Course Title	**Transforms, Fourier Series and Numerical Methods**	**Semester**	III
Course Code	MVJ19MEE31	**CIE**	50
Total No. of Contact Hours	60 L : T : P :: 40 : 0 : 20	**SEE**	50
No. of Contact Hours/week	4	**Total**	100
Credits	3	**Exam. Duration**	3hrs

Course objective is to: This course will enable students to

- Solve the linear differential equations using Laplace transforms
- Apprehend and apply Fourier Series
- Realize and use of Fourier transforms and Z-Transforms
- Use of numerical methods to solve ordinary differential equation
- Use of statistical methods in curve fitting applications

Module-1	**L1, L2, L3**	**10Hrs.**

Laplace Transforms: Definition, Transforms of elementary functions, Properties, Periodic function, Unit step function.

Inverse Laplace Transforms: Inverse Laplace Transforms, Convolution theorem to find inverse Laplace transform.

Solution of linear differential equations using Laplace transforms

Applications: Analysis of electrical and electronic circuits, used in Signal processing and in control systems.

Video Link: https://youtu.be/NFuwtTT7VPM

Module-2	**L1, L2**	**10Hrs.**

Fourier Series: Continuous and Discontinuous functions, Convergence and divergence of infinite series of positive terms, Periodic functions, Dirichlet's conditions, Fourier series of periodic functions of period 2π and arbitrary period.

Half Range Fourier Series: Half range fourier sine series and cosine series of period π and arbitrary period.

Practical harmonic analysis

Applications: Fourier series solution to differential equation, Digital signal processing, spectrum analyzer.

Video Link: https://youtu.be/r18Gi8lSkfM

Module-3	**L1, L2, L3**	**10Hrs.**

Fourier Transforms: Infinite Fourier transform, Fourier Sine and Cosine transforms, Properties, Inverse Fourier transforms.

Z-Transforms: Definition, standard Z-transforms, damping rule, shifting rule, initial value and final value theorems. Inverse Z- transform.

Application of Z-transforms to solve difference equations.

Applications: Fourier transforms used in image processing and Z-transforms in Digital signal processing.

Video Link: https://youtu.be/spUNpyF58BY

Module-4	**L1, L2, L3**	**10Hrs.**

Numerical solution of ordinary differential equations: Numerical solution of first order and first degree; Taylor's series method, modified Euler's method, Runge-Kutta method of fourth-order. Milne's and Adams- Bashforth predictor and corrector method.

Applications: To solve initial value problems

Video Link https://youtu.be/pbYn3MEZyms

Module-5	L1, L2, L3	10Hrs.
Statistical Methods: Correlation and regression-Karl Pearson's coefficient of correlation-problems. Regression analysis- lines of regression –problems. **Curve Fitting:** Curve fitting by the method of least squares, fitting of linear, quadratic and geometric curve. **Applications:** Applications of Correlation in Signal Processing and application of regression analysis in business **Video Link** https://youtu.be/jwTvCxasICc		

Course Outcomes:	
CO1	Learn to solve linear differential equations using Laplace transforms
CO2	Learn to represent a periodic function in terms of sine and cosine functions.
CO3	Evaluate Fourier transforms and use Z-transform to solve difference equations.
CO4	Learn to solve algebraic, transcendental and ordinary differential equations numerically.
CO5	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data

Reference Books:	
1.	B.S. Grewal, "Higher Engineering Mathematics" Khanna Publishers, 43rd Edition 2013.
2.	Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley-India publishers, 10th edition, 2014.
3.	Ramana B. V., "Higher Engineering Mathematics", Tata Mc Graw-Hill, 2006.
4.	Bali N. P. & Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, 8th Edition
5.	H K Dass:"Advanced Engineering Mathematics"- S Chand & Company Ltd. 12th edition.

