MVJ College of Engineering, Whitefield, Bangalore

An Autonomous Institution, Affiliated to VTU, Belagavi

Scheme of Teaching and Examination 2020-21

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

Effective from the academic year 2020-21

I SEMESTER B.E. (PHYSICS GROUP)

S No	Course		Course Title	Teaching Department	Teaching hours/week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in Hours	CIE Marks	SEE Marks	Total marks	
	Type	Code			L	T	P					
1	BSC	MVJ20MAT11	Calculus and Linear Algebra-Mathlab	Mathematics	3	0	2	3	50	50	100	4
2	BSC	MVJ20PHY12	Engineering Physics	Physics	3	0	2	3	50	50	100	4
3	ESC	MVJ20EE13	Basic Electrical Engineering	Electrical & Electronics Engineering	2	2	0	3	50	50	100	3
4	ESC	MVJ20CV14	Elements of Civil Engineering &Mechanics	Civil Engineering	2	2	0	3	50	50	100	3
5	ESC	MVJ20ME15	Engineering Graphics	Mechanical Engineering	2	0	2	3	50	50	100	3
6	BSC	MVJ20PHYL16	Engineering Physics Lab	Physics	0	0	2	3	50	50	100	1
7	ESC	MVJ20EEL17	Basic Electrical Engineering Lab	Electrical & Electronics Engineering	0	0	2	3	50	50	100	1
8	HSMC	MVJ20EGH18	Technical English-I	Humanities	0	2	0	3	50	50	100	1
				Total	12	10	4	24	400	400	800	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	Duration in Hours	CIE Marks	SEE Marks	Total marks	
	Type	Code			L	T	P					
1	BSC	MVJ20MAT21	Advanced Calculus and Numerical Analysis-Math lab	Mathematics	3	0	2	3	50	50	100	4
2	BSC	MVJ20PHY22	Engineering Physics	Physics	3	0	2	3	50	50	100	4
3	ESC	MVJ20EE23	Basic Electrical Engineering	Electrical & Electronics Engineering	2	2	0	3	50	50	100	3
4	ESC	MVJ20CV24	Elements of Civil Engineering &Mechanics	Civil Engineering	2	2	0	3	50	50	100	3
5	ESC	MVJ20ME25	Engineering Graphics	Mechanical Engineering	2	0	2	3	50	50	100	3
6	BSC	MVJ20PHEL26	Engineering Physics Lab	Physics	0	0	2	3	50	50	100	1
7	ESC	MVJ20EEL27	Basic Electrical Engineering Lab	Electrical & Electronics Engineering	0	0	2	3	50	50	100	1
8	HSMC	MVJ20EGH28	Technical English-II	Humanities	0	2	0	3	50	50	100	1
				Total	12	10	4	24	400	400	800	20
Note: BSC: Basic Science, ESC: Engineering Science, HSMC: Humanity and Social Science												

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Accredited by NBA & NAAC

Course Title	**Calculus and Linear Algebra-Math Lab**	Semester	I
Course Code	**MVJ20MAT11**	**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 Calculus and Linear algebra 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**	12Hrs.

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.

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=PLMLsjhQWWlUqBoTCQDtYlloI-o-9hxp11

Module-2	**L1,L2**	12Hrs.

Differential Calculus-2**:**

Maclaurin's series expansions for one variable, indeterminate forms - L'Hospital's rule. Partial differentiation; Total derivatives-differentiation of composite functions, Jacobians , Method of Lagrange multipliers with one subsidiary condition ,Maxima and minima for a function of two variables- Applications with illustrative examples.

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=PLMLsjhQWWlUqBoTCQDtYlloI-o-9hxp11

Module-3	**L1,L2,L3**	12Hrs.

Integral Calculus:

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.

Beta and Gamma functions: Definitions, Relation between beta and gamma functions and problems.

Laboratory Sessions: Evaluation of the double integral using Python

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.

Video link : https://www.youtube.com/watch?v=db7d_a0wiUg&list=PLU6SqdYcYsfLoKyzF_dwxAQf8lli6VC54
https://www.khanacademy.org/math/ap-calculus-ab/ab-integration-new/ab-6-1/v/introduction-to-integral-calculus

Module-4	**L1,L2,L3**	12Hrs.

