



MVJ College of Engineering, Whitefield, Bangalore

An Autonomous Institution, Affiliated to VTU, Belagavi

Scheme of Teaching and Examination 2021

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

Effective from the academic year 2021-22

I SEMESTER B.E. (PHYSICS GROUP)

S. No	Course		Course Title	Teaching Department	Teaching hours/week			Examination				Credits	
					Theory Lecture	Tutorial	Practical/Drawi ng	Self-Study Component	Duration in Hours	CIE Marks	SEE Marks		Total marks
	L	T			P	S							
1	BSC	MVJ21MAT11	Calculus and Linear Algebra with python	Mathematics	3	1	1		5	50	50	100	4
2	BSC	MVJ21PHY12	Engineering Physics	Physics	2	2	0		4	50	50	100	3
3	ESC	MVJ21EE13	Basic Electrical Engineering	Electrical & Electronics Engineering	2	2	0		4	50	50	100	3
4	ESC	MVJ21CV14	Elements of Civil Engineering & Mechanics	Civil Engineering	2	2	0		4	50	50	100	3
5	ESC	MVJ21EGR15	Engineering Graphics	Mechanical Engineering	2	2	0		4	50	50	100	3
6	BSC	MVJ21PHYL16	Engineering Physics Lab	Physics	0	0	2		2	50	50	100	1
7	ESC	MVJ21EEL17	Basic Electrical Engineering Lab	Electrical & Electronics Engineering	0	0	2		2	50	50	100	1
8	HSMC	MVJ21EGH18	Business communication	Humanities	1	0	0		1	50	50	100	1
9	AEC	MVJ21AEC19	Ability Enhancement Course		1	0	0		1	50	50	100	1
Total					13	9	5		27	450	450	900	20

Note: BSC: Basic Science, ESC: Engineering Science, HSMC: Humanity and Social Science

II SEMESTER B.E. (PHYSICS GROUP)

S. No	Course		Course Title	Teaching Department	Teaching hours/week			Examination				Credits	
					Theory Lecture	Tutorial	Practical/Drawing	Self-Study Component	Duration in Hours	CIE Marks	SEE Marks		Total marks
	Type	Code			L	T	P	S					
1	BSC	MVJ21MAT21	Advanced Calculus and Numerical Methods with Python	Mathematics	3	1	1		5	50	50	100	4
2	BSC	MVJ21PHY22	Engineering Physics	Physics	2	2	0		4	50	50	100	3
3	ESC	MVJ21EE23	Basic Electrical Engineering	Electrical & Electronics Engineering	2	2	0		4	50	50	100	3
4	ESC	MVJ21CV24	Elements of Civil Engineering & Mechanics	Civil Engineering	2	2	0		4	50	50	100	3
5	ESC	MVJ21EGR25	Engineering Graphics	Mechanical Engineering	2	2	0		4	50	50	100	3
6	BSC	MVJ21PHYL26	Engineering Physics Lab	Physics	0	0	2		2	50	50	100	1
7	ESC	MVJ21EEL27	Basic Electrical Engineering Lab	Electrical & Electronics Engineering	0	0	2		2	50	50	100	1
8	HSMC	MVJ21EGH28	Professional Writing	Humanities	1	0	0		1	50	50	100	2
9	AEC	MVJ21AEC29	Ability Enhancement Course		1	0	0		1	50	50	100	1
Total					13	9	5		27	450	450	900	20

Note: BSC: Basic Science, ESC: Engineering Science, HSMC: Humanity and Social Science

Course Title	CALCULUS AND LINEAR ALGEBRA WITH PYTHON	Semester	I
Course Code	MVJ21MAT11	CIE	50
Total No. of Contact Hours	50 L : T : P :: 3 : 1 : 1	SEE	50
No. of Contact Hours/week	5	Total	100
Credits	4	Exam. Duration	3 Hours

Course objective is to:

This course Engineering Mathematics-I will enable students:

- To familiarize the important tools of calculus and differential equations that are essential in all branches of engineering.
- To develop the knowledge of matrices and linear algebra in a comprehensive manner

Module-1

L1 & L2

10 Hours

Differential Calculus-1:

Review of elementary differential calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature- Cartesian and polar forms–applications to evolutes and involutes

Self Study : Centre and Circle of Curvature

Laboratory Sessions- Plotting of standard Cartesian curves using Python

Applications: Differential Calculus is applied in all Science and Engineering

Video link :

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

<https://www.youtube.com/watch?v=s6F5yjY6jWk&list=PLMLsjhQWWIUqBoTCQDtYllol-o-9hxp11>

Module-2

L1 & L2

10 Hours

Differential Calculus-2:

Maclaurin's series expansions for one variable, indeterminate forms ($1^\infty, 0^0, \infty^0$) - L'Hospital's rule. Partial differentiation; Total derivatives-differentiation of composite functions, Jacobians, Maxima and minima for a function of two variables- problems.

Self Study : Other indeterminate forms

Laboratory Sessions: Obtaining partial derivative of some standard functions using Python

Applications: Differential Calculus is applied in all Science and Engineering.

Video link:

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

<https://www.youtube.com/watch?v=s6F5yjY6jWk&list=PLMLsjhQWWIUqBoTCQDtYllol-o-9hxp11>

Module-3	L1 & L2	10 Hours
<p>Integral Calculus:</p> <p>Double and triple integrals. Evaluation of double integrals- change of order of integration and changing into polar co-ordinates. Applications to find area and volume.</p> <p>Beta and Gamma functions: Definitions, Relation between beta and gamma functions - problems.</p> <p>Self Study: Finding Area and Volume of Integrals.</p> <p>Laboratory Sessions: Evaluation of the double integral using Python</p> <p>Applications: Several physical applications of the definite integral are common in engineering and physics like Areas between Curves, Arc length of curve and surface area.</p> <p>Video link :</p> <p>https://www.youtube.com/watch?v=db7d_a0wiUg&list=PLU6SqDYcYsfLoKyzF_dwxAQf8Ili6VC54</p> <p>https://www.khanacademy.org/math/ap-calculus-ab/ab-integration-new/ab-6-1/v/introduction-to-integral-calculus</p>		
Module-4	L1,L2 & L3	10 Hours
<p>Ordinary differential equations of first order:</p> <p>Exact and reducible to exact differential equations, Bernoulli's equation, Applications of ODE's- orthogonal trajectories and Newton's law of cooling.</p> <p>Nonlinear differential equations: Introduction to general and singular solutions; Solvable for p; Clairaut's and reducible to Clairaut's equations.</p> <p>Self Study : L-R circuits</p> <p>Laboratory Sessions: Problems on Ordinary differential equation using Python</p> <p>Applications: Cooling/Warming Law, series circuit, Survivability with AIDS, Draining a tank, Determining the current or charge in the circuit.</p> <p>Video link:</p> <p>https://users.math.msu.edu/users/gnagy/teaching/ode.pdf</p> <p>https://www.mathsisfun.com/calculus/differential-equations.html</p>		
Module-5	L1,L2 & L3	10 Hours
<p>Linear Algebra:</p> <p>Rank of a matrix-echelon form, Solution of system of linear equations – Gauss-elimination method and Gauss-Seidel method, Eigen values and eigenvectors using Rayleigh's power method, Diagonalization of a square matrix of order two.</p>		

Self Study :Gauss – Jordan Method

Laboratory Sessions: Solving system of Linear equations using Python

Applications:Used in all science and Engineering Like-Heat Distribution, Coding Theory, Games Networking, Image compression

Video link :<https://www.math.ust.hk/~machas/matrix-algebra-for-engineers.pdf>
<https://www.khanacademy.org/math/linear-algebra>

Course outcomes:

CO1	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
CO2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.
CO3	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
CO4	Solve first order linear/nonlinear differential equation analytically using standard methods.
CO5	Make use of matrix theory for solving system of linear equations and compute eigenvalues and eigenvectors required for matrix diagonalization process.

