

Course Title	Discrete Math & Probability Theory	Semester	III
Course Code	MVJ19MIS31	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	4 (L : T : P :: 2 : 2 : 0)	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

Prepare for a background in abstraction, notation, and critical thinking for the mathematics most directly related to computer science.

Understand and apply mathematical induction, combinatorics, discrete probability, sequence and recurrence, elementary number theory.

Understand and apply probability distribution, sampling theory and joint probability distributions.

Module-1	L1,L2,L3	12 Hours
<p>Properties of the Integers: The Well Ordering Principle – Mathematical Induction.</p> <p>Principles of Counting: Fundamental Principles of Counting, The Rules of Sum and Product, Permutations, Combinations – The Binomial and Multinomial Theorem, Combinations with Repetition.</p> <p>Application: Distribution with repetition.</p> <p>Video Link:</p> <ol style="list-style-type: none"> http://nptel.ac.in/courses.php?disciplineID=111 http://www.class-central.com/subject/math(MOOCs) http://academicearth.org/ 		
Module-2	L1,L2,L3	12 Hours
<p>The Principle of Inclusion and Exclusion: The Principle of Inclusion and Exclusion, Generalizations of the Principle. Derangements – Nothing is in its Right Place, Rook Polynomials.</p> <p>Recurrence Relations: First Order Linear Recurrence Relation, The Second Order Linear</p>		

Homogeneous Recurrence Relation with Constant Coefficients.

Application: Arrangement with forbidden position.

Video Link:

1. <http://nptel.ac.in/courses.php?disciplineID=111>
2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
3. <http://academicearth.org/>

Module-3

L1,L2,L3

12
Hours

Relations: Cartesian Products, Relations, Properties of Relations, Computer Recognition – Zero-One Matrices and Directed Graphs, Partial Orders – Hasse Diagrams, Equivalence Relations and Partitions.

Functions: Plain and One to One, Onto Functions. The Pigeon-hole Principle, Function Composition and Inverse Functions.

Application: Zero-one matrix and Hasse diagram

Video Link:

1. <http://nptel.ac.in/courses.php?disciplineID=111>
2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
3. <http://academicearth.org/>

Module-4

L1,L2,L3

12
Hours

Probability Distributions: Random variables (discrete and continuous), probability mass/density functions. Binomial distribution, Poisson distribution. Exponential and normal distributions, problems.

Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation, covariance, correlation coefficient.

Application: Finding correlation between random variables.

Video Link:

1. <http://nptel.ac.in/courses.php?disciplineID=111>

2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
3. <http://academicearth.org/>

Module-5	L1,L2,L3	12 Hours
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Sampling Theory: Sampling, Sampling distributions, standard error, test of hypothesis for means and proportions, confidence limits for means, student's t-distribution and Chi-square distribution.

Coding Theory: Coding of binary information and error detection, decoding and error detection.

Application: Testing the level of significance & the goodness of fit for large sample and small sample.

Video Link:

1. <http://nptel.ac.in/courses.php?disciplineID=111>
2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
3. <http://academicearth.org/>

Course outcomes:

CO1	Demonstrate the application of discrete structures in different fields of computer Science.
CO2	Solve problems using recurrence relations and generating functions.
CO3	Solving logical problem using concepts of relations and functions.
CO4	Develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, information theory and Design engineering.
CO5	Demonstrate testing of hypothesis of sampling distributions.

Reference Books:

1.	Ralph P. Grimaldi: Discrete and Combinatorial Mathematics, 5th Edition, Pearson Education. 2004.
2.	B.S. Grewal, "Higher Engineering Mathematics" Khanna Publishers, 43 rd Edition, 2013.
3.	Ramana B. V., "Higher Engineering Mathematics", Tata Mc Graw-Hill, 2006.

4.	Kenneth H. Rosen: Discrete Mathematics and its Applications, 6th Edition, McGraw Hill, 2007
5.	Basavaraj S Anami and Venakanna S Madalli: Discrete Mathematics – A Concept based approach, Universities Press, 2016.

CIE Assessment:

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

SEE Assessment:

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

CO-PO Mapping

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

High-3, Medium-2, Low-1

Course Title	Data Structure	Semester	III
Course Code	MVJ19IS32	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:

Understand the various techniques of sorting and searching

Design and implement arrays, stacks, queues, and linked lists

Understand the complex data structures such as trees and graphs

Module-1	L1,L2,L3	12 Hours
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Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off.

Searching: Linear Search and Binary Search Techniques and their complexity analysis.

Laboratory Sessions/ Experimental learning:

Implementation of searching Techniques

Applications: Array data type used in a programming language to specify a variable that can be indexed. Array data structure is used for arrangement of items at equally spaced and sequential addresses in computer memory makes it easier to perform operations like sorting, merging, traversal, retrievals

Video link / Additional online information :

https://www.tutorialspoint.com/data_structures_algorithms/array_data_structure.htm

Module-2	L1,L2,L3	12 Hours
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ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

Laboratory Sessions/ Experimental learning:

Stack ADT to perform push and pop operations.