Ordinary differential equations(ODE's)of first order:

Exact and reducible to exact differential equations. Bernoulli's equation. Applications of ODE's - orthogonal trajectories and Newton's law of cooling .

Nonlinear differential equations: Introduction to general and singular solutions ; Solvable for p; Clairaut's and reducible to Clairaut's equations.

Laboratory Sessions: Problems on Ordinary differential equation using Python

Applications: Cooling/Warming Law,series circuit, Survivability withAIDS,Draining a tank, Determining the current or charge in the circuit.
Video link: https://users.math.msu.edu/users/gnagy/teaching/ode.pdf
https://www.mathsisfun.com/calculus/differential-equations.html

Module-5	**L1,L2,L3**	12 Hrs.

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Linear Algebra:

Rank of a matrix-echelon form. Solution of system of linear equations – consistency. Gauss-elimination method, Gauss –Jordan method and Approximate solution by Gauss-Seidel method. Eigen values and eigen vectors-Rayleigh's power method. Diagonalization of a square matrix of order two.

Laboratory Sessions: Solving system of Linear equations using Python

Applications:Used in all science and Engineering Like-Heat Distribution, Coding Theory,GamesNetworking,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 eigen vectors required for matrix diagonalization process.

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.	G. B. Gururajachar: Calculus and Linear Algebra, Academic Excellent Series Publication, 2018-19

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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

Course Title	ENGINEERING PHYSICS	Semester	I/II
Course Code	MVJ20PHY12/22	CIE	50
Total No. of Contact Hours	60 L : T : P :: 50 :00 : 10	SEE	50
No. of Contact Hours/week	4	Total	100
Credits	4	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.
Oscillations and Waves Free oscillations: Definition of SHM, Derivation of Equation for SHM, Mechanical simple harmonic Oscillators, (Mass suspended to spring), Complex notation and phasor representation of SHM, Equation of motion for Free oscillations , natural frequency of oscillations, Damped oscillations. Theory of damped oscillations: over damping, critical damping and under damping, Quality factor. 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 **Self Learning topics:** forced oscillations, LC oscillations. Laboratory **Sessions/ Experimental learning:** 1. Verification of Hooke's law 2. Calculating the time period of oscillations of springs in Series and parallel **Applications:** Introduction to aerospace engineering(AE) ,Aerodynamics-I(AS), Engineering Geology(CV), Earthquake engineering (CV),Dynamics of Machines(ME), Advanced Vibrations(ME) **Video link / Additional online information:** https://www.youtube.com/watch?time_continue=29&v=olTD-mpsU4E&feature=emb_logo https://www.youtube.com/watch?time_continue=420&v=T3XguAI-	L1, L2, L3	10

I5c&feature=emb_logo https://www.youtube.com/watch?v=bO2Z308uFpo		
Module-2	**RBT Level**	**Hrs.**
Elastic Properties of materials 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, Limits of Poission's Ratio. 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 Torsion of a cylinder: Expression for couple per unit twist for a solid cylinder (Derivation), Torsional pendulum, Expression of period of Oscillations. **Self Learning topics:** Young's Modulus of materials by Uniform Bending Method **Experimental learning:** Model making of types of beams. **Applications:** 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), **Video link / Additional online information:** https://youtu.be/ITuWnrl3aKI https://youtu.be/JGK8i0X55Mc https://www.youtube.com/watch?v=R6yC-rkrYz4	L1, L2, L3	10