Text Books:

1	B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2	E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed., 2015.
3	G. B. Gururajachar: Calculus and Linear Algebra, Academic Excellent Series Publication, 2018-19

Reference Books:

1	N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.
2	B.V.Ramana: "Higher Engineering Mathematics" Tata McGraw-Hill, 2006.
3	H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics", S. Chand publishing, 1st edition, 2011.

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 (10 marks)
- Assignments/ Self study assignment/seminars (10 Marks)

SEE Assessment:

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

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

High-3, Medium-2, Low-1

Course Title	ADVANCED CALCULUS AND NUMERICAL METHODS WITH PYTHON	Semester	II
Course Code	MVJ21MAT21	CIE	50
Total No. of Contact Hours	50 L : T : P :: 3 : 1 : 1	SEE	50
No. of Contact Hours/week	5	Total	100
Credits	4	Exam. Duration	3 Hours

Course objective is to:

This course viz., Advance Calculus and Numerical Methods aims to prepare the students:

- To familiarize the important tools of vector calculus, ordinary/partial differential equations and power series required to analyze the engineering problems.
- To apply the knowledge of interpolation/extrapolation and numerical integration technique whenever analytical methods fail or very complicated, to offer solutions

Module-1

L1 & L2

10 Hours

Vector Calculus:

Vector Differentiation: Scalar and vector fields. Gradient, curl and divergence, solenoidal and irrotational vector fields- problems, Vector identities.

Vector Integration: Line integrals, Theorems of Green, Gauss divergence and Stokes. Applications to work done by a force and flux.

Self Study : Physical Interpretation of Curl and Divergence, Directional Derivative

Laboratory Sessions-To demonstrate the physical interpretation of gradient, divergence and curl using Python

Applications: Vector Calculus is applied in all Science and Engineering .Used in 2-D and 3-D gaming theory.

Video link :

<https://www.slideshare.net/raghuram401/vector-calculus-20955340>

<https://www.slideshare.net/jacobblackvampire/rajatshukla>

<https://www.youtube.com/watch?v=sO9Z2RSeH4s>

Module-2

L1 & L2

10 Hours

Differential Equations of higher order:

Second order linear ODE's with constant coefficients-Inverse differential operators, Cauchy's and Legendre homogeneous equations. Applications to L-C-R circuits.

Self Study : Method of Variation of Parameter

Laboratory Sessions: Finding complementary function of constant coefficient second and higher order ordinary differential equations using Python

Applications: Differential equation has highest application in all field of science and engineering

Videolink:<https://www.slideshare.net/ayeshajavednoori/application-of-higher-order-differential-equations>
<https://www.math24.net/topics-higher-order-differential-equations/>

Module-3

L1 & L2

10 Hours

Partial Differential Equations:

Formation of PDE's by elimination of arbitrary constants and functions, Solution of non- homogeneous PDE by direct integration, Homogeneous PDE's involving derivative with respect to one independent variable only. Derivation of one dimensional heat and wave equations and solutions by the method of separation of variables.

Self Study: More number of engineering application problems on heat and wave equations

Laboratory Sessions: Solutions to the problems on different types of Partial differential equations using Python

Applications: Tangent Plane and Linear approximation .To find Local Maxima and Minima

Video link : <http://tutorial.math.lamar.edu/Classes/DE/IntroPDE.aspx>

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

<http://www.nptelvideos.in/>

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

Module-4

L1,L2 & L3

10 Hours

Infinite Series:Series of positive terms-convergence and divergence. P-series test, comparison test D'Alembert's ratio test and Cauchy's root test – examples.

Power Series solutions-Recurrence relation, Series solution of Bessel's differential equation leading to $J_n(x)$ - Bessel's function of first kind, orthogonality. Series solution of Legendre's differential equation leading to $P_n(x)$ -Legendre polynomials. Rodrigue's formula- problems.

Self Study : Proofs of D'Alembert's ratio test and Cauchy's root test

Laboratory Sessions: Illustration of convergent, divergent and oscillatory sequences using Python.

Applications: Series solution helps in understand the derivative in term of series solution using Power series and Frobenius Method.

Video link:

<http://easymathseasytricks./>

<http://www.nptelvideos.in/>

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

Module-5	L1,L2 & L3	10 Hours
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Numerical Methods:

Finite differences: Interpolation and Extrapolation using Newton's forward and backward difference formula, Newton's divided difference and Lagrange's formula.

Solution of polynomial and transcendental equations– Newton-Raphson and Regula-Falsi methods-Problems.

Numerical integration: Simpson's (1/3)rd and (3/8)th rules, Weddle's rule– Problems.

Self Study : Proof's of Newton Raphson and Regula-Falsi Method

Laboratory Sessions: Solving algebraic equation (Regula-Falsi and Newton-Raphson methods) using Python

Applications: Use of Numerical Methods help in reducing the theoretical work

<http://www.nptelvideos.in/>

<http://www.class-central.com/subject/math>

Course outcomes:

CO1	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.
CO2	Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
CO3	Construct a variety of partial differential equations and solution by exact methods/method of separation of variables.
CO4	Explain the applications of infinite series and obtain series solution of ordinary differential equations.
CO5	Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.

Text Books:

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CIE Assessment:

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- Quizzes (10 marks)
- Assignments/ Self- study/ Seminars (10 Marks)

SEE Assessment:

- iv. 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.
- v. 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.
- vi. 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	2	0	0	0	0	0	0	1	1
CO2	3	3	0	2	0	0	0	0	0	0	1	1
CO3	3	3	0	3	0	0	0	0	0	0	0	1
CO4	2	2	0	3	0	0	0	0	0	0	1	1
CO5	2	2	0	2	0	0	0	0	0	0	0	1

High-3, Medium-2, Low-1

Course Title	ENGINEERING PHYSICS	Semester	I/II
Course Code	MVJ21PHY12/22	CIE	50
Total No. of Contact Hours	40 L : T : P :: 2 : 2 : 0	SEE	50
No. of Contact Hours/week	4	Total	100
Credits	3	Exam. Duration	3 HOURS

Course objective is to: Enable students

- Learn the basic concepts in physics which are very essential in understanding and solving engineering related Challenges
- Gain better knowledge of newer concepts in modern Physics for the better appreciation of modern technology.