Stack ADT for Expression Evaluation

Array Implementation of Queue ADT

Applications: Expression Handling , Backtracking Procedure

Video link / Additional online information :

https://www.tutorialspoint.com/data_structures_algorithms/stack_algorithm.htm

https://www.tutorialspoint.com/data_structures_algorithms/dsa_queue.htm

Module-3

L1,L2,L3

12
Hours

Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis

Laboratory Sessions/ Experimental learning:

Implementation of linked list techniques(SLL,DLL,CLL)

Applications: The cache in your browser that allows you to hit the BACK button where a linked list of URLs can be implemented. A linked list would be a reasonably good choice for implementing a linked list of file names, undo functionality in Photoshop

Video link / Additional online information :

https://www.tutorialspoint.com/data_structures_algorithms/linked_list_algorithms.htm

https://www.tutorialspoint.com/data_structures_algorithms/doubly_linked_list_algorithm.htm

Module-4

L1,L2,L3

12
Hours

Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with Complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

Laboratory Sessions/ Experimental learning:

Develop a program to create a Binary Search Tree and to Traverse the tree.

Applications: Store hierarchical data, like folder structure, organization structure, XML/HTML data. Binary Search Tree is a tree that allows fast search, insert, delete on a sorted data. It also allows finding closest item. Heap is a tree data structure which is implemented using arrays and used to implement priority queues.

Video link / Additional online information :

https://www.tutorialspoint.com/data_structures_algorithms/tree_data_structure.htm

https://www.tutorialspoint.com/data_structures_algorithms/binary_search_tree.htm

Module-5	L1,L2,L3	12 Hours
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Introduction to graph – types of graphs - Graph representations - Traversal algorithms- Depth First Search (DFS) and Breadth First Search (BFS) - Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting.

Laboratory Sessions/ Experimental learning:

Implement shortest path Algorithms

Applications: The link structure of a website could be represented by a directed graph: the vertices are the web pages available at the website and a directed edge from page A to page B exists if and only if A contains a link to B. Graph colouring concept can be applied in job scheduling problems of CPU, jobs are assumed as vertices of the graph and there will be an edge between two jobs that cannot be executed simultaneously and there will be one-one relationship between feasible scheduling of graphs.

Video link / Additional online information :

https://www.tutorialspoint.com/data_structures_algorithms/graph_data_structure.htm

Course outcomes:

CO1	Implement all the operations of linear data structures to store and retrieve the given data.
CO2	Create a hierarchical data structure to represent the given data using tree data structure.

CO3	Compare efficiency of various searching techniques using different tree data structures.
CO4	Apply stack, Queue, Lists, Trees and Graph concepts in problem solving
CO5	Implement all data structures in a high-level language for problem solving

Reference Books:

1	Seymour Lipschutz and Vijayalakshmi Pai G A, –Data Structures , Tata McGraw Hill, New Delhi, 2013.
2	Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, Fundamentals of Data Structures in C, Second Edition, Universities Press, 2008.
3	Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Second Edition, Pearson Education, 2015

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Quizzes/mini tests (4 marks)

Mini Project / Case Studies (8 Marks)

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.

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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
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CO2	3	3	3	2	3	0	0	0	0	2	0	0
CO3	3	3	2	2	3	0	0	0	0	2	0	0
CO4	3	3	2	2	3	0	0	0	0	2	0	0
CO5	3	3	3	2	3	0	0	0	0	2	0	0

High-3, Medium-2, Low-1

Course Title	Analog and Digital Electronics	Semester	III
Course Code	MVJ19IS33	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:

Analyse the working of oscillators and use of regulators.

Make use of simplifying techniques in the design of combinational circuits.

Illustrate combinational and sequential digital circuits.

Demonstrate the use of flipflops and design registers and counters.

Design and test Analog-to-Digital and Digital-to-Analog conversion techniques.

Module-1

L1,L2,L3

12 Hours

Metal Oxide Semiconductor Field Effect transistor (MOSFET): Structure and I-V characteristics, MOSFET as a switch, MOSFET as an amplifier, CMOS, and its applications.

Oscillators: Basic working and applications of RC Phase shift oscillator, Wien Bridge oscillator, LC oscillator, Colpitt oscillator, Crystal Oscillator.

Linear Power Supplies: Constituents of a Linear Power Supply, Designing Mains Transformer, Linear IC voltage regulators, Regulated Power Supply Parameters

Laboratory Sessions/ Experimental learning:

Plotting the V-I characteristics of MOSFET

Applications:

FET,s are the basic elements in constructing memory devices. Oscillators' gives an ides of generating clock signals. Regulated power supplies help in regulating power in electronic products.

Video link / Additional online information :

<https://www.youtube.com/watch?v=lNuS8mddhs0>

Module-2	L1,L2,L3	12 Hours
<p>Karnaugh maps: Minimum forms of switching functions, two and three variable Karnaugh maps, four variable karnaugh maps, Quine-McClusky Method: determination of prime implicants, The prime implicant chart, petricks method, simplification of incompletely specified functions, simplification using map-entered variables,</p> <p>Laboratory Sessions/ Experimental learning: Writing and Analysing C program for K-maps.</p> <p>Applications: Karnaugh maps are used for many small design problems. It gives a great deal of insight to digital logic circuits.</p> <p>Video link / Additional online information : https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/106105185/lec20.pdf</p>		
Module-3	L1,L2,L3	12 Hours
<p>Combinational Circuits: Multiplexer, Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU-Design and popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices</p> <p>Laboratory Sessions/ Experimental learning: Designing a 32-bit ALU</p> <p>Applications: These components are used as a fundamental element in processor, communication devices etc.</p> <p>Video link / Additional online information : https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/106102062/lec11.pdf</p>		
Module-4	L1,L2,L3	12 Hours
<p>Flip-Flops and Registers: Flip Flops: S-R,J-K,D and T flip flops, Edge-triggered JK FLIP-FLOPs Registers: Types of Registers, Serial In - Serial Out, Serial In - Parallel out, Parallel In</p>		