Module-3	RBT Level	Hrs.
Quantum Mechanics **Wave Mechanics:** Phase velocity, group velocity, Relation between, relation between phase velocity and group velocity, De-Broglie hypothesis, matter waves, characteristics of matter waves. **Quantum Mechanics:** Black body radiation, Wien's law, Wien's displacement law, Rayleigh jeans law, Planck's law of Radiation, Compton effect. Failure of classical mechanics. Introduction to Quantum mechanics, Wave nature of particles, Heisenberg's uncertainty principle and applications (non confinement of electrons in the nucleus), Schrodinger's time independent wave equation ,Significance of Wave function , Normalization, particle in a box energy Eigen values of particle in a box ,probability densities. **Applications:** Introduction to astrophysics and Space Environment(AS) Electron Devices/ digital electronics(ECE) **Video link / Additional online information:** https://nptel.ac.in/courses/115101107/ https://nptel.ac.in/courses/115102023/ https://nptel.ac.in/courses/115104096/ https://oyc.yale.edu/physics/phys-201/lecture-19 https://ocw.mit.edu/courses/physics/8-05-quantum-physics-ii-fall-2013/video-lectures/lecture-1-wave-mechanics/	L1, L2, L3	10
Module-4	**RBT Level**	**Hrs.**
Lasers and optical fibers Lasers: Review of spontaneous and stimulated processes, Einstein's coefficients (derivation of expression for energy density), Requisites of a Laser system, Principle, construction and working of CO2 laser Semiconductor Lasers. Application of Lasers in Defence (Laser range finder), And Engineering (Data storage),Numerical problems Optical fibers: Propagation mechanism, angle of acceptance. Numerical	L1, L2, L3	10

aperture. Modes of propagation and types 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 **Self learning topics:** Optical amplifiers. **Experimental learning:** 1. Demonstration of directionality of Laser light. 2. Model of point to point communication. **Applications:** , Space vehicle Design(AS) – Laser cutting Highway Engineering(CV)—laser drilling, cutting of metals, Optical fibre communication -(ECE) **Video link / Additional online information:** https://www.youtube.com/watch?v=PK4yFaGHSFc&list=PLU0oJASIjGxdZMtypwhvGrnmuzNnNdcKt https://www.youtube.com/watch?v=saVE7pMhaxk https://www.youtube.com/watch?v=urbZ8CTceu0 https://www.youtube.com/watch?v=_qixt0NLc9I		
Module-5	**RBT Level**	**Hrs.**
Crystals and Nano Science Crystals: Review of Bravais lattices, directions and planes in crystals, Miller indices, expression for inter planar spacing, coordination number, atomic packing factor(Sc, FCC, BCC) Nano-Science: Introduction to Nanoscience, mesoscopic state, Density of states in 1D, 2D, 3D structures, Top-down and Bottom –up approach. Ball milling and sol-gel methods. CNT-Properties, synthesis, Arc discharge and Pyrolysis methods, Applications of CNT. SEM: Principle, construction, working and applications **Self learning topics:** TEM,STEM(Scanning tunnelling electron microscope) **Experimental learning:** 1. Model making of different crystal structures. 2. Demo of sol-gel method of synthesis of nano particles (Zn O) **Applications:** Composite of Materials(AE), MATERIAL SCIENCE(CH),	L1, L2, L3	10

Solid Waste Management (CV), MARERIAL SCIENCE(ME). **Video link / Additional online information:** https://www.youtube.com/watch?v=J8Bo9BHxesE https://www.youtube.com/watch?v=1vsNxkdlcXw https://www.youtube.com/watch?v=k61wjab7iUs https://www.youtube.com/watch?v=ebO38bbq0_4&list=PLbMVogVj5nJTdeiLvuGSB_AE8hloTAHWJ https://www.youtube.com/watch?v=mC0rYNlMz9Q		

Course outcomes:	
CO1	Course outcomes: On completion of this course, students are able to: 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 optic fibers.
CO5	Understand various concepts of crystal structure and the basics of Nano science.

Reference Books:	
1.	Introduction to Mechanics — MK Verma: 2nd Ed, University Press(India) Pvt Ltd, Hyderabad 2009
2.	Lasers and Non Linear Optics – BB laud, 3rd Ed, New Age International Publishers 2011
3	Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018
4	Nano: The Essentials: Understanding Nanoscience and Nanotechnology- T. Pradeep, Tata McGraw Hill- 2008 Ed

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

High-3, Medium-2, Low-1

Course Title	Basic Electrical Engineering	Semester	3
Course Code	MVJ20EE13/ MVJ20EE23	**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:

- Introduction to electric power system and renewable energy sources.
- 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.

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, types of loads.

Non-conventional energy resources: Definition of Renewable and non-renewable energy systems. Elementary discussion on solar P-V, roof top solar panels for domestic power generation.(explanation with block diagram)

Laboratory Sessions/ Experimental learning: Assembling of a solar lamp.

Applications: Understanding different source for generation of electric sources.