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

High-3, Medium-2, Low-1

Course Title	**Electric Circuit Analysis**	**Semester**	3
Course Code	MVJ19EE32	**CIE**	50
Total No. of Contact Hours	60 L: T : P :: 40 : 0 : 20	**SEE**	50
No. of Contact Hours/week	4	**Total**	100
Credits	4	**Exam. Duration**	3Hrs

Course objective is to: This course will enable students to

- Solve the DC&AC circuits using mesh and node analysis and reduction of network using various techniques.
- Apply various network theorems to solve circuits.
- Solve first and second order differential equations to obtain steady state and transient response in series & parallel RLC circuits.
- Analyze the unbalanced three phase circuits
- Analyze the series and parallel resonance in RLC circuits.
- Obtain the two port network parameters.

Module-1	**L1,L2,L3**	**10Hrs.**

Basic circuit concepts: Ideal and Practical sources, Source Transformations, Loop and nodal analysis with linearly dependent and independent sources for DC and AC circuits, Analysis of networks involving concepts of super node, Super mesh.

Laboratory Sessions/ Experimental learning: Verification of Kirchhoff's Voltage law and current law - Virtual lab experiment

Applications: Analysis of electric circuits by reducing the complexity.

Video link : https://nptel.ac.in/courses/108104139/

Module-2	**L1,L2,L3**	**10Hrs.**

Network topology: Graph of a network, Concept of tree and Co-tree, Incidence matrix, tie-set, tie-set schedule, cut-set & cut-set schedule, Formulation and solution of equilibrium equations, concept of duality and dual networks.

Resonant Circuits: Series and parallel resonance, frequency response of series and parallel circuits, Q factor, Bandwidth. Application.

Laboratory Sessions/ Experimental learning: Virtual lab experiment – Series/Parallel Resonance

Applications: Network topology- to understand the networking concepts

Resonant circuits- Oscillating circuit, Radio and communication engineering

Video link : https://nptel.ac.in/courses/108102097/

Module-3	**L1,L2,L3**	**10Hrs.**

Network Theorems: Superposition, Thevenin's and Norton's theorems; Maximum power transfer

theorem, Reciprocity and Millman's theorem.

Laboratory Sessions/ Experimental learning: Verification of all network theorems using Virtual lab.

Applications: Analysis of complex electric circuits by reducing the complexity.

Video link : http://www.digimat.in/nptel/courses/video/108105112/L20.html

Module-4	**L1,L2,L3**	**10Hrs.**

Transient Analysis: Behaviour of circuit elements under switching condition and their representation, Evaluation of Initial and Final conditions in RL, RC and RLC circuits.

Laboratory Sessions/ Experimental learning: Virtual Lab experiment on series/Parallel RL,RC circuits

Applications: Stability Analysis of systems containing energy storage elements

Video link: https://nptel.ac.in/courses/108102097/

Module-5	**L1,L2,L3**	**10Hrs.**

Two port networks: Definition of Z, Y, ABCD parameters, Relationship between parameter sets.

Three-phase circuits: Analysis of unbalanced star and delta connected loads, Neutral shift.

Laboratory Sessions/ Experimental learning: Virtual lab experiment – Three phase power measurement for balanced/unbalanced star connected load

Applications: Model of voltage, current characteristics of complex electrical networks, Modeling of transmission line.

Video link: https://nptel.ac.in/courses/108102097/

Course outcomes: At the end of the course, the student will be able to	
CO1	Analyse DC and AC circuits using mesh and node analysis.
CO2	Analyse series and parallel resonance circuits.
CO3	Apply network theorems to solve the circuits.
CO4	Apply analytical techniques to analyse transient behaviour of networks.
CO5	Solve two port networks to obtain various parameters.