Module-1	RBT Level	Hrs.
<p align="center">Oscillations and Waves</p> <p>Free oscillations: Definition of SHM, Derivation of Equation for SHM, Mechanical Simple Harmonic Oscillators, (Mass suspended to spring), (Pre-requisite: Complex notation and phasor representation of SHM), Equation of motion for Free oscillations, Natural frequency of oscillations.</p> <p>Damped oscillations. Theory of damped oscillations: over damping, critical damping and under damping, Quality factor. Numerical problems.</p> <p>Shock waves: Mach number, Properties of shock waves, Control volume, Laws of conservation of mass, energy and momentum. Construction and working of Reddy Shock Tube, Applications of shock waves. Numerical problems.</p> <p>Self-Learning topics: Forced oscillations, LC oscillations.</p> <p>Teaching Learning Process :Chalk and Board, PowerPoint presentation, and Videos</p> <p>Laboratory Sessions/ Experimental learning:</p> <ol style="list-style-type: none"> 1. Verification of Hooke's law 2. Calculating the time period of oscillations of springs in Series and parallel <p>Related to Higher semester subjects: Introduction to aerospace engineering(AE) ,Aerodynamics-I(AS), Engineering Geology(CV), Earthquake engineering (CV),Dynamics of Machines(ME), Advanced Vibrations(ME)</p>	L1, L2, L3	8

<p>Video link / Additional online information:</p> <p>https://www.youtube.com/watch?time_continue=29&v=olTD-mpsU4E&feature=emb_logo</p> <p>https://www.youtube.com/watch?time_continue=420&v=T3XguAl-15c&feature=emb_logo</p> <p>https://www.youtube.com/watch?v=bO2Z308uFpo</p>		
Module-2	RBT Level	Hrs.
<p style="text-align: center;">Elastic Properties of materials</p> <p>Elasticity : Concept of elasticity, Plasticity, Stress, Strain, Tensile stress, Shear stress, Strain hardening and strain softening, failure (fracture/ fatigue), Hooks law, Different elastic moduli: Poisson ratio, Expression for Young’s Modulus (Y), Bulk Modulus (K), and Rigidity modulus (n) in terms of β. Relation between Y, n, K.</p> <p>Bending of Beams: Definition of beams, different types of beams, Definition of neutral surface/plane and neutral axis, Bending moment: expression for bending moment in terms of moment of inertia, Bending moment for circular and rectangular cross sections. Single cantilever: derivation of expression for Young’s Modulus.</p> <p>Torsion of a cylinder: Expression for couple per unit twist for a solid cylinder (Derivation), Torsional pendulum, Expression of period of Oscillations. Numerical problems.</p> <p>Self-Learning topics: Young’s Modulus of materials by Uniform Bending Method</p> <p>Teaching Learning Process :Chalk and Board, PowerPoint presentation, and Videos</p> <p>Experimental learning: Model making of types of beams.</p> <p>Related to Higher semester subjects: Mechanics of Materials(AE)Aerospace Materials(AE),Material Science(CH), Strength of Materials(CV), MECHANICS OF MATERIALS(ME), MARERIAL SCIENCE(ME), THEORY OF ELASTICITY (Elective)(ME),</p>	L1, L2, L3	9

<p>Video link / Additional online information:</p> <p>https://youtu.be/ITuWnrl3aKI</p> <p>https://youtu.be/JGK8i0X55Mc</p> <p>https://www.youtube.com/watch?v=R6yC-rkrYz4</p>		
Module-3	RBT Level	Hrs.
<p style="text-align: center;">Quantum Mechanics</p> <p>Wave Mechanics: Brief discussion on Phase velocity, group velocity, Relation between phase velocity and group velocity (No derivation).</p> <p>Quantum Mechanics: Failure of classical physics - Black body radiation, Wien's displacement law, Wien's law, Rayleigh jeans law, Planck's law of Radiation. Compton effect. De-Broglie hypothesis, matter waves, characteristics of matter waves. Heisenberg's uncertainty principle (HUP) – Statement, Different forms. Application of HUP - non confinement of electrons in the atomic nucleus. Wave function (WF), Physical Significance of WF, Normalization. Schrodinger's time independent wave equation, particle in a 1-D Infinite potential well- Derivation of WF. Probability densities and Energy Eigen values of a particle in a 1-D Infinite potential well in first three energy levels. Numerical problems.</p> <p>Introduction to Quantum Computing: Difference between classical computing and quantum computing, Advantages and disadvantages of Quantum computing.</p> <p>Self-Learning topics: Quantum logic gates</p> <p>Teaching Learning Process :Chalk and Board, PowerPoint presentation, and Videos</p> <p>Related to Higher semester subjects: Introduction to astrophysics and Space Environment(AS), Electron Devices/ digital electronics(ECE)</p> <p>Video link / Additional online information:</p> <p>https://nptel.ac.in/courses/115101107/</p> <p>https://nptel.ac.in/courses/115102023/</p> <p>https://nptel.ac.in/courses/115104096/</p> <p>https://oyc.yale.edu/physics/phys-201/lecture-19</p> <p>https://ocw.mit.edu/courses/physics/8-05-quantum-physics-ii-fall-2013/video-lectures/lecture-1-wave-mechanics/</p>	L1, L2, L3	8

Module-4	RBT Level	Hrs.
<p style="text-align: center;">Lasers and Optical Fibers</p> <p>Lasers: Interaction of radiation with matter – Spontaneous and Stimulated processes. Einstein’s A, B coefficients - derivation of energy density. Requisites of a Laser system. Principle, construction and working of CO₂ Laser.</p> <p>Semiconductor Lasers – GaAs Laser. Application of Lasers - Laser range finder, Compact Disc, Retinal reconstruction surgery, Numerical problems.</p> <p>Optical Fibers: Propagation mechanism, angle of acceptance. Numerical aperture. Modes of propagation and types of rays - Meridional rays and Skew ray. Classification of optical fibers. Attenuation: causes of attenuation and mention of expression for attenuation coefficient. Discussion of block diagram of Point to Point communication. Merits and demerits. Numerical problems.</p> <p>Self-Learning topics: Optical amplifiers.</p> <p>Teaching Learning Process :Chalk and Board, PowerPoint presentation, and Videos</p> <p>Experimental learning:</p> <ol style="list-style-type: none"> 1. Demonstration of directionality of Laser light. 2. Model of point to point communication. <p>Related to Higher semester subjects: Space vehicle Design(AS) – Laser cutting , Highway Engineering(CV)—laser drilling, cutting of metals, Optical fibre communication -(ECE)</p> <p>Video link / Additional online information:</p> <p>https://www.youtube.com/watch?v=PK4yFaGHSFc&list=PLU0oJASljGxdZMty_pwhvGrnmuzNnNdckT</p> <p>https://www.youtube.com/watch?v=sAVE7pMhaxk</p> <p>https://www.youtube.com/watch?v=urbZ8CTceu0</p> <p>https://www.youtube.com/watch?v=qixt0NLc9I</p>	L1, L2, L3	8

Module-5	RBT Level	Hrs.
<p align="center">Crystal physics and Nano Science</p> <p>Crystals: Review of Bravais lattices, Directions and planes in crystals, Miller indices, Expression for inter planar spacing, Numerical problems.</p> <p>Liquid Crystals: Types of liquid crystals, Application – LCD</p> <p>Nano-Science: Introduction to Nano-science, Mesoscopic state. Top-down and Bottom –up approach. Ball milling.</p> <p>Carbon Nano Tubes (CNT) – Structures, Properties, Mentioning of any 3 Engineering Applications of CNT.</p> <p>SEM: Principle, Construction, Working and applications.</p> <p>Self-Learning topics: TEM,STEM(Scanning tunnelling electron microscope)</p> <p>Teaching Learning Process :Chalk and Board, PowerPoint presentation, and Videos</p> <p>Experimental learning:</p> <ol style="list-style-type: none"> 1. Model making of different crystal structures. 2. Demo of sol-gel method of synthesis of nanoparticles (Zn O) <p>Related to Higher semester subjects: Composite of Materials (AE), MATERIAL SCIENCE (CH), Solid Waste Management (CV), and MATERIAL SCIENCE (ME).</p> <p>Video link / Additional online information:</p> <p>https://www.youtube.com/watch?v=J8Bo9BHxesE</p> <p>https://www.youtube.com/watch?v=1vsNxkdlcXw</p> <p>https://www.youtube.com/watch?v=k61wjab7iUs</p> <p>https://www.youtube.com/watch?v=ebO38bbq0_4&list=PLbMVogVj5nJTdeiLvuGSB_AE8hloTAHWJ</p> <p>https://www.youtube.com/watch?v=mC0rYNIMz9Q</p>	L1, L2, L3	7

Course outcomes:

Course outcomes: On completion of this course, students are able to:	
CO1	Understand various types of oscillations and their implications, the role of Shock waves in various fields.
CO2	Recognize the elastic properties of materials for engineering applications.
CO3	Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent 1-D Schrodinger’s wave equation.

