming
- Design a database as redundant and error free
- Students can build a database application for real world problems
- Can derive the knowledge or pattern from real world data

Module-1	L1,L2,L3	12 Hours
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Introduction: Database-System Applications – Purpose of Database – View of Data – Database Languages – Relational Databases – Database Design – Data Storage and Querying – Transaction Management – Database Architecture – Data mining and Information Retrieval – Specialty Databases – Database Users and Administrators.

Introduction to Relational Model: Structure of Relational Database – Database Schema – Keys – Schema Diagrams – Relational Query Languages – Relational Operations – Relational Algebra.

Application: This module will give basic knowledge of database and SQL.

Video Link: <https://www.youtube.com/watch?v=X9bQsAoqmfi>

Module-2	L1,L2,L3	12 Hours
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Introduction to SQL: Overview of the SQL Query Languages – SQL Definition – Basic Structure of SQL Queries – Additional Basic Operations – Set Operations – Null Values – Aggregate Functions - Nested Subqueries – Modification of Database.

Intermediate SQL: Join Expressions – Views – Integrity Constraints – SQL Data types and Schemas – Authorization.

Advanced SQL: Functions and Procedures – Triggers.

Application: Students can learn more complex queries and can design error free database using constraints.

Video Link: <https://www.youtube.com/watch?v=fRMv14j5XJU>

Module-3

L1,L2,L3

12
Hours

Relational Database Design: Features of Good Relational Designs – Atomic Domains and First Normal Form – Decomposition Using Functional Dependencies – Functional-Dependency Theory – Algorithm for Decomposition – 2nd Normal Form, 3rd Normal Form, Boyce Codd Normal Form Decomposition using Multivalued Dependencies – 4th Normal Form and domain Key Normal Form.

Application: Students can learn how to divide the table without any data lose and can execute queries without any anomalies.

Video Link: https://www.youtube.com/watch?v=Ko_LE3TNO64&t=1s
<https://www.youtube.com/watch?v=p62he-WUp9E>

Module-4

L1,L2,L3

12
Hours

Transaction: Transaction Concept – A Simple Transaction Model – Transaction Atomicity and Durability – Transaction Isolation – Serializability – Isolation Levels – Implementation of Isolation Level –

Concurrency Control: Lock-Based Protocol – Timestamp-Based Protocols – Validation-Based Protocol.

Advanced SQL: Accessing SQL From a Programming Language.

Application design and Development: Application Programs and User Interfaces – Web Fundamentals – Servlet and JSP

Application: Students can develop a web-based application for accessing database.

Video Link: <https://www.youtube.com/watch?v=w83Ug6IwVTw>
<https://www.youtube.com/watch?v=Thm0xW9oTow>
https://www.youtube.com/watch?v=C_J6K8DodS8

Module-5		L1,L2,L3	12 Hours
<p>Data Warehousing, Data Mining, and Information Retrieval: Data Warehousing and Mining – Data Warehousing – Data Mining – Classification – Association Rules – Data mining algorithms using Weka Tools.</p> <p>Application: Students can develop an application using JAVA with Weka for data mining operations.</p> <p>Video Link: https://www.youtube.com/watch?v=XlbM9ibjUuM</p>			
<p>Practical Experiments</p> <p>Accessing Database through JDBC (Hands-On)</p> <p>Clustering – Using Weka tool (Hands-On)</p> <p>Classification using Weka tool (Hands-On)</p> <p>Machine Learning algorithms using Weka tool (Hands-On)</p>			
<p>Course outcomes:</p>			
CO1	Understand the database requirements of real-world problems		
CO2	Querying the data according to different requirements		
CO3	Design database for real world problems like bank, commercial shops		
CO4	Develop application program to real world problems		
CO5	Database mining to derive pattern among different data sets		

Text/Reference Books:	
1.	Database System Concepts, Sixth Edition, by Abraham Silberschatz, Henery F. Korth, S. Sundarshan
2.	Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7 th Edition, 2017, Pearson.
3.	Database Management System, Ramakrishnan and Gehrke, 3 ^d Edition, Mc-GrawHill, 2013.
4.	Data Mining Concepts and Techniques, Second Edition, by Jiawei Han and Micheline Kamber, Elsevier.

