

V SEMESTER

Semester: V		
SOFTWARE ENGINEERING & PROJECT MANAGEMENT (Theory)		
Course Code: MVJ21SPM51		CIE Marks:100
Credits: L:T:P:S: 3:0:0:0		SEE Marks: 100
Hours: 40L		SEE Duration: 3 Hrs
Course Learning Objectives: The students will be able to		
1	Describe the importance of management and functions of a manager.	
2	Explain the process of planning and organizing	
3	Understand principles, concept, methods and techniques of the software engineering approach to producing quality software (particularly for large, complex systems).	
4	Impart skills in the design and implementation of efficient software across disciplines.	
5	Gather knowledge on various maintenance methods.	

UNIT-I	
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. Video Link: https://www.youtube.com/watch?v=mub7Z8FI3ZU	8 Hrs
UNIT-II	
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. Video Link: https://www.youtube.com/watch?v=pCUs3UKwYpc	8 Hrs
UNIT-III	
FUNDAMENTALS OF SOFTWARE ENGINEERING AND REQUIREMENTS ENGINEERING: Software Engineering Fundamentals; Software processes: Software life-cycle models; Software requirements and specifications: Requirements elicitation; Requirements analysis modeling techniques; Functional	8 Hrs

and non-functional requirements; User requirements, System requirements, requirement validation and software requirement specification document. Prototyping - Basic concepts of formal specification techniques. Video link / Additional online information: https://nptel.ac.in/courses/106105182/	
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UNIT-IV

SOFTWARE DESIGN: Fundamental design concepts and principles; Design characteristics; System Models - Context, Behavioral, Data and, Object models, Architectural design- System structuring, Control models; Structured design; Object-oriented analysis and design; User interface design; Design for reuse; Design patterns; Video link / Additional online information: https://www.coursera.org/lecture/client-needs-and-software-requirements/3-2-4-use-cases-bZNCr	8 Hrs
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UNIT-V

SOFTWARE VALIDATION AND MAINTENANCE : Software validation: Validation planning; Testing fundamentals, including test plan creation and test case generation; Black-box and white-box testing techniques; Unit, integration, validation, and system testing; Object-oriented testing; Inspections. Software evolution: Software maintenance; Characteristics of maintainable software; Reengineering; Legacy systems; Software reuse. Video link / Additional online information: https://www.youtube.com/watch?v=T3q6QcCQZQg	8 Hrs
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Course Outcomes: After completing the course, the students will be able to	
CO1	Describe the importance of management and functions of a manager.
CO2	Explain the process of planning and principles of organizing
CO3	Comprehend software development life cycle and Prepare SRS document for a project
CO4	Apply software design and development techniques
CO5	Identify verification and validation methods in a software engineering project.

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.	Ian Sommerville, "Software Engineering", 9th Edition, Addison- Wesley, 2011
4.	R. S. Pressman, Software Engineering, a practitioner's approach, McGraw Hill,7th Edition, 2010

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom’s taxonomy level.

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	2	-
CO5	2	-	-	-	-	2	-	2	-	-	2	-

High-3, Medium-2, Low-1

Semester: V		
THEORY OF COMPUTATION (Theory)		
Course Code: MVJ21CG52		CIE Marks:100
Credits: L:T:P:S: 3:0:0:0		SEE Marks: 100
Hours: 40L		SEE Duration: 3 Hrs
Course Learning Objectives: The students will be able to		
1	To have a knowledge of regular languages and context free languages.	
2	To have an understanding of finite state and pushdown automata.	
3	To make a study of the programming capabilities of Turing machines.	

UNIT-I	
<p>Finite Automata: Mathematical preliminaries and notations – Central concepts of automata theory – Finite automata -Deterministic Finite Automata - Nondeterministic Finite Automata – Equivalence of DFA and NFA –Finite Automata with Epsilon transitions - Application of FA</p> <p>Video link / Additional online information (related to module if any): https://nptel.ac.in/courses/106/105/106105196/</p>	8 Hrs
UNIT-II	
<p>Regular Expressions: Regular languages: Regular Expressions – Finite Automata and Regular Expressions –Applications of Regular Expressions - Regular Grammars.</p> <p>Video link / Additional online information (related to module if any): https://www.youtube.com/watch?v=OA8EY3HKZoc</p>	8 Hrs
UNIT-III	
<p>Regular Languages: Properties of regular languages: Pumping lemma for regular languages – Closure properties of regular languages –Equivalence and Minimization of Finite Automata. C</p> <p>Video link / Additional online information (related to module if any): https://www.youtube.com/watch?v=ganHwe4DU7A</p>	8 Hrs
UNIT-IV	
<p>Context Free Grammar: Context Free languages: Context Free Grammars – Parse Trees - Ambiguity in Grammars and languages– Applications of Context Free Grammars – Pushdown automata (PDA) – Languages of a PDA -Equivalence of PDA's and CFG's</p> <p>Video link / Additional online information (related to module if any):</p>	8 Hrs

<ul style="list-style-type: none"> https://www.youtube.com/watch?v=FjGrU7vczyg 	
https://www.youtube.com/watch?v=b3OPI5wS4AQ	
UNIT-V	
<p>Context Free Languages: Properties of Context Free Languages: Normal Forms (CNF, GNF) for Context Free Grammars - Pumping lemma for CFL's - Closure properties of CFL</p> <p>Turing Machines: Turing Machines- Programming Techniques for Turing Machines – Multitape Turing Machines.</p> <p>Video link / Additional online information (related to module if any):</p> <p>https://www.youtube.com/watch?v=lhyEGNn-7Uo</p>	8 Hrs

Course Outcomes: After completing the course, the students will be able to	
CO1	Design Finite automata for different Problems
CO2	Understand about Regular Expressions
CO3	Apply pumping lemma to Regular languages and Context Free languages
CO4	Design Push down automata and write CFG for different problems
CO5	Analyze the properties of Context free languages and Turing Machine