CO4	Apprehend theoretical background of laser, construction and working of different types of laser and its applications in optical fibers.
CO5	Understand various concepts of crystal structure and the basics of Nanoscience.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and of Semester End Exam (SEE) is 50%.

The student has to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration). Based on this, grades will be awarded.

Continuous Internal Evaluation:

1. Methods suggested: Test, Open Book test, Written Quiz, Seminar, Report writing etc.
2. The class teacher has to decide the topic for closed book test, open book test, Written Quiz and Seminar. In the beginning of the semester, the teacher has to announce the methods of CIE for the subject.

Semester End Examination:

Theory SEE will be conducted by the institution involving the Board of examiners as per the scheduled time table.

1. The question paper will have two parts: Part A and Part B.
2. Part A will contain 1 or 2 marks questions for a total of 20 marks.
Part B will contain 5 questions of 16 marks each.
3. There will be 2 questions from each module in Part B with internal choice. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

Text Books:

1.	A Text book of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand & Company Ltd, New Delhi
2.	Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017
3.	Nano: The Essentials: Understanding Nanoscience and Nanotechnology- T. Pradeep, Tata McGraw Hill- 2008 Ed
4.	A Text book of Engineering Physics-S.P.Basavaraju

Reference Books:

1.	Introduction to Mechanics — MK Verma: 2nd Ed, University Press(India) Pvt Ltd, Hyderabad 2009
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Course Title	Basic Electrical Engineering	Semester	I
Course Code	MVJ21EE13/ MVJ21EE23	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	3Hrs

Course objective is to:

- Introduction to electric power system and Electricity billing
- Application of Ohm's law and Kirchhoff's laws to DC circuits.
- Analysis of single phase AC series circuits and three phase balanced circuits.
- Construction, working and performance of electrical machines and transformer.
- Concepts of electrical wiring, circuit protecting device and earthing.
- Introduction to moving coil and moving iron type measuring instruments

Module-1	L1,L2	08Hrs.
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Introduction to Electrical Power system: Introduction to generation, transmission and distribution of electrical power. AC and DC power. Concept of grid and need for interconnection of grids, conditions for grid connection, types of loads,

Domestic wiring: Service mains, meter board and distribution board, necessity of earthing, energy efficient lamps, Fuse and Miniature circuit breaker (MCB), merits and demerits.

Safety measures: Electric Shock, Safety Precautions to avoid shock.

Electricity bill: Power rating of household appliances including air conditioners, PCs, laptop, printer etc. Definition of "unit" used for consumption of electrical energy, two - part electricity tariff

Laboratory Sessions/ Experimental learning: Calculation of electricity bill for domestic consumers.

Applications: Calculation of electricity bill, Electrical safety

Web Link and Video Lectures:

1. <https://nptel.ac.in/courses/108/102/108102047/>
2. <https://www.electricaleasy.com/2016/01/electricity-rates-or-tariff.html>

Module-2	L1,L2,L3	08Hrs.
<p>D.C. Circuits: Ohm's law, Kirchhoff's laws, current and voltage division rule (Self study contents) analysis of series, parallel and series-parallel circuits excited by independent voltage sources, power and energy.</p> <p>Single phase AC circuits: Generation of sinusoidal voltage, definition of average value, r.m.s. value, form factor and peak factor of sinusoidal varying voltage and current, phasor representation of alternating quantities, analysis with phasor diagram of R-L, R-C and R-L-C series circuits, real power, reactive power, apparent power and power factor.</p>		
<p>Laboratory Sessions/ Experimental learning: Simulation of circuits using software.</p> <p>Applications: Analysis of electrical circuits.</p> <p>Web Link and Video Lectures:</p> <ol style="list-style-type: none"> 1. https://www.khanacademy.org/ 2. http://www.nptelvideos.in/ 3. https://www.classcentral.com/ 		
Module-3	L1,L2,L3	08Hrs.
<p>D.C. machines: Faraday's laws, Lenz's law, Fleming's rules, statically and dynamically induced emfs (Self study contents) working principle of a D.C. machine as a generator and a motor, constructional details in brief</p> <p>D.C. motor: Back emf, torque equation, type of DC motors and applications, necessity of starter for a DC motor</p> <p>Transformers: Self-inductance, mutual inductance and coupling coefficient, Principle of operation and construction of single phase transformers (core and shell types), EMF equation, losses and efficiency.</p> <p>Laboratory Sessions/ Experimental learning: Demonstration of machines.</p> <p>Application: Understanding the fundamental operation of different electrical machines.</p> <p>Web Link and Video Lectures:</p> <ol style="list-style-type: none"> 1. https://www.khanacademy.org/ 2. http://www.nptelvideos.in/ 3. https://www.classcentral.com/ 		

Module-4	L1,L2,L3	08Hrs.
<p>Three phase AC circuits: Necessity and advantages of three phase systems, phase sequence, relationship between line and phase quantities in balanced star and delta connections, power in three phase circuits.</p>		
<p>Three phase induction motors: Constructional details, production of rotating magnetic field, principle of operation, slip, types and applications, necessity and types of starter.</p>		
<p>Laboratory Sessions/ Experimental learning:</p>		
<p>1. Measurement of power for 3-phase circuits using software.</p>		
<p>Application: Understanding the fundamental operation of mostly used industrial machine.</p>		
<p>Web Link and Video Lectures:</p>		
<p>1. https://www.khanacademy.org/</p>		
<p>2. http://www.nptelvideos.in/</p>		
<p>3. https://www.classcentral.com/</p>		

Module-5	L1,L2,L3	08Hrs.
<p>Measuring Instruments: Construction and working of moving iron type and moving coil type instruments, advantages and disadvantages, Construction and working of wattmeter, energy meter and megger.</p>		
<p>Laboratory Sessions/ Experimental learning:</p>		
<p>1. Demonstration of measuring instruments.</p>		
<p>2. Layout of house wiring with following requirements: No. of Rooms-02. Each room has 1 distribution board, 2 fans or 1 AC, 3 lamp loads and 2 power sockets.</p>		
<p>Application: Understanding the fundamentals electrical wiring.</p>		
<p>Web Link and Video Lectures:</p>		
<p>1. https://www.khanacademy.org/</p>		
<p>2. http://www.nptelvideos.in/</p>		
<p>3. https://www.classcentral.com/</p>		

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

C103.1	Understand the concepts of generation, transmission and distribution of electric power, Electricity billing and safety measures.
C103.2	Analyze DC and single phase AC circuits.
C103.3	Understand the construction and principle of operation of electrical machines and single phase transformers.
C103.4	Understand three phase AC circuits and principle of operation of induction motor.
C103.5	Understand the working of measuring instruments and house wiring.

Text Books:

1.	E. Hughes, "Electrical And Electronic Technology", Pearson, International Students Tenth Edition.
2.	C Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, Revised first Edition.