Web Link and Video Lectures:

1. https://www.khanacademy.org/
2. http://www.nptelvideos.in/
3. https://www.classcentral.com/

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

D.C. Circuits: Ohm's law, Kirchhoff's laws, current and voltage division rule, analysis of series, parallel and series-parallel circuits excited by independent voltage sources, power and energy.

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.

Laboratory Sessions/ Experimental learning: Simulation of circuits using software.

Applications: Analysis of electrical circuits.

Web Link and Video Lectures:

1. https://www.khanacademy.org/
2. http://www.nptelvideos.in/
3. https://www.classcentral.com/

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

D.C. machines: Faraday's laws, Lenz's law, Fleming's rules, statically and dynamically induced emfs, working principle of a D.C. machine as a generator and a motor, constructional details in brief. Back emf, torque equation, type of DC motors and applications, necessity of starter for a DC motor

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.

Laboratory Sessions/ Experimental learning: Demonstration of machines.

Application: Understanding the fundamental operation of different electrical machines.

Web Link and Video Lectures:

1. https://www.khanacademy.org/
2. http://www.nptelvideos.in/
3. https://www.classcentral.com/

Module-4	**L1,L2,L3**	08Hrs.

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.

Three phase induction motors: Constructional details, production of rotating magnetic field, principle of operation, slip, types and applications, necessity and types of starter.

Laboratory Sessions/ Experimental learning:

1. Measurement of power for 3-phase circuits using software.
2. Rating and energy calculations of common house hold electrical appliances (Computation of energy bill as per BESCOM Tariff structure

Application: Understanding the fundamental operation of mostly used industrial machine.

Web Link and Video Lectures:

1. https://www.khanacademy.org/
2. http://www.nptelvideos.in/

3. https://www.classcentral.com/

Module-5	L1,L2,L3	08Hrs.

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 digital multimeter.

Domestic wiring: Service mains, meter board and distribution board, necessity of earthing, energy efficient lamps.

Laboratory Sessions/ Experimental learning:

1. Demonstration of measuring instruments.
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.

Application: Understanding the fundamentals electrical wiring.

Web Link and Video Lectures:

1. https://www.khanacademy.org/
2. http://www.nptelvideos.in/
3. https://www.classcentral.com/

Course outcomes: At the end of the course, the student will be able to	
CO1	Understand the concepts of generation, transmission and distribution of electric power and different types of energy sources
CO2	Analyse DC and single phase AC circuits.
CO3	Understand the construction and principle of operation of electrical machines and single phase transformers.
CO4	Understand three phase AC circuits and principle of operation of induction motor.
CO5	Understand the working of measuring instruments and house wiring.

Reference Books:	
1.	E. Hughes, “Electrical And Electronic Technology”, Pearson, International Students Tenth Edition.
2.	Ashfaq Husain, “Fundamentals of Electrical Engineering”, Dhanpat Rai & Co. Third Edition

3.	M V Rao, “Basic Electrical Engineering”.
4.	D C Kulshreshtha, “Basic Electrical Engineering”, Tata McGraw Hill, Revised first Edition.

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

High-3, Medium-2, Low-1

Course Title	**ELEMENTS OF CIVIL ENGINEERING & MECHANICS**	Semester	I/II
Course Code	MVJ20CV14/24	**CIE**	50
Total No. of Contact Hours	60 L : T : P :: 40 : 10 : 10	**SEE**	50
No. of Contact Hours/week	3	**Total**	100
Credits	3	**Exam. Duration**	3 Hrs

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
- Calculate the First and Second area moment for regular geometrical cross sections
- Analyze the force and motion of bodies under kinematics

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

Module-1	**L3**	**12 Hrs.**

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	L3	12 Hrs.

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 co planar 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	L3	12 Hrs.

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	**L3**	**12 Hrs.**

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.

Dynamics:

D' Alembert's principle and its application in plane motion and connected bodies including pulleys (Online Mode) -Numerical Problems.

Laboratory Sessions/ Experimental learning: (Self-Learning)

- Conducting Linear motion of object under given condition of gravitation and Projectiles

Applications: (Self-Learning)

- Motion of Lift
- Lifting of open storage containers

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

- Dynamics: https://nptel.ac.in/courses/112/106/112106180/

Module-5	**L3**	**12 Hrs.**

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.