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Quizzes/mini tests (4 marks)

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Activities/Experimentations related to courses (8 Marks)

SEE Assessment:

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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/P O	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	2	3	3	2	2	2	3	2
CO2	3	3	3	2	2	3	2	2	2	2	2	1
CO3	2	3	3	2	2	3	2	2	1	1	2	2
CO4	2	3	3	2	2	2	2	1	1	1	2	2
CO5	2	3	2	3	1	1	2	2	1	2	2	1

High-3, Medium-2, Low-1

Course Title	Advanced JAVA & J2EE	Semester	V
Course Code	MVJ19IS551	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	4 (L : T : P :: 3 : 0 : 1)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to: : *This course will enable students to*

Construct client-server applications using Java socket API

Identify the need for advanced Java concepts like Enumerations and Collections

Make use of JDBC to access database through Java Programs

Adapt servlets to build server side programs

Demonstrate the use of JavaBeans to develop component-based Java software

Module-1	L1,L2,L3	12 Hours
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Syllabus Content:

Enumerations, Autoboxing and Annotations(metadata): Enumerations, Enumeration fundamentals, the values() and value Of() Methods, java enumerations are class types, enumerations Inherits Enum, example, type wrappers, Autoboxing, Autoboxing and Methods, Autoboxing/Unboxing occurs in Expressions, Autoboxing/Unboxing, Boolean and character values, Autoboxing/Unboxing helps prevent errors, A word of Warning. Annotations, Annotation basics, specifying retention policy, Obtaining Annotations at run time by use of reflection, Annotated element Interface, Using Default values, Marker Annotations, Single Member annotations, Built-In annotations

Application:

choices on a menu, rounding modes, command line flags, etc.

Autoboxing & Auto unboxing:

Annotations

Video Link: <https://www.youtube.com/watch?v=vJ-Zn4fo0MQ&t=608s>

Module-2	L1,L2,L3	12 Hours
<p>Syllabus Content:</p> <p>The collections and Framework: Collections Overview, Recent Changes to Collections, The Collection Interfaces, The Collection Classes, Accessing a collection Via an Iterator, Storing User Defined Classes in Collections, The Random Access Interface, Working With Maps, Comparators, The Collection Algorithms, Why Generic Collections, The legacy Classes and Interfaces,</p> <p>Parting Thoughts on Collections.</p> <p>Application: Writing an application</p> <p>Video Link: https://www.youtube.com/watch?v=Ma7u6KEKzPE</p>		
Module-3	L1,L2,L3	12 Hours
<p>Syllabus Content:</p> <p>String Handling :The String Constructors, String Length, Special String Operations, String Literals, String Concatenation, String Concatenation with Other Data Types, String Conversion and toString() Character Extraction, charAt(), getChars(), getBytes() toCharArray(), String Comparison, equals() and equalsIgnoreCase(), regionMatches() startsWith() and endsWith(), equals() Versus == , compareTo() Searching Strings, Modifying a String, substring(), concat(), replace(), trim(), Data Conversion Using valueOf(), Changing the Case of Characters Within a String, Additional String Methods, StringBuffer , StringBuffer Constructors, length() and capacity(), ensureCapacity(), setLength(), charAt() and setCharAt(), getChars(),append(), insert(), reverse(), delete() and deleteCharAt(), replace(), substring(), Additional StringBuffer Methods, StringBuilder</p> <p>Application: Datatype</p> <p>Video Link: https://www.youtube.com/watch?v=N63JCXwdd14</p>		
Module-4	L1,L2,L3	12 Hours

Syllabus Content:

Background; The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API; The Javax.servlet Package; Reading Servlet Parameter; The Javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking. Java Server Pages (JSP): JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects

Application: java-based web application.

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

Module-5	L1,L2,L3	12 Hours
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Syllabus Content:

JDBC Overview – JDBC implementation – Connection class – Statements - Catching Database Results, handling database Queries. Networking– InetAddress class – URL class- TCP sockets - UDP sockets, Java Beans –RMI.

Application: Connecting, storing, retrieving data between program and any database.