Reference Books:

1.	M V Rao, "Basic Electrical Engineering".
2.	Ashfaq Husain, "Fundamentals of Electrical Engineering", Dhanpat Rai & Co. Third Edition

CIE Assessment:

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

- Quizzes/mini tests (4 marks)
- Mini Project / Case Studies (8 Marks)

Activities/Experimentations related to courses (8 Marks)

SEE Assessment:

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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C103.1	3	1	1	-	-	1	3	-	2	-	-	1
C103.2	3	3	2	-	-	-	-	-	2	-	-	2
C103.3	3	2	1	-	-	-	-	-	-	-	-	1
C103.4	2	1	-	-	-	-	-	-	-	-	-	-
C103.5	2	1	-	-	-	-	-	-	2	-	-	1

High-3, Medium-2, Low-1

Course Title	ELEMENTS OF CIVIL ENGINEERING & MECHANICS	Semester	I/II
Course Code	MVJ21CV14/24	CIE	50
Total No. of Contact Hours	40 L : T : P :: 2 : 2 : 0	SEE	50
No. of Contact Hours/week	4	Total	100
Credits	3	Exam. Duration	3 Hours

Course objective is to:

- Learn Scope of various fields of Civil Engineering, basics of Engineering Mechanics Concepts.
- Verify the Equilibrium condition of Coplanar Concurrent Force System
- Solve the problems associated with Forces / Loads and Moments with different support conditions
- Analyze the force and motion of bodies under kinematics
- Calculate the First and Second area moment for regular geometrical cross sections

Prerequisites: Knowledge of Mathematics (Integration, Vector Algebra), Knowledge of Physics- Units and Measurements, Motion in a Straight Line, Centroid, forces.

Module-1

L1, L2, L3

8 Hours

Introduction: Application of Mechanics in various disciplines of Engineering. (Online Mode) **Scope of**

different fields of Civil Engineering: Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics Engineering, Transportation Engineering. (Online Mode)

Engineering Mechanics: Introduction - Idealization of bodies - particle, Continuum, rigid body, point force, Newton's laws of motion, Concept of force & its Characteristics, internal and external force, force system & types of force systems, Parallelogram law: concept and Numerical Problems, Principle of Transmissibility of forces, Principle of Superposition and Physical independence of forces. Resolution and composition of force, resultant of coplanar concurrent forces - concept and Numerical Problems. Moment of a force about a point and about an axis, couple, characteristics of couple, moment of couple, Numerical Problems.

Laboratory Sessions/ Experimental learning: (Self-Learning)

- Determination of Resultant of concurrent and non-concurrent forces by graphical method

Applications: (Self-Learning)

- Resultant force for Ship Movement
- Resultant moment of a Couple

Video link / Additional online information: (Self-Learning)

- Fundamental Law: <https://nptel.ac.in/courses/122104014/>
- Concurrent force : <https://nptel.ac.in/courses/115104094/>

Module-2**L1, L2, L3****8 Hours**

Resultant of coplanar forces: Varignon's theorem (Principle of moments) (Online Mode): Resultant of coplanar non-concurrent forces by method of resolution- Numerical Problems.

Equilibrium: Concept of equilibrium, Free body diagram, conditions of equilibrium of concurrent and non-concurrent coplanar force system. Triangle law-concept and Polygon law of forces-concept, Lame's Theorem-concept (Online Mode) and Numerical Problems. Graphical Method to find Resultant of concurrent and non-concurrent forces Graphical Method to justify the Equilibrium of coplanar concurrent and non-concurrent force systems.

Laboratory Sessions/ Experimental learning: (Self-Learning)

- Model Making of Principle of Moment under given loading condition

Applications: (Self-Learning)

- Equilibrium condition of Rigid body
- Cantilever Beam Support Reaction

Video link / Additional online information: (Self-Learning)

- Varignon's theorem: <https://nptel.ac.in/courses/115104094/>
- Equilibrium: <https://nptel.ac.in/courses/122104015/>

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

Support Reactions: Types of Loads and Supports, Introduction to statically determinate and indeterminate beams (Online Mode), Numerical Problems on support reactions for statically determinate beams (point load, uniformly distributed load, uniformly varying loads and moments).

Friction: Introduction, coefficient of friction, limiting friction, angle of friction, angle of repose, cone of friction; laws of Dry (Coulomb) friction (Online Mode), Numerical Problems on single and multi-body system on horizontal and incline planes and ladder friction.

Laboratory Sessions/ Experimental learning: (Self-Learning)

- Determine the coefficient of friction between different surfaces on an inclined plane

Applications: (Self-Learning)

- Motion of Piston in Cylinder
- Screw Jack for uplifting of objects

Video link / Additional online information: (Self-Learning)

- Law of Friction: <https://nptel.ac.in/courses/113108083/>

Module-4	L1, L2, L3	8 Hours
<p>Kinematics: Definitions, Displacement, Average velocity, Instantaneous velocity, Speed, Acceleration, Average acceleration, Variable acceleration, Acceleration due to gravity, rectilinear motion, Projectile Motion (Online Mode) - Numerical Problems.</p> <p>Dynamics: D' Alembert's principle and its application in plane motion and connected bodies including pulleys (Online Mode) - Numerical Problems.</p> <p>Laboratory Sessions/ Experimental learning: (Self-Learning)</p> <ul style="list-style-type: none"> • Conducting Linear motion of object under given condition of gravitation and Projectiles <p>Applications: (Self-Learning)</p> <ul style="list-style-type: none"> • Motion of Lift • Lifting of open storage containers <p>Video link / Additional online information: (Self-Learning)</p> <ul style="list-style-type: none"> • Dynamics: https://nptel.ac.in/courses/112/106/112106180/ 		
Module-5	L1, L2, L3	8 Hours
<p>Centroids and Centre of gravity: Concept, centroid of line and regular geometrical area, centroid of irregular lamina by method of integration, centroids of composite Areas and built-up sections (Online Mode) - Numerical Problems.</p> <p>Moment of inertia: Regular shapes by integration method, polar moment of inertia, radius of gyration, Parallel and Perpendicular axis theorem, moment of inertia of composite areas and built-up sections (Online Mode) – Numerical Problems. Practical verification of significance of Centroid of different types of lamina.</p> <p>Laboratory Sessions/ Experimental learning: (Self-Learning)</p> <ul style="list-style-type: none"> • Verification of significance of Centroid of different types of plane lamina <p>Applications: (Self-Learning)</p> <ul style="list-style-type: none"> • Axis of Symmetry • Bending Resistance of the Beam <p>Video link / Additional online information: (Self-Learning)</p> <p>Centroid: http://www.nptelvideos.in/2012/12/engineering-mechanics-drgsaravana-kumar.html</p>		

Course outcomes: On completion of the course, students would be able to	
CO1	Understand and appreciate the applications of Mechanics in various disciplines of Engineering
CO2	Compute the resultant and the effect of the Forces on bodies
CO3	Calculate the support reactions of statically determinate beams.
CO4	Comprehend the basics of dynamic analysis with D' Alembert's Principle
CO5	Find the centroid and moment of inertia of composite areas and built-up sections

Text Books:	
1	Shesha Prakash M N, Ganesh B. Mogaveer, "Elements of Civil Engineering and Engineering Mechanics", PHI Learning Private Limited, Delhi, 3 rd Edition (2017).
2	Bhavikatti S S, "Elements of civil engineering and mechanics", New age international publishers, 3 rd Edition (2009).
Reference Books:	
1	Andy Ruina and Rudra Pratap, "Introduction to Statics and Dynamics", Oxford University Press (2002).
2	Kolhapure B K, "Elements of civil engineering and engineering mechanics", Eastern book promoters Belgaum, Belagavi (2010).
3	Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", Tata McGraw-Hill Publishing company, New Delhi, 8th Edition (2004).
4	Egor P Popov, "Engineering Mechanics of Solids", Pearson Publishing, 2 nd Edition (2006)