- Serial Out, Parallel In - Parallel Out, Universal Shift Register, Applications of Shift Registers. Counters: Asynchronous Counters, Decoding Gates, Synchronous Counters, Changing the Counter Modulus, Decade Counters, Applications of Counters.

Laboratory Sessions/ Experimental learning:

Implementing 2-digit counters using seven segment display

Applications: Registers are use in processors for performing operations. Counters are used as Digital clocks, Frequency counters, Binary counters etc.

Video link / Additional online information :

<https://www.youtube.com/watch?v=Gc3DL-tmr-g>

Module-5	L1,L2,L3	12 Hours
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D/A Conversion and A/D Conversion:

Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit.

Analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D Converter ICs

Laboratory Sessions/ Experimental learning:

Demonstration of CODEC which houses both ADC and DAC.

Applications: DACs are commonly used in music players to convert digital data streams into analog audio signals. They are also used in televisions and mobile phones to convert digital video data into analog video signals. ADCs are used in music recording, Digital signal processing, Scientific Instruments etc.

Video link / Additional online information :

<https://www.youtube.com/watch?v=wa7pIviT-do->

Course outcomes:	
CO1	Design and analyse analog circuits using transistors, power supply, MOSFETS,regulator IC and opamp.
CO2	Simplify digital circuits using Karnaugh Map , POS and Quine-McClusky Methods
CO3	Explain construction and working of data processing circuits
CO4	Understanding the various types of latches and flip flops and building the registers and counters using flip flops.
CO5	Explain the basic principles of A/D and D/A conversion circuits and develop the same.
Reference Books:	
1.	Anil K Maini, Varsha Agarwal, Electronic Devices and Circuits, Wiley, 2012.
2.	Charles H Roth and Larry L Kinney, Fundamentals of Logic design, Cengage Learning,2020.
3.	Donald P Leach, Albert Paul Malvino & Goutam Saha, Digital Principles and Applications, 8th Edition, Tata McGraw Hill, 2015.
4	M. Morris Mani, Digital Design, 4th Edition, Pearson Prentice Hall, 2008.
5	David A. Bell, Electronic Devices and Circuits, 5th Edition, Oxford University Press, 2008

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

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

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
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CO3	3	3	3	2	0	0	0	0	0	0	0	1
CO4	3	3	2	2	0	0	0	0	0	0	0	1
CO5	3	3	3	2	0	0	0	0	0	0	0	1

High-3, Medium-2, Low-1

Course Title	Data Communication	Semester	III
Course Code	MVJ19IS34	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:

Discuss the digital data communication techniques.

Gain knowledge on basic concepts of data communication layers, protocols and performance.

Understand a few representative protocols and network components.

Introduce the functions of different layers from deployed examples.

Introduce standards employed in computer networking.

Module-1

L1,L2,L3

12
Hours

Data Communications, Networks, The Internet, Protocol sand standards, Network Models-Reference models OSI, TCP/IP Model, Addressing, Data &Signal-Analog and Digital, Periodic Analog Signals, Digital Signals, Transmission impairment, Data Rate Limits, Performance.

Laboratory Sessions/ Experimental learning:

Write a code simulating PING and TRACEROUTE commands

Applications: Resource sharing such as printers and storage devices.

Video link / Additional online information :

<http://nptel.ac.in/courses/106105082/>

Module-2

L1,L2,L3

12
Hours

Digital to Digital Conversions, Analog to Digital Conversions, Transmission Modes, Analog Transmission-Digital to Analog conversion, Analog to Analog conversion, Multiplexing- FDM, WDM, STDM, Statistical TDM, Spread Spectrum, Guided Media-

Twisted pair cable, Co-axial cable, Fiber optic cable, Unguided media-Wireless-Radio waves, Microwaves, Infrared.

Laboratory Sessions/ Experimental learning:

Create a socket for HTTP for web page upload and download.

Applications: Cellular telephony, video conferencing, digital TV

Video link / Additional online information :

<http://nptel.ac.in/video.php?subjectId=106105081>

Module-3

L1,L2,L3

12
Hours

Circuit switched networks, Datagram networks, Virtual circuit networks, Structure of a Switch-Structure of Circuit Switches & Packet Switches, Data Link Layer-Detection and Correction-Introduction, Block Coding-Error Detection and Correction, Hamming Distance, Minimum Hamming Distance, Linear Block Codes, Cyclic Codes- CRC, Polynomials, Checksum.