Video Link: <https://www.youtube.com/watch?v=Cq4lwVE2Fzk>

Practical Experiments:

1. Program to demonstrate working of Inet Address class and the methods of the InetAddress class for Java Networking
 2. Program to demonstrate how to apply event handling mechanism to JCheckBox Swing Components :
 3. Program to demonstrate JDBC
 4. Program to demonstrate RMI
 5. Program to demonstrate SERVLETS
 6. Program to demonstrate JSP
- Program to demonstrate JAVA BEANS

Course outcomes:

CO1	Interpret the need for advanced Java concepts like enumerations and collections in developing modular and efficient programs
CO2	Build client-server applications and TCP/IP socket programs
CO3	Illustrate database access and details for managing information using the JDBC API
CO4	Describe how servlets fit into Java-based web application architecture

CO5	Develop reusable software components using Java Beans
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Text/Reference Books:

1.	Herbert Schildt: JAVA the Complete Reference, 7th/9th Edition, Tata McGraw Hill, 2007.
2.	Jim Keogh: J2EE-TheCompleteReference, McGraw Hill, 2007.
3.	Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education,2004.
4.	Uttam K Roy, Advanced JAVA programming, Oxford University press, 2015.
5.	Herbert Schildt: JAVA the Complete Reference, 7th/9th Edition, Tata McGraw Hill, 2007.

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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	System Software	Semester	V
Course Code	MVJ19IS552	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	4 (L : T : P :: 4 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

Understand the role of system software in improving the system performance.

Design Assembler, Linker, Loader and Macro processor

Module-1	L1,L2,L3	12 Hours
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Syllabus Content:

System Software Vs. Application Software, SIC & SIC/XE Architecture, Addressing modes, SIC & SIC/XE Instruction set, Assembler Directives and Programming-Traditional CISC Machine – RISC Machine.

Application: Flexible access to memory, easy access to variables, arrays, records, pointers, and other complex data types

Video Link: <https://www.youtube.com/watch?v=HkQKTkw6-Rw>

Module-2	L1,L2,L3	12 Hours
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Syllabus Content:

Basic Functions of Assembler-Assembler output format -Header, Text and End Records-Assembler data structures, two pass assembler algorithm, and Machine dependent assembler features.

Application: Conversion of assembly language into machine code

Video Link: <https://www.youtube.com/watch?v=GL4rrAAdSGs>

Module-3	L1,L2,L3	12 Hours
<p>Syllabus Content:</p> <p>Machine Independent assembler features - program blocks, Control sections, Assembler design options- Algorithm for Single Pass assembler, Multi pass assembler, Implementation example of MASM Assembler</p> <p>Application: Generation of object program</p> <p>Video Link: https://www.youtube.com/watch?v=JXAzbmFTL2Q</p>		
Module-4	L1,L2,L3	12 Hours
<p>Syllabus Content:</p> <p>Basic functions of loader, Machine dependent loader feature, Machine Independent loader features, Bootstrap Loaders, Loader design options- Linker: Introduction, Relocation and Linking concepts, Design a linker, Self relocating program linking for overlays.</p> <p>Application: Submission of ipa files to app store on Windows, Mac, and Linux systems</p> <p>Video Link: https://www.youtube.com/watch?v=sFFg_-ekc0o https://www.youtube.com/watch?v=vosmW_6MXjM</p>		
Module-5	L1,L2,L3	12 Hours
<p>Syllabus Content:</p> <p>Basic macro processor functions - Macro Definition and Expansion - Macro Processor Algorithm and data structures - Machine-independent macro processor features - Concatenation of Macro Parameters.</p> <p>Generation of Unique Labels - Conditional Macro Expansion - Keyword Macro Parameters – Macro within Macro - Implementation example - MASM Macro Processor.</p> <p>Application: Processing any kind of text</p> <p>Video Link: https://www.youtube.com/watch?v=N0gLU8ka7Jo</p>		
<p>Practical Experiments:</p> <ul style="list-style-type: none"> • Writing various LEX programs • Writing various YACC programs 		
<p>Course outcomes:</p>		