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.

Laboratory Sessions/ Experimental learning: (Self-Learning)

- Verification of significance of Centroid of different types of plane lamina

Applications: (Self-Learning)

- Axis of Symmetry
- Bending Resistance of the Beam

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

- Centroid : http://www.nptelvideos.in/2012/12/engineering-mechanics-drgsaravana-kumar.html

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	Will be able to find the centroid and moment of inertia of composite areas and built-up sections
CO5	Comprehend the basics of dynamic analysis with D' Alembert's Principle

Reference Books:

1.	Shesha Prakash M N, Ganesh B. Mogaveer, "Elements of Civil Engineering and Engineering Mechanics", PHI Learning Private Limited, Delhi, 3rd Edition (2017).
2.	Andy Ruina and Rudra Pratap, "Introduction to Statics and Dynamics", Oxford University Press (2002).
3.	Bhavikatti S S, "Elements of civil engineering and mechanics", New age international publishers, 3rd Edition (2009).
4.	Kolhapure B K, "Elements of civil engineering and engineering mechanics", Eastern book promoters Belgaum, Belagavi (2010).
5.	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).
6.	Egor P Popov, "Engineering Mechanics of Solids", Pearson Publishing, 2nd Edition (2006)

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	MVJ20EGR15/25	**CIE**	50
Total No. of Contact Hours	L : T : P : 20 : 0 : 40	**SEE**	50
No. of Contact Hours/week	05	**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	11 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 third angle projections

Video link / Additional online information :

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

https://www.youtube.com/watch?v=kbllxkkmAW0&t=8s

https://www.youtube.com/watch?v=fK4h5gM73w8&list=PLIhUrsYr8yHxEk_Jv8yOatn3Dcr6KYK3j

Module-2	**RBT Level** L1, L2, L3	13 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: Numerical related to tool post application problems 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=PLIhUrsYr8yHx7TVB51jN3HZVyW3R6RiBg

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

Module-3	**RBT Level** L1, L2, L3	14 Hrs

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.

Laboratory Sessions/ Experimental learning:

- 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

Applications: Section of solids can be explained based on the basic concepts of solids.

Video link / Additional online information:

https://www.youtube.com/watch?v=YV4RZNQ2yB8&list=PLIhUrsYr8yHxARPzEFz1nXgt8j6xF_tEm

https://www.youtube.com/watch?v=6grlJ0XS3iA

https://www.youtube.com/watch?v=QHogS8XvfQk

Module-4	**RBT Level** L1, L2, L3	10 Hrs

Development of Lateral Surfaces of Solids: Introduction, development of right regular prisms, pyramids, cylinders and cones resting with base on HP.

Development of lateral surfaces of above solids, their frustums and truncations.

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=hljpRonTkIs&list=PLIhUrsYr8yHwdB96ft6c0Uwc4SDCLuG1v

Module-5	**RBT Level** L1, L2, L3	12 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=PLIhUrsYr8yHxVky7bfrnbRcdXcHjT_K83

Note: Related to Planes and Solid students will be advised to make model using wood ie. 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.

Reference Books:

1.	**K.R. Gopalakrishna, "*Engineering Graphics*"**, 32nd edition, 2005- Subash Publishers, Bangalore.
2.	**S. Trymbaka Murthy**, "***Computer Aided Engineering Drawing***", 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
4.	**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.
5.	**N.D. Bhatt & V.M. Panchal, "*Engineering Drawing"***, 48th edition, 2005- Charotar Publishing House, Gujarat.
6.	**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

Note: Use of conventional method of drawing using drafter has not been included for the above mentioned syllabus.