Laboratory Sessions/ Experimental learning:

Applications using TCP and UDP Sockets like

- a. DNS
- b. SNMP
- c File Transfer

Applications: Connection between different devices using logical connections

Video link / Additional online information :

<http://www.computerscienceonline.org/courses/>

Module-4

L1,L2,L3

12
Hours

Data Link Layer – Data Link Control- Framing, Flow and error control, Protocols, Noiseless Channels, Noisy Channels, HDLC, Point-to-Point Protocol- Framing, Transition phases, Multiple Access- Random access-Aloha, CSMA, CSMA/CD, CSMA/CA, Controlled access- reservation, polling, token passing, Channelization - FDMA,TDMA,CDMA.

Laboratory Sessions/ Experimental learning:

Implementation of Stop and Wait Protocol and Sliding Window Protocol.

Applications: media access control (MAC) layer, source and destination addresses

Video link / Additional online information :

https://www.youtube.com/view_play_list?p=32DBC269EF768F74

Module-5	L1,L2,L3	12 Hours
<p>Wired LANs: Ethernet – Standard Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless LANs- IEEE 802.11, Bluetooth - Architecture, Bluetooth layers, Radio layer, Baseband layer, L2CAP Connecting Devices–Hub, Repeater, Bridges, Transparent Bridges, Switches, Router, and Gateway.</p> <p>Laboratory Sessions/ Experimental learning: Study of Network simulator (NS).and Simulation of Congestion Control Algorithms using NS Applications: Internet Access.</p> <p>Video link / Additional online information : https://nptel.ac.in/courses/106105082/#</p>		

Course outcomes:

CO1	Analyze OSI and TCP network models and the layers associated functionalities
CO2	Analyze and apply different types of signal conversion techniques in physical layer
CO3	Analyze and apply different types of error detection and correction mechanisms.
CO4	Analyze flow control and Error control mechanism using standard data link layer protocols and Compare different categories of Medium Access protocols
CO5	Analyze different protocols used for Ethernet and various connecting devices used in network

Reference Books:	
1.	Data Communication and Networking, Behrouz A. Forouzan, McGraw-Hill, 5th Edition, 2012.
2.	Data and Computer Communication, William Stallings, 10 th Edition, Pearson Education, 2014.
3.	Introduction to Data Communications and Networking – Wayne Tomasi, Pearson Education, 2009. (Latest Edition)

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Quizzes/mini tests (4 marks)

Mini Project / Case Studies (8 Marks)

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CO2	0	0	3	2	0	0	0	0	0	0	0	2
CO3	0	3	3	0	0	0	0	0	0	0	0	2
CO4	0	0	3	0	0	0	0	0	0	0	0	2
CO5	0	3	2	0	0	0	0	0	0	0	0	2

High-3, Medium-2, Low-1

Course Title	Computer Organization & Architecture	Semester	III
Course Code	MVJ19IS35	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:

distinguish between the various ISA styles

trace the execution sequence of an instruction through the processor

compare different approaches used for implementing a functional unit

understand the fundamentals of memory and I/O systems and their interaction with the processor

Module-1

L1,L2,L3

12
Hours

Functional unit, Basic operational concepts, Bus structures, Software, Performance, Data Representation. Fixed Point Representation. Floating – Point Representation. Instruction codes. Computer Registers Computer instructions– Instruction cycle. Memory – Reference Instructions. Input – Output and Interrupt. STACK organization. Instruction formats. Addressing modes.

Laboratory Sessions/ Experimental learning:

Familiarization with assembly language programming

Applications: Computer system.

Video link / Additional online information :

<https://nptel.ac.in/courses/106/106/106106166/>

Module-2	L1,L2,L3	12 Hours
<p>Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt Direct memory Access, Input –Output Processor (IOP) Serial communication; Introduction to peripheral component, Interconnect (PCI) bus. Introduction to standard serial communication protocols like RS232, USB, IEEE1394</p> <p>Laboratory Sessions/ Experimental learning: Interfacing - DAC, ADC, keyboard-display modules</p> <p>Applications: Monitors, keyboards.</p> <p>Video link / Additional online information: https://drive.google.com/file/d/0B-ITW-kTxwdfSVExbzZIMUFFVFU/view</p>		
Module-3	L1,L2,L3	12 Hours
<p>Cache Coherence, Shared Memory Multiprocessors. Control memory, Address sequencing, micro program example, design of control unit Hard wired control. Micro programmed control, Virtual Memory.</p> <p>Laboratory Sessions/ Experimental learning: Processor design</p> <p>Applications: High end workstations.</p> <p>Video link / Additional online information: https://drive.google.com/file/d/0B-ITW-kTxwdfcV9ma2JxbUc0RUk/view</p>		
Module-4	L1,L2,L3	12 Hours
<p>Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit Decimal Arithmetic operations.</p> <p>Laboratory Sessions/ Experimental learning: Implementation of booth algorithm</p> <p>Applications: Radar,Sonar</p> <p>Video link / Additional online information: https://nptel.ac.in/courses/106/106/106106166/</p>		

Module-5	L1,L2,L3	12 Hours
<p>Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Data hazards – Instruction hazards, Vector Processing, Array Processors. Cache coherence and MESI protocol – Clusters – Non-Uniform Memory Access – Vector Computation</p> <p>Laboratory Sessions/ Experimental learning: Introduction to embedded system.</p> <p>Applications: DSP, Microprocessor</p> <p>Video link / Additional online information: https://drive.google.com/file/d/0B-ITW-kTxwdfNGIMQINSSVIQeEE/view</p>		