Reference Books:

1.	Hayt, Kemmerly and Durbin "Engineering Circuit Analysis" TMH 6th 2002
2.	M E Van Valkenburg "Network Analysis" Ed 3. PHI. 2002
3.	J David Irwin et al" Engineering Circuit Analysis" Wiley India 10th Edition
4.	D. Anand Kumar "Network analysis and Synthesis", PHI Learning, 2019.
5.	Charles K Alexander Matthew N O Sadiku "Fundamentals of Electric Circuits" McGraw-Hill Education, 2016

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

High-3, Medium-2, Low-1

Course Title	**Analog & Digital Electronics**	**Semester**	3
Course Code	MVJ19EE33	**CIE**	50
Total No. of Contact Hours	60 L: T : P :: 40 : 0 : 20	**SEE**	50
No. of Contact Hours/week	3	**Total**	100
Credits	3	**Exam. Duration**	3Hrs

Course objective: This course will enable students to

- Understand the working of different diode and transistor circuits.
- Use transistors as multistage amplifiers, feedback amplifiers and power amplifiers.
- Understand the working of oscillators and conversion of signals.
- Solve different logic equations using Kmap.
- Understand various flip flop applications and implement sequential logic circuits.

Module-1	**L1,L2,L3**	**08Hrs.**

Diode circuits: Diode clipping and clamping circuits, Special Diodes Schottky diodes, Tunnel diode, Varactor diode characteristics and applications.

Transistor analysis using h parameter model. Distortion in amplifiers and CE, CB, CC amplifiers comparison.

Laboratory Sessions/ Experimental learning: Static Transistor characteristics for CE, CB and CC modes and determination of h parameters.

Applications: Analysis of composite picture signals

Video link :

https://lake.videoken.com/nptel/category/698/search/clipping%20using%20diodes/video/tZE0-YcL0XM

Module-2	**L1,L2,L3**	**08Hrs.**

Multistage Amplifiers and Power Amplifiers: Direct coupled and RC Coupled multi-stage amplifiers, Darlington circuits analysis and design, Effect of Bootstraping. Differential Amplifiers, Power amplifiers - Analysis of Class A, Class B & Class C amplifier.

Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems

Laboratory Sessions/ Experimental learning: Determination of gain, input and output impedance of BJT Darlington emitter follower with and without bootstrapping.

Applications: Analysis and design of amplifier circuit for different applications **Videolink** : https://lake.videoken.com/nptel/category/698/search/power%20Amplifiers/video/WFUDeyOEdt		
Module-3	**L1,L2,L3**	**08Hrs.**
Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –LC Oscillators, Hartley and Colpitts **A/D and D/A Converters:** Binary weighted and R-2R ladder type DAC, DAC parameters; Flash type, counter ramp type, tracking, single slop and dual slope type ADC, Successive Approximation ADC. **Laboratory Sessions/ Experimental learning**: Analysis of Wien-bridge Oscillators and LC oscillator **Applications**: Analysis of different pulse generations. **Video link** : https://lake.videoken.com/nptel/category/698/search/a%2Fd%20and%20d%2Fa%20converters/video/3__b72gcGfQ		
Module-4	**L1,L2,L3**	**08Hrs.**
Principles of Combinational Logic: Definition of combinational logic, representation of logic functions-SOP and POS forms, Karnaugh maps-3,4,5 variables with don't care condition,Look ahead carry, Binarycomparators **Digital Logic Families:** Comparison of RTL, DTL, TTL, ECL and MOS families -operation, characteristics of digital logic family. **Laboratory Sessions/ Experimental learning**: Analysis of Wien-bridge Oscillators and LC oscillator **Applications**: Analysis of different pulse generations. **Videolink**: https://lake.videoken.com/nptel/category/698/search/a%2Fd%20and%20d%2Fa%20converters/video/3		
Module-5	**L1,L2,L3**	**08Hrs.**
Flip-Flops Applications: Triggering of Flip-flops: Master Slave Flip-Flops, Edge Triggered Flip Flops, Characteristic Equations, Conversion of flip-flops, Shift Registers, Ripple Counters, Synchronous Counters, Design of a synchronous mod-n counter using clocked T, JK, D and SRflip-flops. **Sequential Circuit Design:** Mealy and Moore models, State machine notation, Synchronous Sequential circuit analysis, Construction of state diagrams, counter design. **Laboratory Sessions/ Experimental learning**: Simplification, realization of Boolean expressions using logic gates/Universal gates. **Applications**: Analysis of switching device used in different relays. **Video link:** https://lake.videoken.com/nptel/category/698/search/Karnaugh%20maps/video/BzN3nFV-vTQ		

Course outcomes: At the end of the course, the student will be able to	
CO1	Interpret the characteristics of different transistor configurations and special diodes.
CO2	Develop multistage and feedback amplifiers and power amplifiers using transistors.
CO3	Explain different oscillator circuits and signals conversion techniques.
CO4	Solve different logic equations using K map and compare different logic families.
CO5	Develop state diagrams for given clocked sequential circuits.