Reference Books	
1.	J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", 3rd Edition, Pearson Education, 2011
2.	J.Martin, "Introduction to Languages and the Theory of Computation", 3rd Edition, TMH, 2007.
3.	H.R.Lewis and C.H.Papadimitriou, "Elements of the theory of Computation", 2nd Edition, Pearson Education/PHI, 2003
4.	Micheal Sipser, —Theory and Computatio, 7th Edition, Thomson Course Technology, 2008

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

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

High-3, Medium-2, Low-1

Semester:V		
DATABASE MANAGEMENT SYSTEMS & LAB (Theory and Practice)		
Course Code: MVJ21CG53		CIE Marks:50+50
Credits: L:T:P: 3:0:1		SEE Marks: 50 +50
Hours:40 L+ 26 P		SEE Duration: 03+03 Hours
Course Learning Objectives: The students will be able to		
1	Provide a strong foundation in database concepts, technology, and practice.	
2	Practice SQL programming through a variety of database problems.	
3	Demonstrate the use of concurrency and transactions in database.	
4	Design and build database applications for real world problems.	

UNIT-I	
<p>Introduction to Databases: Introduction; An example; characteristics of the database approach; actors on the scene; workers behind the scene; advantages of using the DBMS approach; A brief history of database Applications; when Not to use a DBMS.</p> <p>Overview of Database Languages and Architectures: Data Models, Schemas, and Instances. Three schema architecture and data independence, databaselanguages, and interfaces, The Database System environment.</p> <p>Modelling using Entities and Relationships: Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams,examples.</p> <p>Video link / Additional online information (related to module if any):</p> <ul style="list-style-type: none"> • https://nptel.ac.in/courses/106106093/ • https://nptel.ac.in/courses/106105175/ <p>https://www.youtube.com/watch?v=WSNqcYqByFk</p>	8 Hrs
UNIT-II	
<p>Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, dealing with constraint violations.</p> <p>Relational Algebra: Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra.</p> <p>Mapping Conceptual Design into a Logical Design: Relational Database Design</p>	8 Hrs

<p>using ER-to-Relational mapping.</p> <p>SQL: SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL.</p> <p>Video link / Additional online information (related to module if any):</p> <ul style="list-style-type: none"> • https://nptel.ac.in/courses/106106093/ • https://nptel.ac.in/courses/106105175/ • https://www.youtube.com/watch?v=gGGHjYbQMvw • https://www.youtube.com/watch?v=nc1yivH1Yac <p>https://www.youtube.com/watch?v=64szTfLNu3o</p>	
UNIT-III	
<p>SQL: Advances Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL.</p> <p>Database Application Development: Accessing databases from applications, An introduction to JDBC, JDBC classes and interfaces, SQLJ, Stored procedures, Embedded SQL.</p> <p>Video link / Additional online information (related to module if any):</p> <ul style="list-style-type: none"> • https://www.youtube.com/watch?v=64szTfLNu3o • https://www.digimat.in/nptel/courses/video/106105175/L11.html <p>https://www.youtube.com/watch?v=sjzlr0EsZL4</p>	8 Hrs
UNIT-IV	
<p>Normalization: Database Design Theory – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. Dependency theory - functional dependencies, Armstrong's axioms for FD's, closure of a set of FD's, minimal covers.</p> <p>Video link / Additional online information (related to module if any):</p>	8 Hrs

- <https://nptel.ac.in/courses/106106093/>
- <https://nptel.ac.in/courses/106105175/>

UNIT-V

Transaction Processing: Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL.

8 Hrs

Concurrency Control in Databases: Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering.

Introduction to Database Recovery Protocols: Recovery Concepts, NO-UNDO/REDO recovery based on Deferred update, Recovery techniques based on immediate update, Shadow paging,

File Organizations and Indexes: Introduction, Hashing techniques, Indexing, Structures for Files.

Video link / Additional online information (related to module if any):

- <https://nptel.ac.in/courses/106106093/>
- <https://nptel.ac.in/courses/106105175/>

LABORATORY EXPERIMENTS

1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3. Creation of Views, Synonyms, Sequence, Indexes, Save point.
4. Creating an Employee database to set various constraints.
5. Creating relationship between the databases.
6. Study of PL/SQL block.
7. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
8. Write a PL/SQL block that handles all types of exceptions.
9. Creation of Procedures.
10. Creation of database triggers and functions
11. Miniproject (Application Development using Oracle/Mysql)
 - a) Inventory Control System.
 - b) Material Requirement Processing.
 - c) Hospital Management System.
 - d) Railway Reservation System.
 - e) Personal Information System.
 - f) Web Based User Identification System.

g) Timetable Management System.

h) Hotel Management System

Any 10 experiments to be conducted

Course Outcomes: After completing the course, the students will be able to

CO1	Identify, analyse and define database objects, enforce integrity constraints on a database using RDBMS.
CO2	Use Structured Query Language (SQL) for database manipulation.
CO3	Design and build simple database systems.
CO4	Apply the concepts of Normalization and design database which possess no anomalies.
CO5	Develop application to interact with databases.

Reference Books

1.	Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson
2.	Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill
3.	Silberschatz Korth and Sudharshan, Database System Concepts, 6th Edition, McGrawHill, 2013.
4.	Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Laboratory- 50 Marks

The laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average of the marks over number of weeks is considered for 30 marks. At the end of the semester a test is conducted for 10 marks. The students are encouraged to implement additional innovative experiments in the lab and are awarded 10 marks. Total marks for the laboratory is 50.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks are executed by means of an examination.