Course outcomes:	
CO1	Demonstrate the fundamental organization of a computer system
CO2	Analyse various issues related to memory hierarchy.
CO3	Examine various, inter connection structures of multi processors.
CO4	Formulate and solve problems related to computer arithmetic, performance of systems
CO5	Demonstrate parallel computing and concepts of pipeline

Reference Books:	
1.	M. Morris Mano, Computer System Architecture, 3rd edition, Prentice- Hall of India Pvt. Ltd., 1999.
2.	Carl Hamacher : "Computer Organization ", Fifth Edition, Mc Graw Hill
3.	William Stallings: "Computer Organisation and Architecture", 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/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	0	0	3	2	0	0	0	2	0	0	0	1
CO2	0	3	3	2	0	0	0	2	0	0	0	2
CO3	0	3	3	2	0	0	0	2	0	0	0	3
CO4	0	3	3	2	0	0	0	2	0	0	0	2
CO5	0	3	3	2	0	0	0	2	0	0	0	3

High-3, Medium-2, Low

Course Title	Software Engineering	Semester	III
Course Code	MVJ19IS36	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:

To understand the phases in a software project

To understand fundamental concepts of requirements engineering and Analysis Modeling.

To understand the various software design methodologies

To learn various testing and maintenance measures

Module-1

L1,L2, L3

12
Hours

What is software engineering? Software Development Life Cycle, Essential characteristics of socio technical systems, Emergent System Properties, Systems Engineering, Functional and Non-functional requirements, User Requirements, System Requirements, Interface Specification, Documentation of the software requirements, Feasibility study, Requirements elicitation and analysis, Requirements Validations, Requirements Management.

Laboratory Sessions/ Experimental learning:

Identifying the Requirements from Problem Statements

Applications: Software Project

Video link / Additional online information :

<https://nptel.ac.in/courses/106/105/106105182/>

<http://vlabs.iitkgp.ernet.in/se/>

Module-2	L1,L2, L3	12 Hours
<p>Process and Project, Component Software Processes, Software Development Process Models: Waterfall Model, Prototyping, Spiral model, Iterative Development, Rational Unified Process, The RAD Model, Time boxing Model.</p> <p>Rapid Software Development: Agile methods; Plan-driven and agile development, Extreme programming</p> <p>Laboratory Sessions/ Experimental learning: Demonstration of Process Models</p> <p>Applications: Software Project</p> <p>Video link / Additional online information : https://nptel.ac.in/courses/106/105/106105182/ http://vlabs.iitkgp.ernet.in/se/</p>		
Module-3	L1,L2, L3	12 Hours
<p>Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design – Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components</p> <p>Laboratory Sessions/ Experimental learning: Modeling UML Use Case Diagrams and Capturing Use Case Scenarios</p> <p>Applications: System Design</p> <p>Video link / Additional online information : https://nptel.ac.in/courses/106/105/106105182/ http://vlabs.iitkgp.ernet.in/se/</p>		

Module-4	L1,L2, L3	12 Hours
<p>Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing and Debugging.</p> <p>Laboratory Sessions/ Experimental learning:</p> <p>Designing Test Suites.</p> <p>Applications: System Testing</p> <p>Video link / Additional online information :</p> <p>https://nptel.ac.in/courses/106/105/106105182/</p> <p>http://vlabs.iitkgp.ernet.in/se/</p>		
Module-5	L1,L2, L3	12 Hours
<p>Software Implementation Techniques: Coding Practices, Refactoring, Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.</p> <p>Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision</p> <p>COCOMO I & II Model .</p> <p>Laboratory Sessions/ Experimental learning:</p> <p>Cost estimation of Project</p> <p>Applications: Successful development of the project's procedures of initiation, planning, execution, regulation and closure</p> <p>Video link / Additional online information :</p> <p>https://nptel.ac.in/courses/106/105/106105182/</p> <p>http://vlabs.iitkgp.ernet.in/se/</p>		

Course outcomes:	
CO1	Identify the key activities in software engineering
CO2	Compare different process models.
CO3	Apply requirements engineering process and analysis modeling.
CO4	Apply systematic procedure for software design and deployment.
CO5	Compare and contrast various testing techniques and apply software implementation techniques

Reference Books:	
1.	Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Seventh Edition, Mc Graw-Hill International Edition, 2010.
2.	Ian Sommerville, "Software Engineering", 9th Edition, Pearson Education Asia, 2011.
3.	Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI Learning Private Limited, 2009.
4.	Pankaj Jalote, "Software Engineering", Narosa Publication

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</p>

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	0	0	2	0	0	0	0	0	0	0	0	0
CO2	2	2	0	0	0	0	0	0	0	0	0	0
CO3	2	0	1	0	3	0	0	0	0	0	0	0
CO4	2	2	0	2	0	1	0	1	0	0	3	3
CO5	1	2	0	0	0	0	0	0	0	0	0	3

High-3, Medium-2, Low-1

Course Title	Data Structure Lab	Semester	III
Course Code	MVJ19ISL37	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:

Implement linear and non-linear data structures

Understand the different operations of search trees

Implement graph traversal algorithms

Get familiarized to sorting and searching techniques

Sl No	Experiment Name	RBT Level	Hours
1	Implementation of searching algorithms a) Linear Search b) Binary Search	L3	4
2	Implementation of sorting algorithms a) Insertion sort b) Selection sort c) Quick sort d) Merge sort	L3	4
3	a) Array implementation of List ADT b) Linked list implementation of List ADT	L3	4
4	a) Array implementation of Stack ADT b) Linked list implementation of Stack ADT	L3	4
5	a) Array implementation of queue ADT b) Linked list implementation of queue ADT	L3	4
6	Program to create a Binary Search Tree and to traverse the tree.	L3	4
7	Program to compute the shortest path from a single source	L3	4
8	Program to construct a graph and perform graph traversal (BFS, DFS)	L3	4

9	Program to construct a minimum spanning tree using: a) Prims Algorithm b) Kruskal's Algorithm	L3	4
10	Development of a Mini project/Present a case Study	L3	4

Course outcomes:

CO1	Compute the time and space complexity of searching and sorting algorithms with asymptotic notations.
CO2	Implement all the operations of linear data structures to store and retrieve the given data.
CO3	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data
CO4	Create a hierarchical data structure to represent the given data using tree data structure.
CO5	Design graph algorithms to compute the shortest path of the given graph and to identify the Minimum spanning tree.

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	3	0	0	0	0	2	0	0
CO2	3	3	3	2	3	0	0	0	0	2	0	0
CO3	3	3	2	2	3	0	0	0	0	2	0	0
CO4	3	3	2	2	3	0	0	0	0	2	0	0
CO5	3	3	3	2	3	0	0	0	0	2	0	0

High-3, Medium-2, Low-1

Course Title	Analog & Digital Electronics Lab	Semester	III
Course Code	MVJ19ISL38	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:

Analog components and circuits including transistor, regulator, etc.

Combinational logic circuits.

Flip - Flops and their operations

Counters and Registers using Flip-flops.

Synchronous and Asynchronous Sequential Circuits

Sl No	Experiment Name	RBT Level	Hours
1	Study of transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.	L3	3
2	Design and test IC 723 voltage regulator	L3	3
3	Given a 4-variable logic expression, simplify it using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer IC.	L3	3
4	A) Realization and implementation of 2-bit comparator using logic gates. b) Implementation of 4-bit magnitude comparator using IC 7485.	L3	3
5	To design and construct basic flip-flops R-S ,J-K,J-K Master slave flip-flops using gates and verify their truth table	L3	3
6	Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops	L3	4

7	Design and implementation of 3-bit synchronous up/down counter	L3	4
8	Design and implement a ring counter and Johnson counter using 4-bit shift register and demonstrate its working.	L3	3
9	Design and implement a mod-n ($n < 8$) synchronous up counter using J-K Flip-Flop ICs and demonstrate its working.	L3	4
10	Design and implement an asynchronous counter using decade counter IC to count up from 0 to n ($n \leq 9$) and demonstrate on 7-segment display (using IC-7447).	L3	3

Course outcomes:

CO1	Demonstrate various Electronic Devices like Cathode ray Oscilloscope, Signal generators, Digital Trainer Kit, Multimeters and components like Resistors, Capacitors, Op amp and Integrated Circuit
CO2	Examine and verify different analog circuits.
CO3	Design and demonstrate various combinational logic circuits.
CO4	Design and demonstrate various types of counters and Registers using Flip-flops
CO5	Design and demonstrate the working of DAC

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

High-3, Medium-2, Low-1

Course Title	CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW	Semester	III/IV
Course Code	MVJ19CPH39/49	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	2 hrs

Course objective is to:

To know the fundamental political codes, structure, procedures, powers, and duties of Indian constitution, Indian government institutions, fundamental rights, directive principles and the duties of the citizens.

To provide overall legal literacy to the young technocrats to manage complex societal issues in the present scenario.

To understand engineering ethics & their responsibilities, identify their individual roles and ethical responsibilities towards society.

Module-1

RBT Level
L1,L2,L3

03
Hours

Introduction to Indian Constitution

The Necessity of the Constitution, The Societies before and after the Constitution adoption. Introduction to the Indian Constitution, The Making of the Constitution, The role of the Constituent Assembly – Preamble and Salient features of the Constitution of India. Fundamental Rights and its Restriction and Limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and Significance in Nation Building.

Module – II

RBT Level
L1,L2,L3

03
Hours

Union Executive and State Executive

Parliamentary System, Federal System, Centre-State Relations. Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary

Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism. State Executives – Governor, Chief Minister, State Cabinet, State Legislature, High Court and Subordinate Courts, Special Provisions (Article 370, 371, 371J) for some States.

Module – III

RBT Level

03

L1,L2,L3

Hours

Elections, Amendments and Emergency Provisions

Elections, Electoral Process, and Election Commission of India, Election Laws.

Amendments - Methods in Constitutional Amendments (How and Why) and Important Constitutional Amendments. Amendments – 7,9,10,12,42,44,61,73,74,75,86, and 91,94,95,100,101,118 and some important Case Studies. Recent Amendments with explanation. Important Judgements with Explanation and its impact on society (from the list of Supreme Court Judgements).

Emergency Provisions, types of Emergencies and it's consequences.

Constitutional Special Provisions:

Special Constitutional Provisions for SC & ST, OBC, Special Provision for Women, Children & Backward Classes.