Reference Books:	
1.	Electronic Devices and Circuit Theory, Robert L Boylestad Louis Nashelsky, Pearson, 11th Edition, 2015.
2.	Electronic Devices and Circuits, S.Salivahanan&N.Suresh, McGraw Hill, 3rd Edition, 2013.
3.	A Text Book of Electrical Technology, Electronic Devicesand Circuits, B.L. Theraja& A.K. Theraja, S. Chand, Reprint, 2013

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

High-3, Medium-2, Low-1

Course Title	Power System Engineering	Semester	IV
Course Code	MVJ19EE34	CIE	50
Total No. of Contact Hours	60 L: T : P :: 40 : 0 : 20	SEE	50
No. of Contact Hours/week	40	Total	100
Credits	3	Exam. Duration	3hrs

Course objective is to: This course will enable students to

- Understand the different types of power generating stations.
- Examine A.C. and D.C. distribution systems.
- Understand and compare overhead line insulators and Insulated cables.
- Illustrate the economic aspects of power generation and tariff methods.
- Evaluate the transmission line parameters calculations
- Understand the concept of corona

Module-1	L1,L2	8Hrs

GENERATION OF ELECTRIC POWER

Conventional Sources (Qualitative): Hydro station, Steam Power Plant, Nuclear Power Plant and Gas Turbine Plant.

Non Conventional Sources (Qualitative): wind Energy and Solar Energy, Introduction of other Non Conventional Sources (Ocean Energy, Tidal Energy, Wave Energy)

Laboratory Sessions/ Experimental learning: Visit near any power station to get practical knowledge on working of power station.

Applications: All industrial applications

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

http://nptel.iitm.ac.in

https://youtu.be/Yg6XsepGCKY

Module-2	L1,L2,L3	8 Hrs

ECONOMICS OF GENERATION

Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer.

Laboratory Sessions/ Experimental learning: Load estimating using software

Applications: Energy auditing

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

http://nptel.iitm.ac.in

https://youtu.be/GRwJqD4StEU

Module-3	L1,L2,L3	8 Hrs

OVERHEAD LINE INSULATORS & INSULATED CABLES

Introduction, types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential..

Introduction, insulation, insulating materials, Extra high voltage cables, insulation resistance of a cable, Capacitance of a single core and three core cables, Overhead lines versus underground cables, types of cables

Laboratory Sessions/ Experimental learning: Insulation test of materials for high voltage- HVE Lab

Applications: Design of insulators and cables

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

http://nptel.iitm.ac.in
https://youtu.be/gd1nruo4_iA

Module-4	**L1,L2,L3**	**8Hrs**

INDUCTANCE & CAPACITANCE CALCULATIONS OF TRANSMISSION LINES

Line conductors, inductance and capacitance of single phase and three phase lines with symmetrical. Composite conductors-transposition, bundled conductors, and effect of earth on capacitance.
Corona: Introduction, disruptive critical voltage, corona loss, Factors affecting corona loss and methods of reducing corona loss, Disadvantages of corona.

Laboratory Sessions/ Experimental learning: Calculation of inductance and capacitance of transmission line using MAT LAB -Simulink software.

Applications: Design of transmission line for different voltages.

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

http://nptel.iitm.ac.in
https://youtu.be/lr1jgbR5ca8

Module-5	**L1,L2,L3**	**8Hrs**

A.C. DISTRIBUTION

Introduction, AC distribution, Single phase, 3-phase, 3 phase 4 wire system, bus bar arrangement, Selection of site for substation .Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages. , Testing of HVDC Valves and Equipment.