CO1	Explore the machine architecture of SIC, SIC/XE, CISC and RISC.
CO2	Compare the features of one pass, two pass and multipass assembler in terms of performance and analyze the suitable assembler for the given program.
CO3	Design and Implement assembler programs
CO4	Analyze the features of loaders and linkers
CO5	Implement the algorithm and data structure of machine independent macro processors

Text/Reference Books:

1.	Leland L Beck and D Manjula, System Software - An Introduction to Systems Programming,
2.	Pearson Education 2011.
3.	Srimanta Pal, Systems Programming, Oxford University Press, 2011
4.	John R. Levine, Linkers & Loaders, Morgan Kauffman, 2003
5.	John J. Donovan, Systems Programming, Tata McGraw-Hill, 1991

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	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	2										
CO2	1	2	2	2								
CO3		2	3									
CO4	1	2	3	3								
CO5	1		2	2								

High-3, Medium-2, Low-1

Course Title	Unix shell programming	Semester	V
Course Code	MVJ19IS553	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	4 (L : T : P :: 4 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

Learn about operating system and interact through commands.

Understand texting based command and shell programming

Work with process and files

Understand how networking and client/server system works.

Learn 'perl' script cording

Module-1	L1,L2,L3	12 Hours
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Unix Components/Architecture – Environment and Structure – Posix and Single Unix Specification – Login Prompt – Unix Commends and Structure – Commands Arguments Options – Basic Commands & Combining commands – *date*, *passwd*, and *cal* Command - Types of commands and locating it – man command – Unix online manual page – Knowing user terminal – displaying – setting – managing the non-uniform behaviour of terminals and keyboards – Root Login, etc/*passwd* and etc/*shadow* files – command for add, modify and delete users

Unix Files: File types - Organization - hidden files and standard directories – Parent and child relationship - Home Directory – File path with various options – Directory commands – *cat*, *mv*, *rm* *cp*, *wc* commands – *od*, *cmp* and *comm*, *diff* commands – File attributes and Permission – Directory Permission

Application: Students will get awareness about opensource platforms, Unix OS and commands.

Video Link: <https://www.youtube.com/watch?v=3DA1grSp4mU>

Module-2	L1,L2,L3	12 Hours
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vi-basics – input mode command – navigation commands – searching for pattern (/ and ?) search and replace (:S) – shells interpretive cycle – Removing special meanings of wild cards – three standard files and redirections – connecting

commands: PIPE, Splitting the output: tee – ‘grep’ and ‘sed’ command – command substitution – basic and extended regular expressions – examples involving different regular expression.

Shell Programming: Ordinary and environment variables – The .profile, .read and readonly commands – Command line arguments – logical operators – for conditional execution – exit and exit status of a command – test command and its shortcut – Control Statements – loop statements – ‘if’ statement examples – ‘case’ statement – sort command and its options – set and shift command – handling positional parameter – two special files /dev/null and dev/tty – Head and tail commands – cut and paste commands – unmask and default file permission.

Application: Students can learn basic Unix command and ‘vi’ editor for text processing.

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

Module-3	L1,L2,L3	12 Hours
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The Process: The process and control – creating parent and child process – ps command its options – background processes – corn command crontab files – kill and find commands – batch command and priority – ‘nice’ command. Process identifiers – fork, vfork, exit, wait, waitpid, wait3, wait4 functions – race conditions – exec functions – changing user IDs and Group IDs – Interpreter Files – System function – Process Accounting – User Identification – Process times – I/O Redirection.

Process Relationship: Terminal login – network logins – process groups – sessions – Controlling Terminal – tcgetpgrp and tcsetpgrp functions – Job Control – Shell Execution of programs – Orphaned process groups.

Application: Students can learn process related commands and User privileges

Video Link: <https://www.youtube.com/watch?v=9YRxhlvt9Zo>

Module-4	L1,L2,L3	12 Hours
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Inter-process Communication: 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: Students can learn how schedule process for run and inter-process

communication.

Video Link: <https://www.youtube.com/watch?v=lcRqHwIn5Dk>

Module-5

L1,L2,L3

12 Hours

Structure of Perl script – Variables – Operators – String Handling functions – Range operators – lists and arrays - @variables and splice operators – File and File handling functions – Regular Expressions – simple and multiple search patterns – match and substitute operators – defining and using subroutines.