Module – IV

RBT Level

03

L1,L2,L3

Hours

Professional / Engineering Ethics

Scope & Aims of Engineering & Professional Ethics - Business Ethics, Corporate Ethics, Personal Ethics. Engineering and Professionalism, Positive and Negative Faces of Engineering Ethics, Code of Ethics as defined in the website of Institution of Engineers (India) : Profession, Professionalism, Professional Responsibility. Clash of Ethics, Conflicts of Interest. **Responsibilities in Engineering** - Responsibilities in Engineering and Engineering Standards, the impediments to Responsibility. Trust and Reliability in Engineering, IPRs (Intellectual Property Rights), Risks, Safety and liability in Engineering.

Module – V

RBT Level

03

L1,L2,L3

Hours

Internet Laws, Cyber Crimes and Cyber Laws:

Internet and Need for Cyber Laws, Modes of Regulation of Internet, Types of cyber terror capability, Net neutrality, Types of Cyber Crimes, India and cyber law, Cyber Crimes and

the information Technology Act 2000, Internet Censorship, Cybercrimes and enforcement agencies.

Course Outcomes: On completion of this course, students will be able to

CO1	Have constitutional knowledge and legal literacy
CO2	Understand Engineering and Professional ethics and responsibilities of Engineers.
CO3	Understand the cyber-crimes and cyber laws for cyber safety measure.

Text Books:

1.	Constitution of India and Professional Ethics, T.S. Anupama, Sunstar Publisher

Reference Books:

1.	Durga Das Basu (DD Basu): "Introduction to the Constitution on India", (Students Edition.) Prentice –Hall EEE, 19 th /20 th Edn., (Latest Edition) or 2008.
2.	Shubham Singles, Charles E. Haries, and Et al : "Constitution of India and Professional Ethics" by Cengage Learning India Private Limited, Latest Edition – 2018.
3	M.Govindarajan, S.Natarajan, V.S.Senthilkumar, "Engineering Ethics", Prentice – Hall of India Pvt. Ltd. New Delhi, 2004.
4.	M.V.Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002.
5.	Latest Publications of NHRC - Indian Institute of Human Rights, New Delhi.

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 (40 marks each), the final IA marks to be awarded will be the average of three tests
Assignment (10 marks)

SEE Assessment:

Question paper for the SEE consists one part. It is compulsory and consists of objective type 1 mark each for total of 50 marks covering the whole syllabus.

Ten questions 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	2	2	1	1	1	2	2	1	1	1	1	2
CO2	1	2	2	1	1	2	1	1	1	1	1	2
CO3	2	1	2	1	1	1	1	1	1	1	1	2
CO4	2	2	1	1	1	1	1	1	1	1	1	2
CO5	2	2	1	1	1	2	1	1	1	1	1	2

High-3, Medium-2, Low-1

Course Title	UNIVERSAL HUMAN VALUES I	Semester	III
Course Code	MVJ19UHV310	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
 Perceive the need for developing a holistic perspective of life
 Sensitise the scope of life – individual, family (inter-personal relationship), society and nature/existence, Strengthening self-reflection
 Develop more confidence and commitment to understand, learn and act accordingly

Module-1	L1,L2	3 Hrs
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Welcome and Introductions: Getting to know each other (Self-exploration)
Aspirations and Concerns: Individual academic, career, Expectations of family, peers, society, nation, Fixing one's goals (Basic human aspirations Need for a holistic perspective Role of UHV)
Self-Management: Self-confidence, peer pressure, time management, anger, stress, Personality development, self-improvement (Harmony in the human Being)
Health: Health issues, healthy diet, healthy lifestyle, Hostel life (Harmony of the Self and Body Mental and physical health)
Relationships: Home sickness, gratitude, towards parents, teachers and, others Ragging and interaction, Competition and cooperation, Peer pressure (Harmony in relationship Feelings of trust, respect, gratitude, glory, love)
Society: Participation in society (Harmony in the society)
Natural Environment: Participation in nature (Harmony in nature/existence)

Video link:

https://youtube.com/playlist?list=PLYwzG2fd7hzc4HerTNkc3pS_IvcCfKznV

<https://youtube.com/playlist?list=PLYwzG2fd7hzcZz1DkrAegkKF4TseekPFv>

Presentation: https://fdp-si.aicte-india.org/AicteSipUHV_download.php

Module-2	L1,L2	3 Hrs
<p>Introduction to Value Education: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Self-exploration as the Process for Value Education, Happiness and Prosperity – Current Scenario.</p> <p>Video link: 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</p>		
Module-3	L1,L2	3 Hrs
<p>Introduction to Harmony in the Human Being: Understanding Human being as the Co-existence of the Self and the Body, The Body as an Instrument of the Self, Harmony of the Self with the Body.</p> <p>Video link: https://www.youtube.com/watch?v=GpuZo495F24 https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw</p>		
Module-4	L1,L2	3 Hrs
<p>Introduction to Harmony in the Family and Society: Harmony in the Family – the Basic Unit of Human Interaction, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society.</p> <p>Video link: https://www.youtube.com/watch?v=F2KVV4WNnS8 https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw</p>		
Module-5	L1,L2	3 Hrs
<p>Introduction to Implications of the Holistic Understanding: Natural Acceptance of Human Values, Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Holistic Technologies, Production Systems and Management Models-Typical Case Studies.</p>		