DC DISTRIBUTION:

Classification of Distribution Systems.- Comparison of DC vs. AC and Under-Ground vs. Over-Head Distribution Systems.- Requirements and Design features of Distribution Systems.-.

Laboratory Sessions/ Experimental learning: Visit near AC power distribution substation to get practical knowledge on working of power substation

Applications: Domestic applications

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

http://nptel.iitm.ac.in
https://youtu.be/_iz8ZkjD7z8

Course outcomes:	
CO1	Discuss the operation of conventional generating stations and renewable sources of electrical power.
CO2	Evaluate the economic aspects of power generation and tariff methods
CO3	Discuss the performance of typical transmission and distribution system components.
CO4	Determine the electrical circuit parameters of transmission lines
CO5	Analyse A.C. and D.C. distribution systems for different loads.

Reference Books:	
1.	1. C.L. Wadhwa –Electrical Power Systems, Fifth Edition, New Age International, 2009
2.	2. M.V. Deshpande –Elements of Electrical Power Station Design, Third Edition, Wheeler Pub. 1998
3.	H.Cotton& H. Barber-The Transmission and Distribution of Electrical Energy, Third "V.K Mehta and Rohit Mehta", "Principles of Power Systems", S. Chand& Company Ltd, New Delhi, 2004

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

High-3, Medium-2, Low-1

Course Title	**Electrical and Electronics Measurements**	**Semester**	3
Course Code	MVJ19EE35	**CIE**	50
Total No. of Contact Hours	60 L: T : P :: 40 : 0 : 20	**SEE**	50
No. of Contact Hours/week	3	**Total**	100
Credits	3	**Exam. Duration**	3Hrs

Course objective is to: This course will enable students to

- Understand the characteristics of measuring systems and operation of Analog meters.
- Understand the working of wattmeter, energy meter and Instrument transformers.
- Measure power factor, Frequency and basic circuit elements using Bridges.
- Understand the working of Function generator and display devices.
- Understand the principles of various types of transducers and sensors.

Module-1	**L1,L2,L3**	**08Hrs.**

Standards and Units: SI units of charge, voltage, current, power, energy, flux..Static characteristics: Accuracy, Precision, Sensitivity and Resolution and dynamic characteristics: speed of response and fidelity.

Analog and Digital Indicating Meters:- Types of analog instruments, Digital Instruments : AC digital voltmeter, DC digital ammeter, multimeter : Measurement of current by digital multimeter, measurement of resistance by digital multimeter, complete circuit of digital multimeter.

Laboratory Sessions/ Experimental learning: Extension of the range of Voltmeter and Ammeter

Applications: Measurement of Voltage and Current in the Laboratories

Video link: https://nptel.ac.in/courses/108/105/108105153/

Module-2	**L1,L2,L3**	**08Hrs.**

Measurement of Power and Energy: Dynamometer type wattmeter Torque expression, digital wattmeter, Energy meter and its Calibration.

Instrument Transformers: Use of Instrument Transformers. Ratios and Burden of IT-Ratio and phase angle error of CT and PT, Silsbee's method of testing CT, Difference between CT and PT.

Laboratory Sessions/ Experimental learning: Vlab- Three Power Measurement using two Wattmeter method

Applications: Usage of Instrument Transformers for measurement of high current and Voltage and also used as the protective Relays for Power System