The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

Semester:V		
DATA COMMUNICATION & COMPUTER NETWORKS & LAB (Theory and Practice)		
Course Code: MVJ21CG54		CIE Marks:50+50
Credits: L:T:P: 3:0:1		SEE Marks: 50 +50
Hours:40 L+ 26 P		SEE Duration: 03+03 Hours
Course Learning Objectives: The students will be able to		
1	Introduce the fundamental concepts and types of computer networks.	
2	Demonstrate the TCP/IP and OSI models with merits and demerits.	
3	Understand the difference between all communication protocols.	

UNIT-I	
<p>Data Communications: Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, ISDN</p> <p>Physical layer: Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.</p> <p>Video link / Additional online information (related to module if any): http://www.nptelvideos.in/2012/11/computer-networks.html</p>	8 Hrs
UNIT-II	
<p>Data link layer: Introduction, Framing, and Error – Detection and Correction – Parity – LRC – CRC Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. 111 Medium Access sub layer: ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization.</p> <p>Video link / Additional online information (related to module if any): http://www.nptelvideos.in/2012/11/computer-networks.html</p>	8 Hrs
UNIT-III	
<p>Network layer: Logical Addressing, Internetworking, Tunneling, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols.</p> <p>Video link / Additional online information (related to module if any): http://www.nptelvideos.in/2012/11/computer-networks.html</p>	8 Hrs
UNIT-IV	
<p>Transport Layer: Process to Process Delivery, UDP and TCP protocols, Data</p>	8 Hrs

Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks. Video link: http://www.nptelvideos.in/2012/11/computer-networks.html	
UNIT-V	
Application Layer: Domain name space, DNS in internet, electronic mail, SMTP, FTP, WWW, HTTP, SNMP. Video link: http://www.nptelvideos.in/2012/11/computer-networks.html	8 Hrs
LABORATORY EXPERIMENTS	
<ol style="list-style-type: none"> 1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and traceroute PDUs using a network protocol analyzer and examine. Screen effectiveness studies 2. Write a program for error detecting code using CRC-CCITT (16- bits). 3. Write a program to find the shortest path between vertices using bellman-ford algorithm. 4. Applications using TCP and UDP sockets like: <ol style="list-style-type: none"> a) Chat b) File Transfer 5. Simulation of DNS using UDP sockets. 6. Write a code for simulating ARP /RARP protocols. 7. Implementation of Stop and Wait Protocol and Sliding Window Protocol. 8. Write a program for congestion control using leaky bucket algorithm. 9. Implement three nodes point – to- point networks with duplex links between them. Set the queue size vary the bandwidth and find the number of packets dropped. 10. Simulate the transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion. 11. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination. 12. Simulate simple ESS and with transmitting nodes in wireless LAN by simulation and determine the performance with respect to transmission of packets <p style="text-align: center;">Any 12 experiments to be conducted</p>	

Course Outcomes: After completing the course, the students will be able to	
CO1	Interpret the basics of Computer Networks and Various Protocols.
CO2	Generalize functionalities and services of each layer of OSI model.
CO3	Explains the concept of data framing and error control mechanisms
CO4	Compares Different routing protocols
CO5	Identify the concepts of network security, Mobile and adhoc networks

Reference Books	
1.	Data Communications and Networking, Behrouz A. Forouzan , Fourth Edition

	TMH,2006.
2.	Computer Networks, Andrew S Tanenbaum, 4th Edition. Pearson Education, PHI.
3.	An Engineering Approach to Computer Networks, S. Keshav, 2 nd Edition, Pearson Education.
4.	Computer Networking: A Top-Down Approach Featuring the Internet. James F. Kurose & Keith W. Ross, 3 rd Edition, Pearson Education.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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Laboratory- 50 Marks

The laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average of the marks over number of weeks is considered for 30 marks. At the end of the semester a test is conducted for 10 marks. The students are encouraged to implement additional innovative experiments in the lab and are awarded 10 marks. Total marks for the laboratory is 50.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks are executed by means of an examination.

The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom’s taxonomy level.

Laboratory- 50 Marks

Experiment Conduction with proper results is evaluated for 40 marks and Viva is for 10 marks. Total SEE for laboratory is 50 marks.

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

High-3, Medium-2, Low-1

Semester: V		
CYBER FORENSICS AND IPR		
(Theory)		
Course Code: MVJ21CG551		CIE Marks:100
Credits: L:T:P:S: 3:0:0:0		SEE Marks: 100
Hours: 40L		SEE Duration: 3 Hrs
Course Learning Objectives: The students will be able to		
1	Be familiar with different forensics methods	
2	Analyse various computer forensics technologies	
3	Disseminate knowledge on laws and acts to protects IPR	
4	Understanding, defining and differentiating different types of intellectual properties (IPs) and their roles in cyberspace.	

UNIT-I	
<p>Prerequisites: Basic Knowledge of crypto algorithms</p> <p>Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis</p> <p>Video link / Additional online information:</p> <ul style="list-style-type: none"> https://www.youtube.com/watch?v=2ESqwX3qb94-https://nptel.ac.in/courses/106/104/106104119/ 	8 Hrs
UNIT-II	
<p>Introduction to Cyber Crime Investigation, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies, Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.</p> <p>Video link / Additional online information:</p> <ul style="list-style-type: none"> https://www.coursera.org/lecture/cyber-conflicts/introduction-to-cybercrime-and-fundamental-issues-xndSq 	8 Hrs
UNIT-III	
<p>Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC , Electronic Communication Privacy ACT, Legal Poli</p> <p>Video link / Additional online information:</p> <p>https://www.youtube.com/watch?v=qJ693ZlvceAcies</p>	8 Hrs