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	MVJ19PHYL16/26	**CIE**	50
Total No. of Contact Hours	01Hr Tutorial (Instructions) + 02 Hours Laboratory	**SEE**	50
No. of Contact Hours/week	2	**Total**	100
Credits	1	**Exam. Duration**	3 HOURS

Course objective is to:

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

Laboratory Experiments
1. Measurement of wavelength of laser using diffraction grating
2. Determination of Planck's constant.
3. Determination of spring constants In series and Parallel Combination
4. Verification of Stefan's law.
5. Determination of resonant frequency and quality factor in series and parallel combinations of LCR Circuit
6. Determination Of Young's Modulus Of A Given Beam By Uniform Bending
7. Determination of dielectric constant of given capacitor
8. Study Of V-I Characteristics of Given Photo Diode In Reverse Bias
9. Determination Of Young's Modulus Of A Given Beam By Single Cantilever Experiment.
10. Determination Of Radius Of Curvature Of Given Plano Convex Lens by Newton Rings Method.
11. Determination The Acceptance Angle And Numerical Aperture Of An Optical Fibre
12. Determination Of Moment Of Inertia And Rigidity Modulus Of The Given Wire.

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

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	-	-	2	2	-	3
CO2	3	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	MVJ20EEL17/27	**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:

- Exposure to common electrical components such as Resistors, capacitors and inductors, types of wires and measuring instruments.
- Power and power factor measurement of different types of lamps and three phase circuits.
- Measurement of impedance for R-Land R-C circuits and
- Measurement of three phase power consumed in a 3 phase load.
- Measurement of earth resistance and Two way, three way control of a lamp

S.No	**Name of Experiment**
1	Verification of KCL and KVL for DC circuits
2	Measurement of current, power and power factor of incandescent lamp, fluorescent lamp, and LED lamp.
3	Measurement of resistance and inductance of a choke coil using 3-voltmeter method
4	Determination of phase and line quantities in three phase star and delta connected loads.
5	Measurement of three-phase power using two-wattmeter method.
6	Two way and three-way control of lamp and formation of truth table.
7	Study of effect of open and short circuit in simple circuits**.**
8	Inverse time characteristics of fuse and MCB.
9	Measurement of earth resistance using Megger
Demonstration experiments	
1	Demonstration of cutout sections of electrical machines (DC machines, Induction machines and synchronous machines).

2	Understanding of SMPS
3	3-phase induction motor starting showing the effect of phase sequence.
Course outcomes:	
CO1	Identify the common electrical components and measuring instruments used for conducting experiments in the electrical laboratory.
CO2	Compare power consumed and power factor of different types of lamps.
CO3	Determine impedance of an electrical circuit and power consumed in a 3-phase load.
CO4	Determine earth resistance and understand two way and three-way control of lamps.
CO5	Demonstrate the working of Protective devices

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

High-3, Medium-2, Low-1

Technical English I
B.E. I Semester
Common to all Branches [As per Choice Based Credit System (CBCS) scheme]

Subject Code	MVJ20EGH18	IA Marks	50
Number of Lecture Hours/Week	02	Exam marks	50
Total Number of Lecture Hours	35 hours		

Credits – 1

Course Objectives: This course will enable 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

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

Modules	RBT Level
Module -1	
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	L1, L2, L3
Module - 2	
Introduction to Listening Skills and Phonetics 1.1 Introduction to Phonetics 1.2 Phonetic symbols and transcription 1.3 Sounds Mispronounced 1.4 Speech Sounds: Vowels, Consonants and Diphthongs 1.5 Silent Letters 1.6 The magic 'e' 1.7 Homophones and Homonyms 1.8 Aspiration and Pronunciation of 'The' 1.9 Listening Comprehension 1.10 Articles: Use of Articles; common errors in the use of Articles	L1, L2, L3

Module -3	
Developing Listening Skills 1.1 Importance of listening in communication 1.2. Techniques for effective listening 1.3 Incongruencies in English pronunciation 1.4 Word Accent - Rules for Word Accent, Stress Shift 1.5 Sentence stress 1.6 Standard pronunciation 1.7 Plural forms 1.8 Question forms and intonation 1.9 Preposition, and those Prepositions often confused 1.10 Prepositional phrases 1.11 Listening Comprehension	L1, L2, L3
Module - 4	
Speaking Skills and Vocabulary-1 1.1 Vocabulary used in everyday situations 1.2 Words 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	L1, L2, L3
Module - 5	
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, professing appreciation etc.	L1, L2, L3
Details of Topics to be covered Interactive practice sessions in Language Lab Role plays to master functional language skills – asking and giving directions, greeting, introducing, asking and providing information, offering help Listening Comprehension Pronunciation, Intonation, Stress and Rhythm – Reading practice	