Video link : https://nptel.ac.in/courses/108/105/108105153/		
Module-3	**L1,L2,L3**	**08Hrs.**
DC and AC Bridges: Necessity of Bridges, Resistance Measurement -Wheatstone bridge, Limitations, Kelvin double bridge, four-wire method. Measurement of L and C- Maxwell's Bridge, Schering Bridge. Measurement of Earth resistance – Megger**.** **Measurement of phase and frequency:** Power Factor meter, Synchro scopes, Q meter **Laboratory Sessions/ Experimental learning:** Vlab-Measurement of R,L C **Applications:** Measurement of unknown R,L C values and power factor **Video link :** https://nptel.ac.in/courses/108/105/108105153/		
Module-4	**L1,L2,L3**	**08Hrs.**
Function Generators: Introduction, Basic elements of Function generators**,** Pulse Generator **Display Devices:** Concept of Lissajous' patterns, Basic CRO Circuits, Introduction to DSO, Observation and Measurement of Voltage, Current, Frequency and Phase of a waveform, LCD and LED display **Laboratory Sessions/ Experimental learning**: Generation of different waveforms(eg:Sine, Square, Triangular etc) using simulation tool and measure the amplitude, frequency and other parameters **Applications:** Generate the test signals to analyze the performance of the system **Video link** https://nptel.ac.in/courses/108/105/108105153/		
Module-5	**L1,L2,L3**	**08Hrs.**
Transducers: Classification of transducers, selection factors, Operation of potentiometric transducer. LVDT, Thermistors, Thermocouples, Piezoelectric transducers. **Sensors:** Pressure Sensor, Temperature sensor, Hall effect sensor, photo sensor and its application **Laboratory Sessions/ Experimental learning:** Vlab- Characteristics of LVDT, Thermocouple, Temperature sensor, Strain gauge Sensor **Applications:** Used in various practical applications and in projects **Video link:** https://nptel.ac.in/courses/108/108/108108147/		

Course outcomes: At the end of the course, the student will be able to	
CO1	Distinguish the meters to measure the AC and DC electrical quantities
CO2	Explain the working of Wattmeter, Energy meter and Instrument transformers.
CO3	Identify and Select suitable Bridges to measure the basic electrical quantities.
CO4	Explain the working of Function generator and interpret the waveform using CRO.
CO5	Select the suitable transducer and sensor for a particular application.

Reference Books:	
1.	Sawhney A K,A Course in Electrical and Electronic Measurement and Instrumentation‖, Dhanpat Rai & Sons, New Delhi, 2011.
2.	Doeblin E O and Dhanesh N Manik,Measurement Systems", McGraw-Hill, New Delhi, 2012.
3.	David A. Bell,Electronic Instrumentation and Measurements, Oxford University Press, New Delhi, 2012.
4.	Rangan C S, Sharma G R, Mani V S,Instrumentation Devices and Systems‘, Tata McGraw-Hill, New Delhi, 2004

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

High-3, Medium-2, Low-1

Course Title	**Object Oriented Programming& C++**	**Semester**	3
Course Code	MVJ19EE36	**CIE**	50
Total No. of Contact Hours	60 L: T : P :: 40 : 0 : 20	**SEE**	50
No. of Contact Hours/week	3	**Total**	100
Credits	3	**Exam. Duration**	3Hrs

Course objective is to: This course will enable students to

- Identify the need for Java - an object oriented language. Set up Java JDK environment to create, debug and run simple Java programs.
- Illustrate the use of classes and distinguish the usage of different types of Inheritance and constructors in real world.
- Demonstrate the use of exceptions and to create multi-threaded programs
- Design the event driven Graphical User Interface (GUI) programming using swings
- Develop Java Application using JDBC connectivity.

Module-1	**L1,L2,L3**	**08Hrs.**

Prerequisites : Basic Knowledge about C or C++

Introduction to Object Oriented Concepts and Java: Java's Magic: the Byte code; Java Development Kit (JDK); The Java Buzz words, Object Oriented Programming - Two Paradigms, Abstraction, The Three OOP Principles, Simple Java programs. Data types, variables and arrays, Operators, Control Statements.

Laboratory Sessions/ Experimental learning:

A professor in college will allow a student to be excused from the final exam if either of the following is true:

- They have a 90% average or higher in the class and have missed 3 or less class lectures.
- They have a 80% average or higher in the class and have not missed any class lectures. The program below will determine whether a student can get out of the exam or not. Rewrite the program so only one if statement is used.

Applications: Arrays in mathematical vectors, matrices.