Scheme of Evaluation:		
Details		Marks
Average of three Internal Assessment (IA) Tests of 30 Marks each i.e. Σ (Marks Obtained in each test) / 3		30
Quizzes		2x2=4
Activities / Experimentations related to courses		8
Mini Projects / Case Studies		8
Semester End Examination	SEE (50)	50
	Total	100

CO-PO Mapping

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

High-3, Medium-2, Low-1

Course Title	ENGINEERING GRAPHICS	Semester	I / II
Course Code	MVJ21EGR15/25	CIE	50
Total No. of Contact Hours	40 L : T : P : 2:0:2	SEE	50
No. of Contact Hours/week	04	Total	100
Credits	03	Exam. Duration	3 Hours

Course objective is to:

- To understand the concept of projection systems; standards and conventions.
- To develop the views of basic geometrical entities - points, lines, planes and solids.
- To enhance speed and accuracy in use of drawing instruments and sketching capabilities.
- To acquire the skill of expressing two and three dimensional objects as pictorial views.
- Exposure to Engineering communication.

Module-1

RBT Level
L1, L2

8 Hrs

Introduction to Engineering Graphics: Orthographic projection- Principal planes-First angle projection- projection of points.

Projection of lines and Basic constructions of plane surface

Projection of straight lines (only First angle projections) inclined to both the principal planes – Determination of true lengths and true inclinations by rotating line method. Midpoint problems. Construction of triangle, square, pentagon and hexagon.

Introduction to software commands and basic constructions of the planes in the software.

Laboratory Sessions/ Experimental learning:

- Prepare models of quadrants with thin sheets of appropriate material to better understand quadrant system, first angle and third angle projections

Applications: Engineering drawing of components in various angles of projections.

Video link / Additional online information :

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

<https://www.youtube.com/watch?v=kblxkkmAW0&t=8s>

https://www.youtube.com/watch?v=fK4h5gM73w8&list=PLlhUrsYr8yHxEk_Jv8yOatn3Dcr6KYYK3j

Module-2

RBT Level
L1, L2, L3

8 Hrs

Orthographic Projections: Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in first

quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes.

Orthographic Projections of Plane Surfaces (First Angle Projection Only). Introduction, Definitions - projections of plane surfaces—triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only.

Laboratory Sessions/ Experimental learning:

- Preparation of models on different planes like triangle, square, rectangle, pentagon, hexagon, and circular of given size using thin cardboard

Applications: Drawing of different planes in real time engineering applications can be given to students.

Video link / Additional online information:

<https://www.youtube.com/watch?v=6l764RCCsrw>

<https://www.youtube.com/watch?v=o1YPja2wCYQ>

<https://www.youtube.com/watch?v=AoNIOxnxDO0&list=PLlhUrsYr8yHx7TVB51jN3HZVyW3R6RiBg>

<https://www.youtube.com/watch?v=op-fPNGqQQM&t=27s>

Module-3	RBT Level L1, L2, L3	8 Hrs
<p>Projections of Solids (First angle Projection only): Introduction, Definitions - Projections of right regular tetrahedron, hexahedron (cube), prisms & pyramids (triangular, square, pentagonal, & hexagonal), cylinders, cone and problems on freely suspended solids.</p> <p>Laboratory Sessions/ Experimental learning:</p> <ul style="list-style-type: none"> • Preparation of models on different solids like prisms and pyramids of triangular, square, rectangular, pentagon, and hexagon along with tetra hadron, hexa hadron, circular cone of given size using thin cardboard <p>Applications: Section of solids can be explained based on the basic concepts of solids.</p> <p>Video link / Additional online information:</p> <p>https://www.youtube.com/watch?v=YV4RZnQ2yB8&list=PLlhUrsYr8yHxARPzEFz1nXgt8j6xF_tEm</p> <p>https://www.youtube.com/watch?v=6grlJ0XS3iA</p> <p>https://www.youtube.com/watch?v=QHogS8XvfQk</p>		
Module-4	RBT Level L1, L2, L3	8 Hrs
<p>Development of Lateral Surfaces of Solids: Introduction, development of right regular prisms, pyramids, cylinders and cones resting with base on HP.</p> <p>Development of lateral surfaces of above solids, their frustums and truncations.</p>		

Laboratory Sessions/ Experimental learning:

- Using sheet metal students are advised to prepare models like tray, funnel, cone, cylinder & other real time models given using knowledge of development of lateral surfaces.

Applications: Construction of chimneys, bends, cones/funnels and other hollow channels can be analyzed.

Video link / Additional online information :

<https://www.youtube.com/watch?v=hljpRonTkls&list=PLlhUrsYr8yHwdB96ft6c0Uwc4SDCLuG1v>

Module-5

RBT Level
L1, L2, L3

8 Hrs

Isometric Projection (Using Isometric Scale Only): Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron (cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of two solids.

Laboratory Sessions/ Experimental learning:

- Taking measurement and drawing of simple mechanical blocks like Plummer block (bearing housing), tool post of lathe, vice of shaping machine etc. and drawing 2D and isometric drawings

Applications:

- Conversion of simple isometric models into orthographic views both in sketch book and solid edge
- Analysis and observation of different views when three or more solids are placed one above the other can be analyzed.

Video link / Additional online information :

https://www.youtube.com/watch?v=77ufJXvXUk4&list=PLlhUrsYr8yHxVky7bfrnbRcdXchJT_K83

Note: Related to Planes and Solid students will be advised to make model using wood i.e. Basics of carpentry can be explained.

Course outcomes:

CO1	Draw orthographic projections of basic geometrical entities in various positions and translate the geometric information of engineering objects into engineering drawings.
CO2	Create sketches and Isometric projections of solids
CO3	Develop lateral surfaces of solids and appreciate their applications in the industry.
CO4	Use modern engineering tool (CAD software) necessary for engineering practice.

Text Books:

1.	K.R. Gopalakrishna, " <i>Engineering Graphics</i> ", 32nd edition, 2005- Subash Publishers, Bangalore.
2.	S. Trymbaka Murthy, " <i>Computer Aided Engineering Drawing</i> ", I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006.

3.	A Primer on Computer Aided Engineering Drawing -2006, Published by VTU, Belagavi
Reference Books:	
1.	Luzadder Warren J., Duff John M., "Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production" , Eastern Economy Edition, 2005- Prentice-Hall of India Pvt. Ltd., New Delhi.
2.	N.D. Bhatt & V.M. Panchal, "Engineering Drawing" , 48th edition, 2005- Charotar Publishing House, Gujarat.
3.	M H Annaiah, C N Chandrappa and B Sudheer PremKumar, "Computer Aided Engineering Drawing" Fifth edition, New Age International Publishers.

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

High-3, Medium-2, Low-1

Continuous Internal Evaluation (CIE):		
Evaluation Method		Course with Assignment
Manual Drawing Test (3 CIE to be conducted – Best of two CIE should be considered)		30
Preparation of at least two models in workshop as hands-on sessions		10
Mock Test – to be conducted for 100 marks and scaled down to 10		10
Total		50
Scheme of Evaluation:		
Question No.	From Modules	Marks Allocated
1	Module 2 - [Choice between (Points & Lines) or Planes]	30
2	Module 3 - [Solids]	40
3	Module 4 - [Development] or Module 5 [Isometric]	30
Total		100

Course Title	Engineering Physics Lab	Semester	I/II
Course Code	MVJ21PHYL16/26	CIE	50
Total No. of Contact Hours	15 L : T : P :: 0 : 0 : 2	SEE	50
No. of Contact Hours/week	2	Total	100
Credits	1	Exam. Duration	2 Hours

Course objective is to:

- Course objectives: To realise experimentally, the mechanical, electrical and thermal properties of materials of materials, concept of waves and oscillations
- Design simple circuits and hence study the characteristic of semiconductor devices.