UNIT-IV	
<p>Protection of Intellectual Property Rights in Cyberspace in India: The Cyberspace The Relevance of Domain Names in Intellectual Property Rights, Deception by Squatting in Cyberspace, Bad Faith in Relation to Domain Name Infringement, Some Leading Cases Involving Complaints from India before WIPO, Protection of Copyright on Cyberspace, Rights of Software Copyright Owners, Infringement of Copyright on Cyberspace, Cyberspace, the Internet, Websites and the Nature of the Copyright, Linking, Hyper-Linking and Framing, Remedies for Infringement of Copyright on Cyberspace, The Liabilities of an Internet Services Provider (ISP) in Cyberspace</p> <p>Video link / Additional online information:</p> <ul style="list-style-type: none"> • https://nptel.ac.in/courses/109/105/109105112/ 	8 Hrs
UNIT-V	
<p>Penalties, Compensation and Adjudication of Violations of Provisions of IT Act and Judicial Review: Penalty and Compensation for Damage to Computer, Computer System, Compensation for Failure to Protect Data, Penalty for Failure to Furnish Information, Return or any Other Penalty , Adjudication of Disputes under the IT Act, Cyber Appellate Tribunal, Its Functions and Powers under the IT Act</p> <p>Video link / Additional online information:</p> <p>https://www.lawctopus.com/video-lectures-law-sudhir-law-review/</p>	8 Hrs

Course Outcomes: After completing the course, the students will be able to	
CO1	Analyze Computer Crime and Criminals and Liturgical Procedures
CO2	Apply the laws and regulations to the applications
CO3	Analyze the email tracking cyber applications
CO4	Understanding the protection of Intellectual Property Rights
CO5	Knowledge of law and acts

Reference Books	
1.	Nelson Phillips and EnfingerSteuart, —Computer Forensics and Investigations , Cengage Learning, New Delhi, 2009.
2.	Harish Chander, Cyber Laws and IT protections, PHI Edition

3.	Dumortier, International Encyclopedia Of Cyber Law (3vol) , Jos
4.	Bernadette H Schell, Clemens Martin, Cybercrime, ABC , CLIO Inc, California, 2004

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom’s taxonomy level.

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

High-3, Medium-2, Low-1

Semester: V		
COMPILER DESIGN (Theory)		
Course Code: MVJ21CG552		CIE Marks:100
Credits: L:T:P:S: 3:0:0:0		SEE Marks: 100
Hours: 40L		SEE Duration: 3 Hrs
Course Learning Objectives: The students will be able to		
1	Learn the various parsing techniques and different levels of translation.	
2	Learn how to obtain specific object code from source language.	
3	Learn how to optimize the code and schedule for optimal performance.	

UNIT-I		
FRONT END OF COMPILERS: The Structure of Compiler – Lexical Analysis: Role of Lexical Analyzer, Specification and Recognition of Tokens, Syntax Analysis: Top Down Parsing, Bottom up Parsing, LR Parsers: SLR, CLR, and LALR. Video Links : https://www.youtube.com/watch?v=yxnbvS2t_QA		8 Hrs
UNIT-II		
INTERMEDIATE CODE GENERATION: Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Syntax Directed Translation Schemes, Intermediate Languages: Syntax Tree, Three Address Code, Postfix Code, Declarations, Translation of Expressions, Type Checking, Back Patching. Video Links: https://www.youtube.com/watch?v=EpAzj7zXrbk		8 Hrs
UNIT-III		
RUNTIME AND OBJECT CODE GENERATION: Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management - Issues in Code Generation - Design of Code Generator - Register Allocation and Assignment – Instruction Selection by Tree Rewriting – Optimal Code Generation for Expressions – Dynamic Programming Code Generation. Video Links: https://www.youtube.com/watch?v=IRvaRhPsqOo		8 Hrs
UNIT-IV		
CODE OPTIMIZATION: Basic Blocks and Flow Graphs – Optimization of Basic Blocks – Principal Sources of Optimizations – Data Flow Analysis – Constant Propagation – Partial Redundancy Elimination – Peephole Optimizations. Video Links: https://nptel.ac.in/courses/106/108/106108113/		8 Hrs
UNIT-V		
SCHEDULING AND OPTIMIZING FOR PARALLELISM: Code Scheduling Constraints		8 Hrs

– Basic Block Scheduling – Global Code Scheduling - Basic Concepts in Parallelization – Parallelizing Matrix Multiplication – Iteration Spaces – Affine Array Indexes.

Video Links: <https://www.youtube.com/watch?v=-yMWgtTeQgY>

Course Outcomes: After completing the course, the students will be able to

CO1	Design compiler phases from language specification.
CO2	Design code generators for the specified machine.
CO3	Analyze Object Code Generation techniques.
CO4	Apply the various optimization techniques.
CO5	Understand the Optimizing for Parallelism

Reference Books

1.	Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, —Compilers: Principles, Techniques and Tools , Second Edition, Pearson Education, 2009.
2.	Randy Allen, Ken Kennedy, —Optimizing Compilers for Modern Architectures: A Dependence based Approach , Morgan Kaufmann Publishers, 2002.
3.	Keith D Cooper and Linda Torczon, —Engineering a Compiler , Morgan Kaufmann Publishers Elsevier Science, 2004
4.	V. Raghavan, —Principles of Compiler Design , Tata McGraw Hill Education Publishers, 2010.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may

have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

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

High-3, Medium-2, Low-1

Semester: V		
CRYPTOGRAPHY AND NETWORK SECURITY (Theory)		
Course Code: MVJ21CG553		CIE Marks:100
Credits: L:T:P:S: 3:0:0:0		SEE Marks: 100
Hours: 40L		SEE Duration: 3 Hrs
Course Learning Objectives: The students will be able to		
1	Acquire fundamental knowledge on the concepts of finite fields and number theory.	
2	To gain various block cipher and stream cipher models.	
3	Describe the principles of public key cryptosystems, hash functions and digital signature.	
4	Learn the various malicious attacks and firewall applications.	
5	To develop various security protocols for web and email applications	