Video link / Additional online information:

Differences between JVM vs JRE vs JDK in Java:

https://www.youtube.com/watch?v=5Bp6GLU6HKE

Module-2	**L1,L2,L3**	**08Hrs.**

Classes, Inheritance, Packages and Interfaces: Classes fundamentals; Declaring objects; Assigning object reference variables; Introducing Methods, Constructors, this keyword, Finalize Method. Inheritance: Inheritance basics, using super, creating multi-level hierarchy, when constructors are called, method overriding, using abstract classes. Packages, Access Protection, Importing Packages, Interfaces.

Laboratory Sessions/ Experimental learning:

Write a program that calculates the number of buckets of paint to use for a room and the optimal number of cans to purchase. You need to ask the height of the room and the length and width of the room. The room is rectangular. You must paint the walls and the ceiling but not the floor. There are no windows or skylights. You can purchase the following size buckets of paint.

- 5-liter bucket costs $15 each and covers 1500 square feet.
- 1-liter bucket costs $4 and covers 300 square feet.

Applications: Inheritance in Banking Sectors

Video link / Additional online information:

Types of Inheritance: https://www.youtube.com/watch?v=ZP27c7i5zpg

Module-3	**L1,L2,L3**	**08Hrs.**

Exception Handling and Multi-Threaded Programming: Exception Handling fundamentals, Exception Types, Uncaught Exceptions, Using try catch, Multiple catch clauses, Nested try statements, throw, throws, finally, Java's built-in exceptions, Programming Examples.

Multi-Threaded Programming: The java thread model, Main thread, Creating Thread, Creating multiple threads, Using is Alive() and join(),Thread priorities, Synchronization; InterThread Communication - Bounded buffer problem.

Laboratory Sessions/ Experimental learning:

The Producer-Consumer problem describes two processes, the producer and the consumer, which share a common, fixed-size buffer used as a queue.

- The producer's job is to generate data, put it into the buffer, and start again.
- At the same time, the consumer is consuming the data (i.e. removing it from the buffer), one piece at a time.

Make sure that the producer won't try to add data into the buffer if it's full and that the consumer won't try to remove data from an empty buffer. Write a java code to get the solution for this multi-process synchronization problem.

Applications: Multithreads in Browsers, Servers

Video link / Additional online information:

Multithreading: https://www.youtube.com/watch?v=O_Ojfq-OIpM		
Module-4	**L1,L2,L3**	**08Hrs.**
Event Driven Programming: Event Handling: Two event handling mechanisms; The delegation event model; Event classes; Sources of events; Event listener interfaces; Using the delegation event model. **Swings:** The origins of Swing; Two key Swing features; Components and Containers; The Swing Packages; A simple Swing Application; Create a Swing Applet; Exploring Swing - Jlabel and ImageIcon; JTextField; The Swing Buttons; JTabbedpane; JScrollPane; JList; JComboBox; JTable Laboratory Sessions/ Experimental learning: Develop an Online Exam Project in Java Swing by using java array to store the questions, options and answers without using database. **Applications:** Mobile Applications, Web Applications **Video link / Additional online information**: GUI – Simple Animation: https://www.youtube.com/watch?v=I3usNR8JrEE		
Module-5	**L1,L2,L3**	**08Hrs.**
JDBC: The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata, Data types; Exceptions. **Laboratory Sessions/ Experimental learning:** Develop Student Management System application with swings as the front end and database as the back end using JDBC connectivity. **Applications:** Scientific Applications, Financial Applications **Video link / Additional online information:** Java JDBC : https://www.youtube.com/watch?v=hEWBIJxrLBQ		

Course outcomes: At the end of the course, the student will be able to	
CO1	Illustrate the Object Oriented Programming concepts and basic characteristics of Java
CO2	Demonstrate the principles of classes, inheritance, packages and interfaces
CO3	Experiment with exception handling Mechanisms and Create multi-threaded programs
CO4	Design event driven Graphical User Interface (GUI) programming application using swings
CO5	Develop an application with Database using JDBC connectivity.