Sl No	Experiment Name	RBT Level	Hours
1	Measurement of wavelength of laser using diffraction grating	L3	1
2	Determination of Planck's constant.	L3	1
3	Determination of spring constants In series and Parallel Combination	L3	1
4	Verification of Stefan's law.	L3	1
5	Determination of resonant frequency and quality factor in series and parallel combinations of LCR Circuit	L3	1
6	Determination Of Young's Modulus Of A Given Beam By Uniform Bending	L3	2
7	Determination of dielectric constant of given capacitor	L3	1
8	Study Of V-I Characteristics of Given Photo Diode In Reverse Bias	L3	1
9	Determination Of Young's Modulus Of A Given Beam By Single Cantilever Experiment.	L3	2
10	Determination Of Radius Of Curvature Of Given Plano Convex Lens by Newton Rings Method.	L3	2
11	Determination The Acceptance Angle And Numerical Aperture Of An Optical Fibre	L3	1
12	Determination Of Moment Of Inertia And Rigidity Modulus Of The Given Wire.	L3	1

Course outcomes:

CO1	Apprehend the concepts of interference of light, the diffraction of light.
CO2	Understand the principles of operations of optical fibers and semiconductor devices such as photo diodes
CO3	Determine the elastic modulus and moment of inertia of given materials with the help of suggested procedures

CO4	Recognize the resonance concepts and its practical applications
CO5	Understand the importance of measurement procedure honest recording and representing the data, reproduction of final results

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The student has to obtain minimum of 50% marks individually both in CIE and SEE to pass.

Continuous Internal Evaluation:

1. Weekly evaluation of conduction, record submission will have a weightage of 40 marks for the semester.
2. Two lab internal tests of 50 marks each will be conducted. Average of which will be reduced by a factor of 5 amounting to 10 marks.

Hence, total lab internal will be for 50 marks.

Semester End Examination:

Lab SEE will be conducted by the institution involving the Board of examiners as per scheduled time table.

1. The question paper will contain 2 lab experiments of 50marks each without any choice.
2. The total of which will be reduced by a factor of 2 amounting to 50 marks.

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

High-3, Medium-2, Low-1

Course Title	Basic Electrical Engineering Laboratory	Semester	I/II
Course Code	MVJ21EEL17/ MVJ21EEL27	CIE	50
Total No. of Contact Hours	15	SEE	50
No. of Contact Hours/week	2, L:T:P::0:0:2	Total	100
Credits	1	Exam. Duration	2 Hours

Course objective is to:

- To provide exposure to common electrical components such as Resistors, capacitors and inductors, types of wires and measuring instruments.
- To measure power and power factor measurement of different types of lamps and three phase circuits.
- To explain measurement of impedance for R-L and R-C circuits. To determine power consumed in a 3 phase load.
- Explain methods of controlling a lamp from different places

Sl No	Experiment Name	RBT Level	Hours
1	Verification of KCL and KVL for DC circuits	L3	1
2	Measurement of current, power and power factor of incandescent lamp, fluorescent lamp, and LED lamp.	L3	2
3	Measurement of resistance and inductance of a choke coil using 3-voltmeter method	L3	2
4	Determination of phase and line quantities in three phase star and delta connected loads.	L3	2
5	Measurement of three-phase power using two-wattmeter method.	L3	2
6	Two way and three-way control of lamp and formation of truth table.	L3	1
7	Study of effect of open and short circuit in simple circuits.	L3	1
8	Inverse time characteristics of fuse and MCB.	L3	1

Demonstration experiments

1	Demonstration of cutout sections of electrical machines (DC machines, Induction machines and synchronous machines).	L2	1
2	Understanding of SMPS	L2	1
3	Phase relationship between V and I in single phase RLC circuits.	L2	1

Course outcomes:

C107.1	Identify the common electrical components and measuring instruments used for conducting Experiments in the electrical laboratory.
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C107.2	Compare power factor of different types of lamps.
C107.3	Determine impedance of an electrical circuit and power consumed in a 3-phase load.
C107.4	Understand two way and three-way control of lamps.
C107.5	Demonstrate the working of Protective devices

Scheme of Evaluation

SEE :

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

Write-up : 20 marks

Conduction : 40 marks

Analysis of results : 20 marks

Viva : 20

CIE :

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

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C107.1	3	2	-	1	-	-	-	-	3	2	-	1
C107.2	3	3	-	1	-	-	-	-	3	2	-	1
C107.3	3	2	-	1	-	-	-	-	3	2	-	1
C107.4	3	1	-	1	-	-	-	-	3	2	-	1
C107.5	3	2	-	1	-	-	-	-	3	2	-	1

High-3, Medium-2, Low-1

Course Title	Business Communication	Semester	I
Course Code	MVJ21EGH18	CIE	50
Total No. of Contact Hours	15 L: T:P: 1:0:0	SEE	50
No. of Contact Hours/week	01	Total	100
Credits	01	Exam. Duration	3 Hours

Course objective is to help students:

- To enhance their English vocabulary and language proficiency
- To communicate effectively and with self-confidence, in any given situation
- To master the Functional aspects of the language
- To acquire proficiency in basic English grammar and essential language skills
- To identify the nuances of phonetics, intonation and enhance their pronunciation skills

Module-1

RBT Level
L1 L2 L3

Hours
3hrs

Introduction to Technical Communication

- 1.1 Fundamentals of Communication Skills
- 1.2 Barriers to effective communication
- 1.3 The hallmark of effective communication
- 1.4 Distortion in Communication
- 1.5 Different styles in Communication – Formal and Informal
- 1.6 Types of Communication – oral, written, non-verbal
- 1.7 Interpersonal Communication Skills
- 1.8 Developing Interpersonal Skills
- 1.9 Information Transfer: Oral Presentation

Video Links/Any other special information (Papers): (For additional study of the concepts)

<https://youtu.be/-Y-R9hDI7IU>

Module-2	RBT Level L1 L2 L3	Hours 3 hrs
<p>Introduction to Listening Skills and Phonetics</p> <p>1.1 Introduction to Phonetics</p> <p>1.2 Phonetic symbols and transcription</p> <p>1.3 Sounds Mispronounced</p> <p>1.4 Speech Sounds: Vowels, Consonants and Diphthongs</p> <p>1.5 Silent Letters</p> <p>1.6 The magic 'e'</p> <p>1.7 Homophones and Homonyms</p> <p>1.8 Aspiration and Pronunciation of 'The'</p> <p>1.9 Listening Comprehension</p> <p>1.10 Articles: Use of Articles; common errors in the use of Articles</p> <p>Video Links/Any other special information (Papers): (For additional study of the concepts)</p> <p>https://youtu.be/T8LXnYpqMc4 https://youtu.be/adjaW0YSInU https://youtu.be/-8g_TKJ6oiw</p>		
Module-3	RBT Level L1 L2 L3	Hours 3 hrs
<p>Developing Listening Skills</p> <p>1.1 Importance of listening in communication</p> <p>1.2. Techniques for effective listening</p> <p>1.3 Incongruencies in English pronunciation</p> <p>1.4 Word Accent - Rules for Word Accent, Stress Shift</p> <p>1.5 Sentence stress</p> <p>1.6 Standard pronunciation</p> <p>1.7 Plural forms</p>		