Application: Students can learn to write shell script in Unix environment.

Video

Link:<https://www.youtube.com/watch?v=ELp9ytLjupE&list=PLGqiLyfegVYDeHVG0qigvOK5liPnDi4B9>

Practical experiments:

Basic Unix commands

Unix Shell Programming

Course outcomes:

CO1 Easily interact with Unix shell through commands

CO2 Easily can work with text 'vi' editor for text processing

CO3 Create and execute programs to read/write data from files

CO4 Client/Server communication through network

CO5 Write 'perl' script for unix operating system

Text/Reference Books:

1. Sumitabha Das., Unix Concepts and Applications., 4th Edition., Tata McGraw Hill

2. Terrence Chan Unix System Programming Using C++ , PHI, 1999.

3. W.Richard Stevens, Stephen A. Rago, Advanced Programming in the UNIX Environment , 3rd edition, Pearson Education /PHI, 2005.

4. Behrouz A. Forouzan, Richard F. Gilberg: Unix and Shell Programming – Cengage Learning – India Edition 2009

5. M.G. Venkatesh Murth: Unix and Shell Programming, Pearson Education.

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	2	2	1	1	1	1	1	1	1	1
CO2	2	2	1	1	1	1	1	1	1	1	2	1
CO3	3	2	1	1	1	1	1	1	1	1	2	2
CO4	2	2	1	2	1	1	1	1	1	1	1	1
CO5	2	3	2	1	1	1	1	1	1	1	1	1

High-3, Medium-2, Low-1

Course Title	Information coding techniques	Semester	V
Course Code	MVJ19IS554	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	4 (L : T : P :: 4 : 0 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

Understand error–control coding.

Understand encoding and decoding of digital data streams.

Be familiar with the methods for the generation of these codes and their decoding techniques.

Be aware of compression and decompression techniques.

Learn the concepts of multimedia communication

Module-1

L1,L2,L3

12
Hours

Syllabus Content:

Uncertainty, Information and Entropy – Source coding Theorem – Huffman coding – Shannon Fano coding – Discrete Memory less channels – channel capacity – channel coding Theorem – Channel capacity Theorem.

Application: Data Compression

Video Link: <https://www.youtube.com/watch?v=0hdhiXuCtBo>

Module-2

L1,L2,L3

12
Hours

Syllabus Content:

Differential Pulse code Modulation – Adaptive Differential Pulse Code Modulation – Adaptive subband coding – Delta Modulation – Adaptive Delta Modulation – Coding of speech signal at low bit rates (Vocoders, LPC).

Application: Video Mail

Video Link: https://www.youtube.com/watch?v=aKl17gw_nfU

Module-3	L1,L2,L3	12 Hours
<p>Syllabus Content:</p> <p>Linear Block codes – Syndrome Decoding – Minimum distance consideration – cyclic codes – Generator Polynomial – Parity check polynomial – Encoder for cyclic codes – calculation of syndrome – Convolutional codes.</p> <p>Application: Attack detection</p> <p>Video Link: https://www.youtube.com/watch?v=NuqJglzI6o8</p>		
Module-4	L1,L2,L3	12 Hours
<p>Syllabus Content:</p> <p>Principles – Text compression – Static Huffman Coding – Dynamic Huffman coding – Arithmetic coding – Image Compression – Graphics Interchange format – Tagged Image File Format – Digitized documents – Introduction to JPEG standards.</p> <p>Application: sms</p> <p>Video Link: https://www.youtube.com/watch?v=JsTptu56GM8</p>		
Module-5	L1,L2,L3	12 Hours
<p>Syllabus Content:</p> <p>Linear Predictive coding – code excited LPC – Perceptual coding, MPEG audio coders – Dolby audio coders – Video compression – Principles – Introduction to H.261 & MPEG Video standards.</p> <p>Application: speech coding and speech synthesis</p> <p>Video Link: https://www.youtube.com/watch?v=lWH-Oh5KnNY</p>		
<p>Practical Experiments:</p> <p>Hands on: Application of Error control coding</p> <p>Hands on: Program on image compression</p> <p>Hands on: Application of Modulation Techniques</p> <p>Hands on: Application of Channel capacity Theorem</p> <p>Hands on: Speech coding</p>		
<p>Course outcomes:</p>		
CO1	Design an application with error-control.	