UNIT-I	
<p>INTRODUCTION & NUMBER THEORY: Services, Mechanisms and attacks- Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques. finite fields and number theory: Groups, Rings, Fields-Modular arithmetic- Euclid's algorithm-Finite fields- Polynomial Arithmetic –Prime numbers-Fermat's and Euler's theorem- Testing for primality - The Chinese remainder theorem.</p> <p>Applications: Developing cryptographic algorithms</p> <p>Video link / Additional online information (related to module if any): https://www.cc.gatech.edu/~echow/ipcc/hpc-course/</p>	8 Hrs
UNIT-II	
<p>BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY:Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange- Elliptic curve arithmetic-Elliptic curve cryptography.</p> <p>Applications: Online transactions</p> <p>Video link / Additional online information (related to module if any):</p> <ul style="list-style-type: none"> • http://www.infocobuild.com/education/audio-video-courses/computer- 	8 Hrs

science/IntroductionToCryptography-Ruhr/lecture-08.html	
UNIT-III	
<p>HASH FUNCTIONS AND DIGITAL SIGNATURES: Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS – ElGamal.</p> <p>Applications: Cyber forensic</p> <p>Video link / Additional online information (related to module if any): https://www.educba.com/md5-algorithm/</p>	8 Hrs
UNIT-IV	
<p>SECURITY PRACTICE & SYSTEM SECURITY: Authentication applications – Kerberos – X.509 Authentication services - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures.</p> <p>Applications: Antivirus / Malware detecting software</p> <p>Video link / Additional online information (related to module if any):</p> <ul style="list-style-type: none"> • https://www.simplilearn.com/what-is-kerberos-article 	8 Hrs
UNIT-V	
<p>E-MAIL & IP SECURITY: E-mail Security: Security Services for E-mail-attacks possible through E-mail - establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IPSecurity: Overview of IPSec - IP and IPv6-Authentication Header-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding).</p> <p>Applications: Email and Banking applications</p> <p>Video link / Additional online information (related to module if any):</p> <ul style="list-style-type: none"> • https://www.barracuda.com/glossary/email-security 	8 Hrs

Course Outcomes: After completing the course, the students will be able to

CO1	Implement number theory for various identified attacks.
CO2	Design and develop the public key cryptographic algorithms.

CO3	Develop the digital signature and hashing algorithms
CO4	Design a firewall for detecting malicious attacks.
CO5	Design the protocols for improving security on email, web and IP.

Reference Books	
1.	William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education, March 2013.
2.	Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002.
3.	Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill, 2007.
4.	Charles Pfleeger, "Security in Computing", 4th Edition, Prentice Hall of India, 2006.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

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

High-3, Medium-2, Low-1

Semester: V		
CLOUD COMPUTING (Theory)		
Course Code: MVJ21CG554		CIE Marks:100
Credits: L:T:P:S: 3:0:0:0		SEE Marks: 100
Hours: 40L		SEE Duration: 3 Hrs
Course Learning Objectives: The students will be able to		
1	To understand the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges	
2	To introduce the basic ideas and principles in data center design; cloud management techniques and cloud software deployment considerations	
3	To discuss the different CPU, memory and I/O virtualization techniques that serve in offering software, computation and storage services on the cloud; Software Defined Networks (SDN) and Software Defined Storage (SDS);	
4	To introduce cloud storage technologies and relevant distributed file systems, NoSQL databases and object storage;	
5	To discuss the variety of programming models and develop working experience in several of them	

UNIT-I	
<p>Introduction to Cloud Computing:Cloud Computing in a Nutshell, Roots of Cloud Computing, Layers and Types of Clouds, Desired Features of a Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud</p> <p>Applications: Microsoft Azure, Amazon Web Services</p> <p>Video link / Additional online information : https://www.youtube.com/watch?v=PW-V-72MJNY</p>	8 Hrs
UNIT-II	
<p>'Integration as a Service' Paradigm for the Cloud Era: An Introduction, The Onset of Knowledge Era, The Evolution of SaaS , The Challenges of SaaS Paradigm, Approaching the SaaS Integration Enigma, New Integration Scenarios, The Integration Methodologies, SaaS Integration Products and Platforms , SaaS Integration Services, Businesses-to-Business Integration</p>	8 Hrs

(B2Bi) Services, A Framework of Sensor- Cloud Integration, SaaS Integration Appliances, Issues for Enterprise Applications on the Cloud, Transition Challenges, Enterprise Cloud Technology and Market Evolution, Business Drivers Toward a Marketplace for Enterprise Cloud Computing, The Cloud Supply Chain

Applications: PAAS(Facebook, Google App Engine)

Video link / Additional online information :

<https://www.youtube.com/watch?v=ifZh5SJAujA>

UNIT-III

Virtual Machines Provisioning and Migration Services:

8 Hrs

Introduction and Inspiration- Background and Related Work-Virtual Machines Provisioning and Manageability- Virtual Machine Migration Services- VM Provisioning and Migration in Action–Provisioning in the Cloud Context- The Anatomy of Cloud Infrastructures-Distributed Management of Virtual Infrastructures - Scheduling Techniques for Advance Reservation of Capacity- Capacity Management to meet SLA Commitments- RVWS Design and Cluster as a Service: The Logical Design

Applications:

Hardware Virtualization, Operating system Virtualization, Server Virtualization, Storage Virtualization

Video link / Additional online information :

<https://www.youtube.com/watch?v=7m3f-P-WWbg>

UNIT-IV

Platform and Software as a Service:Technologies and Tools for Cloud Computing- Aneka Cloud Platform- Aneka Resource Provisioning Service- Hybrid Cloud Implementation - CometCloud Architecture- Autonomic Behavior of CometCloud- Overview of CometCloud-based Applications- Implementation and Evaluation- Workflow Management Systems and Clouds- Architecture of Workflow Management Systems - Utilizing Clouds for Workflow Execution- Case Study: Evolutionary Multi objective Optimizations- Visionary thoughts for Practitioners