Course Outcomes:

CO1: Use English that is grammatically correct and identify the nuances of phonetics, intonation and flawless pronunciation

CO 2: Enhance the repertoire of English vocabulary

CO 3: Identify common errors in spoken and written communication

CO 4: Understand and improve non-verbal communication and kinesics

CO 5: Perform with confidence at campus recruitment, engineering and all other competitive examinations

Question Paper pattern: The SEE question paper will be set for 100 marks and the pattern of the paper will be a mix of Objective type (MCQ) and Descriptive type

Suggested Reading:

English for Technical Communication by N. P. Sudharshana and C. Savitha, Cambridge University Press - 2016

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

Practical English Usage by Michael Swan, Oxford University Press -2016

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

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

An Autonomous Institution
Affiliated to VTU, Belagavi
Approved by AICTE, New Delhi
Recognized by UGC under 2(f) & 12(B)
Accredited by NBA & NAAC

Course Title	**Advanced Calculus and Numerical Methods -Math Lab**	Semester	II
Course Code	**MVJ20MAT21**	**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 viz., 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**	12Hrs.

Vector Calculus:-

Vector Differentiation: Scalar and vector fields. Gradient, directional derivative; curl and divergence- physical interpretation; solenoidal and irrotational vector fields- Illustrative problems; Vector identities.

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

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**	12Hrs.

Differential Equations of higher order**:-**Second order linear ODE's with constant coefficients-Inverse differential operators, method of variation of parameters; Cauchy's and Legendre homogeneous equations. Applications to L-C-R circuits.

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,L3**	12Hrs.

Partial Differential Equations(PDE's):-Formation of PDE's by elimination of arbitrary constants and functions. Solution of non- homogeneous PDE by direct integration. Homogeneous PDEs 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

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**	12Hrs.

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

.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./

https://www.khanacademy.org/

http://www.nptelvideos.in/

https://www.classcentral.com/

Module-5	**L1,L2,L3**	12 Hrs.

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

Laboratory Sessions: .Solving algebraic equation (Regula-Falsi and Newton-Raphson

methods) using Python

Applications: Use of Numerical Methods help in reducing the theoretical work
Video link **:** https://www.khanacademy.org/

http://www.nptelvideos.in/

https://www.classcentral.com/

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.

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.	G. B. Gururajachar: Calculus and Linear Algebra, Academic Excellent Series Publication, 2018-19

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

Technical English II B.E. II Semester Common to all Branches [As per Choice Based Credit System (CBCS) scheme]			
Subject Code	MVJ20EGH28	IA Marks	50
Number of Lecture Hours/Week	02	Exam marks	50
Total Number of Lecture Hours	35 hours		

Credits – 1

Course Objectives: This course will enable students:

- 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

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

Modules	RBT Level
Module - 1	
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	L1, L2, L3
Module-2	
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 (Precise 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	L1, L2, L3

Module -3	
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 Voices in Report writing 1.7 Report writing 1.8 Sentence Improvement Exercises, Cloze Test and Theme Detection Exercises.	L1, L2, L3
Module - 4	
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 **1.4** Practice in writing various types of Emails	L1, L2, L3
Module-5	
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	L1, L2, L3
Details of Topics to be covered Interactive practice sessions in Language Lab Listening Comprehension Delivering Speeches Role plays to enhance Functional Language skills – responding to enquiries, offering suggestions, agreeing, disagreeing, complaining, apologizing, expressing preferences	
Course outcomes: On completion of the course, students will be able to: CO 1: Identify common errors in Spoken and Written communication CO 2: Reach higher levels of perfection in English vocabulary and language CO 3: Improve nature and style of sensible writing and acquire employment and workplace communication skills CO 4: Improve their Technical Communication Skills through Technical Reading and Writing practices CO 5: Perform well at campus recruitment, engineering and other competitive examinations	

Question paper pattern: The SEE question paper will be set for 100 marks and the pattern of the paper will be a mix of Objective type (MCQ) and Descriptive type

Suggested Reading:

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

Communication Skills by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018

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

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

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

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

Intermediate Grammar, Usage and Composition by M L Tichoo, A L Subramanian, P R Subramanian, Orient Black Swan – 2016.