CO2	Use compression and decompression techniques.
CO3	Apply the concepts of multimedia communication
CO4	Apply compression and decompression techniques.
CO5	Use the concepts of multimedia communication

Text/Reference Books:	
1.	Simon Haykin, "Communication Systems", 4th Edition, John Wiley and Sons, 2001.
2.	Fred Halsall, "Multimedia Communications, Applications Networks Protocols and Standards", Pearson Education, Asia 2002;
3.	Mark Nelson, "Data Compression Book", BPB Publication 1992.
4.	Watkinson J, "Compression in Video and Audio", Focal Press, London, 1995

CIE Assessment:
<p>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</p> <p>Quizzes/mini tests (4 marks)</p> <p>Mini Project / Case Studies (8 Marks)</p> <p>Activities/Experimentations related to courses (8 Marks)</p>
SEE Assessment:
<p>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.</p> <p>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.</p> <p>One question must be set from each unit. The duration of examination is 3 hours.</p>
CO-PO Mapping

CO/P O	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	2	2	3		2							
CO2	2	2	3	3	2							
CO3	3		2	2								
CO4	3		2	3								
CO5	3	3	3	3	3							

High-3, Medium-2, Low-1

Course Title	Computer Network Lab	Semester	V
Course Code	MVJ19ISL56	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: *This course will enable students to*

Learn different network types and basic networking commands

Functions of different data transmission protocols

Client/Server communication model

IP address and address resolving

To get knowledge about web development

Sl No	Experiment Name	RBT Level	Hours
1	Understating the function of Network related hardware corresponding to OSI or TCP/IP protocol stack (Router, Switch, Repeater, Ethernet etc.,) Interconnecting computers to learn different topologies c)Networking commands	L3	4
2	Establishing LAN by assigning IP addresses (Students should establish LAN by connecting devise using hardware)	L3	4
3	Program to access local, remote and web server IP addresses	L3	4
4	Implementation of socket program for Echo/Ping/Talk Commands	L3	4
5	Implementation of program for Remote Command Execution	L3	4
6	Program for CRC and Hamming code for error handling	L3	4
7	Program to simulate sliding window protocol	L3	4
8	Client/Server Data Transmission using TCP Client/Server Data Transmission using FTP Client/Server Data Transmission using UDP	L3	4
9	Chat application using TCP	L3	4
10	Implementation of Address Resolution Protocol (ARP)	L3	4

Course outcomes:	
CO1	Establish LAN by assigning IP address
CO2	Work with networking Commands
CO3	Write a program using TCP/UDP for data transmission between systems
CO4	Write a program to design Client/Server communication
CO5	Design and Web and develop an web application

CIE Assessment:
Regular Lab work :20 Record writing :5 Lab Tests(Minimum 2 tests shall be conducted for 15 marks and average of two will be taken) Viva 10 marks
SEE Assessment:
Examinations will be conducted for 100 marks and scaled-down to 50. The weightage shall be, Write-up : 20 marks Conduction : 40 marks Analysis of results : 20 marks Viva : 20

CO-PO Mapping												
CO/P O	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	2	2	2	2	2						2	2
CO2	2	2	2	2	2						2	2
CO3	2	2	2	2	2						2	2
CO4	2	2	2	2	2						2	2
CO5	2	2	2	2	2						2	2

High-3, Medium-2, Low-1

Course Title	Operating System & Shell Programming Lab	Semester	V
Course Code	MVJ19ISL57	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: *This course will enable students to*

Learn about operating system and interact through commands.

Understand texting based command and shell programming.

Work with process and files

Understand how networking and client/server system works.

Learn 'perl' script coding.