8 Hrs

Applications: Schedule book

Video link / Additional online information :

<https://www.youtube.com/watch?v=3KJjKY8k9Lk>

UNIT-V	
<p>MapReduce Programming Model and Implementations: MapReduce Programming Model- Major MapReduce Implementations for the Cloud- The Basic Principles of Cloud Computing-A Model for Federated Cloud Computing- Traditional Approaches to SLO Management- Types of SLA- Life Cycle of SLA- SLA Management in Cloud- Automated Policy-based Management- The Current State of Data Security in the Cloud-Data Privacy and Security Issues- Producer_Consumer Relationship-Cloud Service Life Cycle</p> <p>Applications: Network Storage,Google Apps and Microsoft office online</p> <p>Video link / Additional online information :</p> <p>https://www.youtube.com/watch?v=uj2Sb7b_Do0</p>	8 Hrs

Course Outcomes: After completing the course, the students will be able to	
CO1	Recall the recent history of cloud computing, illustrating its motivation and evolution.
CO2	List some of the enabling technologies in cloud computing and discuss their significance
CO3	Articulate the economic benefits as well as issues/risks of the cloud paradigm for businesses as well as cloud providers
CO4	Define SLAs and SLOs and illustrate their importance in Cloud Computing.
CO5	List some of the common cloud providers and their associated cloud stacks and recall popular cloud use case scenarios.

Reference Books	
1.	Cloud Computing, Principles and Paradigms, Rajkumar Buyya, James Broberg, Wiley Publication
2.	Dan C Marinescu: Cloud Computing Theory and Practice. Elsevier(MK) 2013.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each).

The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

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

High-3, Medium-2, Low-1

Semester: V		
WAVELET TRANSFORMS & ITS APPLICATIONS (Theory)		
Course Code: MVJ21CG555		CIE Marks:100
Credits: L:T:P:S: 3:0:0:0		SEE Marks: 100
Hours: 40L		SEE Duration: 3 Hrs
Course Learning Objectives: The students will be able to		
1	To understand the fundamentals concepts of wavelet transforms	
2	To learn system design using Wavelets	
3	To learn the different wavelet families & their applications	

UNIT-I	
Introduction to Multirate signal processing- Decimation and Interpolation, Quadrature Mirror Filters, Sub band coding, Limitations of Fourier transform, Short time Fourier transform and its drawbacks, Continuous Wavelet transform, Time frequency representation, Wavelet System and its characteristics, Orthogonal and Orthonormal functions and function space. Video link / Additional online information : https://nptel.ac.in/courses/108/101/108101093/	8 Hrs
UNIT-II	
Multiresolution formulation of wavelet systems- signal spaces, scaling function, wavelet function and its properties, Multiresolution analysis, Haar scaling and wavelet function, Filter banks Analysis and Synthesis, 1D and 2D Discrete wavelet transform, Wavelet Packets, Tree structured filter bank, Multichannel filter bank, Undecimated wavelet transform Video link / Additional online information : https://nptel.ac.in/courses/117/101/117101123/	8 Hrs
UNIT-III	
Refinement relation for orthogonal wavelet systems, Restrictions on filter coefficients, Design of Daubechies orthogonal wavelet system coefficients, Design of Coiflet and Symlet wavelets. Video link / Additional online information : https://nptel.ac.in/courses/108/101/108101093/	8 Hrs
UNIT-IV	

Continuous Wavelets- Properties of Mexican hat wavelet, Morlet, Gaussian and Meyer wavelets. Orthogonal wavelets- Properties of Haar wavelets, Daubechies wavelets, Symlets, Coiflets and Discrete Meyer wavelets. Properties of Biorthogonal wavelets, Applications of wavelet families. Video link / Additional online information : https://nptel.ac.in/courses/117/101/117101123/	8 Hrs
UNIT-V	
Denosing of Signals and Images, Image enhancement, Edge detection, Image Fusion, Image compression, Wavelet based feature extraction, Analysis of phonocardiogram signals, Analysis of EEG signals, Speech enhancement for hearing aids Video link / Additional online information : https://nptel.ac.in/courses/108/101/108101093/	8 Hrs

Course Outcomes: After completing the course, the students will be able to	
CO 1	Understand about windowed Fourier transform and difference between windowed Fourier transform and wavelet transform.
CO 2	Understand multi resolution analysis and identify various wavelets
CO 3	Implement discrete wavelet transforms with multirate digital filters
CO 4	Understand about wavelet packets
CO 5	Design certain classes of wavelets to specification and justify the basis of the application of wavelet transforms to different fields

Reference Books	
1.	C.Sidney Burrus, Ramesh Gopinath & Haito Guo, Introduction to wavelets and wavelet transform, Prentice Hall, 1998.
2.	Metin Akay, „Time frequency and wavelets in biomedical signal processing,“ Wiley-IEEE Press, October 1997.
3.	M.Vetterli and J. Kovacevic, „Wavelets and sub band coding, Prentice Hall, 1995.
4.	P.P.Vaidyanathan, „Multi rate systems and filter banks“, Prentice Hall, 1993

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The

number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom’s taxonomy level.

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CO4	3	3	2	2	2	-	-	-	-	-	-	3
CO5	3	3	3	3	3	2	-	-	3	3	3	3

High-3, Medium-2, Low-1

Semester: V		
ENVIRONMENTAL STUDIES		
Course Code: MVJ21CV56		CIE Marks: 50
Credits: L:T:P: 1:0:0		SEE Marks: 50
Hours: 15 L		SEE Duration: 2 Hrs.
Course Learning Objectives: The students will be able to		
1	Relate 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	
2	Study drinking water quality standards and to illustrate qualitative analysis of water.	
3	Critically evaluate the science and policy ramifications of diverse energy portfolios on air and water quality, climate, weapons proliferation and societal stability.	