1.8 Question forms and intonation

1.9 Prepositions, and those Prepositions often confused

1.10 Prepositional phrases

1.11 Listening Comprehension

Video Links/Any other special information (Papers): (For additional study of the concepts)

https://youtu.be/-8g_TKJ6oiw

Module-4

RBT Level

Hours

L1 L2 L3

3 hrs

Speaking Skills and Vocabulary-1

1.1 Vocabulary used in everyday situations

1.2 Word formation - Prefixes and Suffixes

1.3 Contractions

1.4 Words often confused

1.5 Question Tags

1.6 Synonyms

1.7 Antonyms

1.8 Spelling Rules and Words often Misspelt

1.9 The sequence of Tenses

Video Links/Any other special information (Papers): (For additional study of the concepts)

<https://youtu.be/w1v3ddhojSs>

Module-5

RBT Level

Hours

L1 L2 L3

3 hrs

Speaking Skills and Vocabulary-2

1.1 Extempore Speaking / Public Speaking – Guidelines

1.2 Overcoming fears and inhibitions

1.3 Voice modulation

1.4 Mother Tongue Influence (MTI)

1.5 Techniques for Neutralization of Mother Tongue Influence

1.6 Listening Comprehension

1.7 Common Errors in Pronunciation

1.8 Speaking in given situations – opening bank account, visiting doctor, attending an interview, gathering information, making plans, making choices, congratulating, expressing appreciation and apologizing etc.

Video Links/Any other special information (Papers): (For additional study of the concepts)

<https://youtu.be/Y4TbGPhQ7Ik> https://youtu.be/JIKU_WT0BlS

Experiential Learning:

Language Lab:

To augment LSRW and GV skills (Listening, Speaking, Reading, Writing, Grammar and Vocabulary) through tests, activities, exercises etc. via comprehensive web-based learning and assessment systems.

Course outcomes:

CO1	Use English that is grammatically correct and identify the nuances of phonetics, intonation and flawless pronunciation
CO2	Enhance the repertoire of English vocabulary
CO3	Identify common errors in spoken and written communication
CO4	Understand and improve non-verbal communication and kinesics
CO5	Perform with confidence at campus recruitment, engineering and all other competitive examinations

Text Books:

1 **English Communication Made Easy** by Chitra Laxman – Sathyasri Printers Pvt. Ltd.

Reference Books:

1 **Technical Communication** by Gajendra Singh Chauhan and Et al, Cengage learning India Pvt Limited [Latest Revised Edition} - 2018.

2 **Communication Skills** by Sanjay Kumar and Pushpa Lata, Oxford University Press - 2018

3 **High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd. 2015

4 **English Language Communication Skills - Lab Manual cum Workbook**, Cengage learning India Pvt. Limited [Latest Revised Edition} – 2018

5 **Technical Communication - Principles and Practice**, Third Edition by Meenakshi Raman and Sangeetha Sharron, Oxford University Press 2017

6 **Effective Technical Communication - Second Edition** by M Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018

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 the three tests

- Assignments (20 marks)

SEE Assessment:

vii. Question paper for the SEE consists of 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 a total of 20 marks, covering the whole syllabus.

viii. Part B also covers the entire syllabus consisting of five questions having choices and may contain subdivisions, each carrying 16 marks. Students have to answer all the five questions.

ix. One question will be set from each unit. The duration of the examination is 3 hours.

CO-PO Mapping

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

High-3, Medium-2, Low-1

Course Title	Professional Writing	Semester	II
Course Code	MVJ20EGH28	CIE	50
Total No. of Contact Hours	15 L:T:P::1:0:0	SEE	50
No. of Contact Hours/week	01	Total	100
Credits	01	Exam. Duration	3 Hours

Course objective:

- To use English vocabulary aptly and flawlessly, and ensure language proficiency
- To achieve better Technical writing and Presentation skills
- To Identify the common errors in Spoken and Written English
- To acquire Employment and Workplace communication skills

Module-1

RBT Level

L1 L2 L3

Hours

3hrs

Introduction to Technical Communication

1.1 Subject Verb Agreement (Concord Rules with Exercises)

1.2 Common errors in Subject-verb agreement, Noun-pronoun agreement

1.3 Common errors in the use of Adjectives, Adverbs and Conjunctions; misplaced modifiers

1.4 Word Order, errors due to the confusion of words

1.5 Anagrams, palindromes, puns

1.6 Idioms and phrases – common errors

1.7. Honing reading skills

Video Links/Any other special information(Papers): (For additional study of the concepts)

<https://youtu.be/-Y-R9hDI7IU>

Module-2

RBT Level

L1 L2 L3

Hours

3hrs

The Nuances of Writing

1.1 Organizing Principles of Paragraphs in Documents

- 1.2 Developing hints into organized paragraphs
- 1.3 Dialogue writing
- 1.4 Contextual vocabulary
- 1.5 Importance of proper Punctuation
- 1.6 One-word substitutes
- 1.7 Polishing writing skills – similes and metaphors
- 1.8 The Art of Condensation (Precis writing)
- 1.9 Word collocations
- 1.10 Redundancy and jargon in writing
- 1.11 Techniques in creative writing
- 1.12 Common Errors due to Indianism in English Communication

Video Links/Any other special information(Papers): (For additional study of the concepts)

<https://youtu.be/T8LXnYpqMc4> <https://youtu.be/adjaW0YSInU> https://youtu.be/-8g_TKJ6oiw

Module-3

RBT Level
L1 L2 L3

Hours
3 hrs

Honing Writing Skills

- 1.1 Effective Technical Reading and Writing Practices
- 1.2 Tips for good and effective writing
- 1.3 Parallelism in sentence structures
- 1.4 Describing processes
- 1.5 Interpretation of non-verbal data – pie-charts, flow charts etc.
- 1.6 Use of Passive Voice in Report writing
- 1.7 Report writing
- 1.8 Sentence Improvement Exercises, Cloze Test and Theme Detection Exercises.

Video Links/Any other special information(Papers): (For additional study of the concepts)

<https://youtu.be/w1v3ddhojSs>

Module-4

RBT Level
L1 L2 L3

Hours
3hrs

Writing Emails and Letters

- 1.1 Components of a Formal Letter
- 1.2 Formats and Types of Business Letters
- 1.3 Email Writing – Dos and Don'ts

Practice in writing various types of emails

Video Links/Any other special information (Papers): (For additional study of the concepts)

https://youtu.be/-8g_TKJ6oiw

Module-5

RBT Level

L1 L2 L3

Hours

3 hrs

Non-Verbal Communication

1.1 Significance of non-verbal communication

1.2 Body Language

1.3 Group Discussion

1.4. Describing people

1.5. Describing events and scenes

1.4 Presentation skills and Formal Presentations by Students

Video Links/Any other special information(Papers): (For additional study of the concepts)

<https://youtu.be/Y4TbGPhQ7Ik> https://youtu.be/JIKU_WTOBlS

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Course outcomes:

CO1	Identify common errors in Spoken and Written communication
CO2	Reach higher levels of perfection in English vocabulary and language
CO3	Improve nature and style of sensible writing and acquire employment and workplace communication skills
CO4	Improve Technical Communication Skills through Technical Reading and Writing practices
CO5	Perform well at campus recruitment, engineering and other competitive examinations

Text Books:

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Reference Books:

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

High-3, Medium-2, Low-1