Sl No	Experiment Name	RBT Level	Hours
1	Write a program to implement CPU scheduling algorithm for first come first serve scheduling.	L3	4
2	Write a program to implement CPU scheduling algorithm for shortest job first scheduling.	L3	4
3	Implement all file allocation strategies.	L3	4
4	Implement Bankers algorithm for Dead Lock Avoidance	L3	4
5	Implement the all page replacement algorithms a) FIFO b) LRU c) LFU	L3	4
6	Use of Basic UNIX Shell Commands: ls, mkdir, rmdir, cd, cat, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit	L3	4
7	Basic programs using iterative and conditional statements in Unix Simple programs to illustrate all looping statements Display odd and even number using all the looping statements.All types of conditional statements	L3	4
8	Write a shell script to create a file. Follow the instructions Input a page profile to yourself, copy it into other existing file; Start printing file at certain line Print all the difference between two file, copy the two files. Print lines matching certain word pattern.	L3	4

9	a. Write a shell programs to sort any given numbers b. Write a shell programs to sort list of given names	L3	4
10	Write a Shell programs using function.	L3	4

Course outcomes:

CO1	Easily interact with Unix shell through commands
CO2	Easily can work with text 'vi' editor for text processing
CO3	Create and execute programs to read/write data from files
CO4	Client/Server communication through network
CO5	Wirte 'perl' script for unix operating system

CIE Assessment:

Regular Lab work :20

Record writing :5

Lab Tests(Minimum 2 tests shall be conducted for 15 marks and average of two will be taken)

Viva 10 marks

SEE Assessment:

Examinations will be conducted for 100 marks and scaled-down to 50. The weightage shall be,

Write-up : 20 marks

Conduction : 40 marks

Analysis of results : 20 marks

Viva : 20

CO-PO Mapping

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

High-3, Medium-2, Low-1

Course Title	Database Management System Lab	Semester	V
Course Code	MVJ19ISL58	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:

- To understand the functions of database system
- Query processing and execution to retrieve data
- Get the idea about complex query execution
- get the knowledge about database and programming connection
- Get the knowledge about data mining algorithms

Sl No	Experiment Name	RBT Level	Hours
1	a. Study of User privileges b. Experiments on All Data Definition Language (create, modify, drop table etc.,)	L3	4
2	Experiments on All Data Manipulation Language (Insert, Delete, Update)	L3	4
3	Experiments on Nested Sub-queries and Inner Queries	L3	4
4	Experiments on All types of Joins	L3	4
5	Experiment on Cursor, Assertion and Triggers	L3	4
6	Experiments on PL\SQL and Procedure and Function	L3	4
7	Implementation of Normal forms – (The faculty should give some set of attributes and students should solve by different normal forms)	L3	4
8	Front-end & Back-end application 1 (Front end – any programming language, Back-end – any database software)	L3	4
9	Front-end & Back-end application 2 (GUI Based)	L3	4
10	Front-end & Back-end application 3 (GUI based application for shops, etc.,)	L3	4

11	Implementation of Data mining Algorithms 1 – using Weka or Orange		
12	Implementation of Data mining Algorithms 2 – using Weka or Orange		
13	Implementation of Data mining Algorithms 3 – using Weka or Orange		

Course outcomes:

CO1	Create table, insert data using sql commands
CO2	Execute queries for acquire data from database
CO3	Develop a program for commercial shop bill maintenance
CO4	Develop a web application to remote data processing
CO5	Implement data mining algorithms for derive patterns in data

CIE Assessment:

Regular Lab work :20

Record writing :5

Lab Tests(Minimum 2 tests shall be conducted for 15 marks and average of two will be taken)

Viva 10 marks

SEE Assessment:

Examinations will be conducted for 100 marks and scaled-down to 50. The weightage shall be,

Write-up : 20 marks

Conduction : 40 marks

Analysis of results : 20 marks

Viva : 20 marks

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	2	3	3	2	2	2	3	2
CO2	3	3	3	2	2	3	2	2	2	2	2	1
CO3	2	3	3	2	2	3	2	2	1	1	2	2
CO4	2	3	3	2	2	2	2	1	1	1	2	2
CO5	2	3	2	3	1	1	2	2	1	2	2	1

High-3, Medium-2, Low-1

Course Title	ENVIRONMENTAL STUDIES	Semester	V
Course Code	MVJ19ENV59	CIE	50
Total No. of Contact Hours	15	SEE	50
No. of Contact Hours/week	1 (L : T : P :: 1 : 0 : 0)	Total	100
Credits	1	Exam. Duration	3 Hrs.