UNIT-I	
<p>Introduction to environmental studies, Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development.</p> <p>Ecosystems (Structure and Function): Forest, Desert, Rivers, Ocean Biodiversity: Types, Hot spots; Threats and Conservation of biodiversity, Deforestation.</p> <p>Video link: https://nptel.ac.in/courses/127/106/127106004/</p>	3 Hr s
UNIT-II	
<p>Advances in Energy Systems (Merits, Demerits, Global Status and Applications): Hydrogen, Solar, Tidal and Wind.</p> <p>Natural Resource Management (Concept and case-study): Disaster Management, Sustainable Mining and Carbon Trading.</p> <p>Video link: https://nptel.ac.in/courses/121/106/121106014/</p>	3 Hr s
UNIT-III	
<p>Environmental Pollution: Surface and Ground Water Pollution, Noise pollution, Soil Pollution and Air Pollution.</p> <p>Waste Management & Public Health Aspects: Bio-medical Waste, Solid waste,</p>	3 Hr s

Hazardous waste and E-waste.	
Video link:	
<ul style="list-style-type: none"> • 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/ 	

UNIT-IV

Global Environmental Concerns (Concept, policies, and case-studies): Global Warming, ClimateChange, AcidRain, OzoneDepletion and Fluorideproblemindrinkingwater.	3 Hr s
Video link:	
<ul style="list-style-type: none"> • https://nptel.ac.in/courses/122/106/122106030/ • https://nptel.ac.in/courses/120108004/ • https://onlinecourses.nptel.ac.in/noc19_ge23/preview 	

UNIT-V

Latest Developments in Environmental Pollution Mitigation Tools (Concept and Applications): G.I.S. & Remote Sensing, Environment Impact Assessment, Environmental Management Systems.	3 Hr s
Video link:	
<ul style="list-style-type: none"> • https://nptel.ac.in/courses/105/102/105102015/ • https://nptel.ac.in/courses/120/108/120108004/ 	

Course Outcomes: After completing the course, the students will 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.
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and Abiotic components.
CO4	Apply their ecological knowledge to illustrate and graph a problem
CO5	Describe the realities that managers face when dealing with complex issues.

Reference Books

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

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE for 50 marks,executed by way of tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 40 marks and assignment is evaluated for 10 marks. The three tests are conducted for 40 marks each and the average of all the tests are calculated for 40. The marks for the assignments are 10 (2 assignments for 5 marks each). The marks obtained in test and assignment are added and report CIE for 50 marks.

Semester End Examination (SEE):

SEE for 50 marks,executed by means of an examination. The Question paper contains objective type questions for 100 marks covering the entire syllabus having same complexity in terms of COs and Bloom’s taxonomy level.

Total marks: 50+50=100

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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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

Semester: V		
RESEARCH METHODOLOGY & IPR (Theory)		
Course Code: MVJ21AEC57		CIE Marks:100
Credits: L:T:P:S: 3:0:0:0		SEE Marks: 100
Hours: 40L		SEE Duration: 3 Hrs
Course Learning Objectives: The students will be able to		
1	Give an overview of the research methodology and explain the technique of defining a research problem.	
2	Explain various research designs and their characteristics.	
3	Explain the details of sampling designs, measurement and scaling techniques and also different methods of data collections.	
4	Explain several parametric tests of hypotheses.	
5	Discuss leading International Instruments concerning Intellectual Property Rights.	

UNIT-I	
<p>Research Methodology: Introduction, Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India.</p> <p>Video link / Additional online information: https://youtu.be/9IJscfF_irU</p>	8 Hrs
UNIT-II	
<p>Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs.</p> <p>Reviewing the literature: Place of the literature review in research, Bringing clarity and focus to research problem, Improving research methodology, Broadening knowledge base in research area, Enabling contextual findings, Review of the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed</p> <p>Video link / Additional online information:</p>	8 Hrs

<ul style="list-style-type: none"> https://youtu.be/Yzfl3rtF0SM 	
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UNIT-III

<p>Design of Sample Surveys: Design of Sampling: Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs.</p> <p>Measurement and Scaling: Qualitative and Quantitative Data, Classifications of Measurement Scales, Goodness of Measurement Scales, Sources of Error in Measurement, Techniques of Developing Measurement Tools, Scaling, Scale Classification Bases, Scaling Technics, Multidimensional Scaling, Deciding the Scale. Data Collection: Introduction, Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data.</p> <p>Video link / Additional online information: https://youtu.be/GVmQpGn-Zuo</p>	8 Hrs
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UNIT-IV

<p>Testing of Hypotheses: Hypothesis, Basic Concepts Concerning Testing of Hypotheses, Testing of Hypothesis, Test Statistics and Critical Region, Critical Value and Decision Rule, Procedure for Hypothesis Testing, Hypothesis Testing for Mean, Proportion, Variance, for Difference of Two Mean, for Difference of Two Proportions, for Difference of Two Variances, P-Value approach, Power of Test, Limitations of the Tests of Hypothesis</p> <p>Video link / Additional online information :</p> <ul style="list-style-type: none"> https://youtu.be/IEP3swFeauE 	8 Hr s
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UNIT-V