Video link:

<https://www.youtube.com/watch?v=BikdYub6RY0>

https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw

Course outcomes: On completion of the course, students would be able to

CO1	Develop a holistic perspective about life
CO2	Explore his/her role (value) in all aspects of living – as an individual, as a member of a family, as a part of the society as an unit in nature
CO3	Become more responsible in life, and in handling problems with sustainable solutions
CO4	Have better critical ability
CO5	Become sensitive to their commitment

Scheme of Evaluation

Details		Marks
Assessment by Faculty mentor (Class Room Evaluation)	CIE(50)	10
Self-Assessment + Assessment by peers		20
Activities / Experimentations related to courses/Assignment		10
Mini Projects / Case Studies		10
Semester End Examination	SEE (50)	50
Total		100

Text Books:

1.	AICTE SIP UHV-I Teaching Material, https://fdp-si.aicte india.org/ AicteSipUHV_download.php
2.	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

Reference Books:	
1.	Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
2.	Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
3.	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
4.	The Story of Stuff (Book).
5.	The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

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

Course Title	Additional Mathematics-I (Common to all branches)	Semester	III
Course Code	MVJ20MISDIP301	CIE	50
Total No. of Contact Hours	40	SEE	50
No. of Contact Hours/week	4	Total	100
Credits	-	Exam. Duration	3hrs

Course objective is to: This course viz., aims to prepare the students:
To familiarize the important and basic concepts of Differential calculus and Differential Equation, ordinary/partial differential equations and Vector calculus and analyse the engineering problems.

Module-1

L1,L2

8Hrs.

Differential calculus: Recapitulations of successive differentiations -nth derivative -Leibnitz theorem and Problems, Mean value theorem -Rolle's theorem, Lagrange's Mean value theorem , Cauchy's theorem and Taylor's theorem for function of one variables.

Video Link:

<https://users.math.msu.edu/users/gnagy/teaching/ode.pdf>

Module-2

L1,L2

8 Hrs.

Integral Calculus:

Review of elementary Integral calculus, Reduction formula

$\int_0^{\frac{\pi}{2}} \sin^m x dx$, $\int_0^{\frac{\pi}{2}} \cos^m x dx$, $\int_0^{\frac{\pi}{2}} \sin^m \cos^n x dx$ and problems.

Evaluation of double and triple integrals and Simples Problems.

Video Link:

<https://www.youtube.com/watch?v=rCWOfQ3cwQ>

<https://nptel.ac.in/courses/111/105/111105122/>

Module-3

L1,L2

8Hrs.

Vector Calculus: Derivative of vector valued functions, Velocity, Acceleration and related problems, Scalar and Vector point functions, Gradient, Divergence, Curl, Solenoidal and Irrotational vector fields. Vector identities - $\text{div}(\varphi A)$, $\text{curl}(\varphi A)$, $\text{curl}(\text{grad } \varphi)$, $\text{div}(\text{curl } A)$.

Video Link:

https://www.whitman.edu/mathematics/calculus_online/chapter16.html

<https://www.math.ust.hk/~machas/vector-calculus-for-engineers.pdf>

Module-4	L1,L2,L3	8 Hrs.
Probability: Introduction-Conditional Probability, Multiplication theorem ,Independent events ,Baye's theorem and Problems. Video Link: https://www.khanacademy.org/math/statistics-probability/probability-library https://nptel.ac.in/courses/111/105/111105041/		
Module-5	L1,L2,L3	8 Hrs.
Differential equation: Homogenous differential equation, Linear differential equation, Bernoulli's differential equation and Exact differential equation. Video Link: https://www.mathsisfun.com/calculus/differential-equations.html		

Course outcomes:	
CO1	Apply the knowledge of Differential calculus in the modeling of various physical and engineering phenomena
CO2	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
CO3	Study on Vector calculus to understand the various solution to Application to Engineering problems.
CO4	Understand the basic Concepts of Probability
CO5	Solve first order linear differential equation analytically using standard methods.

Text Books:	
1.	B.S. Grewal, "Higher Engineering Mathematics" Khanna Publishers, 43rd Edition, 2013.
2.	Ramana B. V., "Higher Engineering Mathematics", Tata Mc Graw-Hill, 2006.

Reference Books:	
1.	Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley-India publishers, 10th edition,2014.
2.	G. B. Gururajachar: Calculus and Linear Algebra, Academic Excellent Series Publication, 2018-19

CIE Assessment:
CIE is based on quizzes, tests, assignments/seminars and any other form of evaluation. Generally, there will be: Three Internal Assessment (IA) tests during the semester (30 marks each), the final IA marks to be awarded will be the average of three tests Quizzes/mini tests (10 marks) Assignments (10 marks)

SEE Assessment:

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

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

CO-PO Mapping

CO/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	0	3	0	0	0	0	0	0	1	1
CO2	2	3	0	3	0	0	0	0	0	0	1	1
CO3	2	2	0	2	0	0	0	0	0	0	1	0
CO4	3	2	0	3	0	0	0	0	0	0	0	1
CO5	3	3	0	2	0	0	0	0	0	0	0	0

High-3, Medium-2, Low-1