Course objective is to:

This course will enable the students to Relate to interdisciplinary approach to complex environmental problems using basic tools of the natural and social sciences including geo-systems, biology, chemistry, economics, political science, and international processes; Study drinking water quality standards and to illustrate qualitative analysis of water. Critically evaluate the science and policy ramifications of diverse energy portfolios on air and water quality, climate, weapons proliferation, and societal stability.

Prerequisites: *Basic Science*

Module-1	L1, L2	4 Hrs.
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Introduction to environmental studies, Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development.

Ecosystems (Structure and Function): Forest, Desert, Rivers, Ocean

Biodiversity: Types, Hot spots; Threats and Conservation of biodiversity, Deforestation.

Video link:

<https://nptel.ac.in/courses/127/106/127106004/>

Module-2	L1, L2	4 Hrs.
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Advances in Energy Systems (Merits, Demerits, Global Status and Applications): Hydrogen, Solar, OTEC, Tidal and Wind.

Natural Resource Management (Concept and case-study): Disaster Management, Sustainable Mining, Cloud Seeding, and Carbon Trading.

Video link:

<https://nptel.ac.in/courses/121/106/121106014/>

Module-3		L1	4 Hrs.
<p>Environmental Pollution (Sources, Impacts, Corrective and Preventive measures, Relevant Environmental Acts, Case-studies): Surface and Ground Water Pollution; Noise pollution; Soil Pollution and Air Pollution.</p> <p>Waste Management & Public Health Aspects: Bio-medical Waste; Solid waste; Hazardous waste; E-waste.</p> <p>Video link: https://nptel.ac.in/courses/122/106/122106030/ https://nptel.ac.in/courses/105/103/105103205/ https://nptel.ac.in/courses/120/108/120108005/ https://nptel.ac.in/courses/105/105/105105160/</p>			
Module-4		L1,	4 Hrs.
<p>Global Environmental Concerns (Concept, policies, and case-studies): Global Warming Climate Change; Acid Rain; Ozone Depletion; Fluoride problem in drinking water.</p> <p>Video link: https://nptel.ac.in/courses/122/106/122106030/ https://nptel.ac.in/courses/120108004/ https://onlinecourses.nptel.ac.in/noc19_ge23/preview</p>			
Module-5		L1, L2	4 Hrs.
<p>Latest Developments in Environmental Pollution Mitigation Tools (Concept and Applications): G.I.S. & Remote Sensing, Environment Impact Assessment, Environmental Management Systems, ISO 14001.</p> <p>Video link: https://nptel.ac.in/courses/105/102/105102015/ https://nptel.ac.in/courses/120/108/120108004/</p>			
Course outcomes: On completion of the course, students would be able to			
CO1	Describe the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.		
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.		

Scheme of Evaluation

Details		Marks
Average of three Internal Assessment (IA) Tests of 30 Marks each i.e. Σ (Marks Obtained in each test) / 3	CIE(50)	40
Quizzes		10
Semester End Examination	SEE (50)	50
Total		100

Textbooks:

1. Environmental Studies Benny Joseph Tata Mc Graw – Hill. 2nd Edition, 2012
2. Environmental Studies S M Prakash Pristine Publishing House, Mangalore 3rd Edition, 2018.
managers face when dealing with complex issues.

CO4 Apply their ecological knowledge to illustrate and graph a problem and describe the realities that

Reference Books:

1. Principals of Environmental Science and Engineering, Raman Siva kumar, Cengage learning, Singapur, 2nd Edition, 2005
2. Environmental Science – working with the Earth G.Tyler Miller Jr. Thomson Brooks /Cole, 11th Edition, 2006
3. Textbook of Environmental and Ecology, Pratiba Singh, Anoop Singh & Piyush Malaviya, ACME Learning Pvt. Ltd. New Delhi, 1st Edition.

CO-PO Mapping

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

High-3, Medium-2, Low-1