<p>Intellectual Property: The Concept, Intellectual Property System in India, Development of TRIPS Complied Regime in India, Patents Act, 1970, Trade Mark Act, 1999, The Designs Act, 2000, The Geographical Indications of Goods (Registration and Protection) Act 1999, Copyright Act, 1957, The Protection of Plant Varieties and Farmers' Rights Act, 2001, The Semi-Conductor Integrated Circuits Layout Design Act, 2000, Trade Secrets, Utility Models, IPR and Biodiversity, The Convention on Biological Diversity (CBD) 1992, Co, Leading International Instruments Concerning IPR, World Intellectual Property Organisation (WIPO), WIPO and WTO, Paris Convention for the Protection of</p>	8 Hr s
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Industrial Property, National Treatment, Right of Priority, Common Rules, Patents, Marks, Designs, Trade Names, Indications of Source, Unfair Competition, Patent Cooperation Agreement, Advantages of PCT Filing, Berne Convention for the Protection of Literary and Artistic Works, Principles, Duration of Protection, Trade Related Aspects of Intellectual Property Rights Agreement, Covered under TRIPS Agreement, Features of the Agreement, Protection of Intellectual Property under TRIPS, Copyright and Related Rights, Trademarks, Geographical Indications, Designs, Patents, Patentable Subject Matter, Rights Conferred, Exceptions, Term of Protection, Conditions on Patent Applicants, Process Patents, Other Use without Authorization of the Right Holder, Layout-Designs of Integrated Circuits, Protection of Undisclosed Information, Enforcement of Intellectual Property Rights, UNSECO.

Course Outcomes: After completing the course, the students will be able to

CO1	To give an overview of the research methodology and explain the technique of defining a research problem
CO2	To explain various research designs and their characteristics
CO3	To explain the details of sampling designs, measurement and scaling techniques and also different methods of data collections
CO4	To explain several parametric tests of hypotheses
CO5	To discuss leading International Instruments concerning Intellectual Property Rights.

Reference Books

1.	Research Methodology: Methods and Techniques, C.R. Kothari, Gaurav Garg, New Age International, 4th Edition, 2018
2.	Study Material (For the topic Intellectual Property under module 5) Professional Programme Intellectual Property Rights, Law and Practice, The Institute of Company Secretaries of India, Statutory Body Under an Act of Parliament, September 2013
3.	Research Methods: the concise knowledge base, Trochim, Atomic Dog Publishing, 2005

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 50 marks and quiz is evaluated for 10 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three (conduct additional quizzes and take best three). The three tests are conducted for 50 marks each and the average of all the tests are

calculated for 50. The marks for the assignments are 20 (2 assignments for 10 marks each). The marks obtained in test, quiz and assignment are added to get marks out of 100 and report CIE for 50 marks.

Semester End Examination (SEE):

Total marks: 50+50=100

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the entire syllabus. Part – B Students have to answer five questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have a maximum of three sub divisions. Each unit will have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom’s taxonomy level.

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

High-3, Medium-2, Low-1

Semester: V		
UNIVERSAL HUMAN VALUES		
Course Code: MVJ21UHVI58		CIE Marks: 50
Credits: L:T:P: 2:0:0		SEE Marks: 50
Hours: 30 L		SEE Duration: 3 Hrs.
Course Learning Objectives: The students will be able to		
1	Appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.	
2	Facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.	
3	Highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.	

UNIT-I	
<p>Introduction to Value Education: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations.</p> <p>Practical Sessions: (1) Sharing about Oneself (2) Exploring Human Consciousness (3) Exploring Natural Acceptance</p> <p>Video link:</p> <ul style="list-style-type: none"> • https://www.youtube.com/watch?v=85XCw8SU084 • https://www.youtube.com/watch?v=E1STJoXCXUU&list=PLWDeKF97v9SP_Kt6jqzA3pZ3yA7g_OAQz • https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw 	6 Hrs
UNIT-II	
<p>Harmony in the Human Being: Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.</p> <p>Practical Sessions: (4) Exploring the difference of Needs of Self and Body (5) Exploring Sources of Imagination in the Self (6) Exploring Harmony of Self with the Body</p>	6 Hrs

Video link:	
<ul style="list-style-type: none"> • https://www.youtube.com/watch?v=GpuZo495F24 • https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEKQw 	
UNIT-III	
<p>Harmony in the Family and Society: Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.</p> <p>Practical Sessions: (7) Exploring the Feeling of Trust (8) Exploring the Feeling of Respect (9) Exploring Systems to fulfill Human Goal</p>	6 Hrs
Video link:	
<ul style="list-style-type: none"> • https://www.youtube.com/watch?v=F2KVV4WNnS • https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEKQw 	
UNIT-IV	
<p>Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence.</p> <p>Practical Sessions: (10) Exploring the Four Orders of Nature (11) Exploring Co-existence in Existence</p>	6 Hrs
Video link:	
<ul style="list-style-type: none"> • https://www.youtube.com/watch?v=1HR-QB2mCF0 • https://www.youtube.com/watch?v=lfN8q0xUSpw • https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEKQw 	
UNIT-V	
<p>Implications of the Holistic Understanding – a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession</p> <p>Practical Sessions: (12) Exploring Ethical Human Conduct (13) Exploring Humanistic Models in Education (14) Exploring Steps of Transition towards Universal Human Order</p>	6 Hrs
Video link:	
<ul style="list-style-type: none"> • https://www.youtube.com/watch?v=BikdYub6RY0 • https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEKQw 	

Course Outcomes: After completing the course, the students will be able to	
CO1	Explore themselves, get comfortable with each other and with the teacher
CO2	Enlist their desires and the desires are not vague.
CO3	Restate that the natural acceptance (intention) is always for living in harmony, only competence is lacking

CO4	Differentiate between the characteristics and activities of different orders and study the mutual fulfillment among them
CO5	Present sustainable solutions to the problems in society and nature

Reference Books

3.	AICTE SIP UHV-I Teaching Material, https://fdp-si.aicte india.org/ AicteSipUHV_download.php
4.	A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
3.	Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2
4.	Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Continuous Internal Evaluation (CIE):

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Semester End Examination (SEE):

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Total marks: 50+50=100

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

High-3, Medium-2, Low-1