Reference Books:	
1.	Herbert Schildt, Java The Complete Reference, 7 /9th Edition, Tata McGraw Hill, 2007.
2.	Jim Keogh: J2EE-The Complete Reference, McGraw Hill, 2007.
3.	Mahesh Bhave and Sunil Patekar, "Programming with Java", First Edition, Pearson Education,2008, ISBN:9788131720806
4.	Rajkumar Buyya , S Thamarasi selvi, xingchen chu, Object oriented Programming with java, Tata McGraw Hill education private limited.
5.	E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies

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

High-3, Medium-2, Low-1

Course Title	**Circuits And Measurements Laboratory**	Semester	III
Course Code	MVJ19EEL37	**CIE**	50
Total No. of Contact Hours	42 L : T : P :: 12 : 0 : 30	**SEE**	50
No. of Contact Hours/week	2	**Total**	100
Credits	1	**Exam. Duration**	3hrs

Course objective is to: This course will enable students to

- Verify network theorems using hardware setup as well as simulation tool
- Measure the resistance, inductance and ratio and phase angle error using suitable circuits/bridges. Understand the calibration of single Phase energy meter.
- Understand the working of transducers.

S.No	**Name of Experiment**
1	Verification of Thevenin's and Norton's Theorem
2	Verification of Maximum Power Transfer Theorem
3	Verification of Superposition Theorem
4	Analysis of Series and Parallel Resonant Circuits
5	Measurement of Low Resistance using four wire method
6	Measurement of Medium Resistance using Wheatstone Bridge
7	Measurement of Inductance using Maxwell's Bridge and Determine Q factor
8	Measurement of Capacitance using Schearing Bridge
9	Determination of Ratio error and phase angle error in current transformer using Silsbee method
10	Calibration of 1Φ Energymeter.
11	Measurement of Linear displacement using LVDT.
12	Measurement of temperature using Thermocouple .

Course outcomes: At the end of the course, the student will be able to

CO1	Apply simulation tool to analyze electrical circuits
CO2	Verify the network theorem using simulation tool and hardware setup
CO3	Select suitable bridge to measure the unknown values of Resistance, Inductance and Capacitance.
CO4	Identify the % error in the energy meter by calibrating the energy meter.

CO5	Make use of transducer in suitable application.

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

High-3, Medium-2, Low-1

Course Title	**Analog and Digital Electronics Laboratory**	**Semester**	III
Course Code	MVJ19EEL38	**CIE**	50
Total No. of Contact Hours	42 L : T : P :: 12 : 0 : 30	**SEE**	50
No. of Contact Hours/week	2	**Total**	100
Credits	1	**Exam. Duration**	3hrs

Course objective is to: This course will enable students to

- Design of different clipper and clamper circuits.
- Design and test different amplifier and oscillator circuits using BJT.
- Realize parallel adders and Subtractors circuits.
- Design and test counters and sequence generators.

S.No	Name of Experiment
1	Design of different clipping and clamping circuits
2	Frequency response of single stage BJT and FET RC coupled amplifier and determination of half power points, bandwidth, input and output impedances.
3	Realization of parallel adder/Subtractors using 7483 chip
4	Design and implementation of code converters using logic gates (i) BCD to excess-3 code and vice versa (ii) Binary to gray and vice-versa
5	Realization of 3 bit counters as a sequential circuit and MOD – N counter design using 7476, 7490, 74192, 74193
6	Design and realization of R-2R ladder DAC.
7	Realization of Two bit Flash ADC
8	Design and verify an IC 555 timer based pulse generator for the specified pulse.

Course outcomes: At the end of the course, the student will be able to

CO1	Design of different clipper and clamper circuits.
CO2	Design and test BJT and FET amplifier and oscillator circuits.
CO3	Realize parallel adder/ Subtractors using 7483 chip
CO4	Realize R-2R ladder DAC and two bit flash ADC.
CO5	Design pulse generators for the specified pulse

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

High-3, Medium-2, Low-1