

Semester: III		
Fourier Series , Transforms, Numerical and Optimization Techniques (Theory)		
Course Code:	MVJ21MA31C	CIE Marks:50
Credits:	L:T:P: 3:1:0	SEE Marks: 50
Hours:	40L+10T	SEE Duration: 3 Hrs
Course Learning Objectives: The students will be able to		
1	Solve the linear differential equations using Laplace transforms	
2	Apprehend and apply Fourier transform	
3	Demonstrate Fourier Transform as a tool for solving Integral equations	
4	Solve initial value problems using appropriate numerical methods	
5	Students learn to linear programming problems in Civil and Chemical engineering	

UNIT-I	
<p>Laplace Transforms: Definition, Transforms of elementary functions, Properties, Periodic function, Unit step function, Unit impulse function–problems. Inverse Laplace Transforms: Inverse Laplace Transforms, Convolution theorem to find inverse Laplace transform. Solution of linear differential equations using Laplace transforms.</p> <p>Self study: Solution of simultaneous first order differential equations Applications: Analysis of electrical and electronic circuits, used in Signal processing and in control systems. Video Link:http://nptel.ac.in/courses.php?disciplineID=111</p>	10 Hrs
UNIT-II	
<p>Fourier Series: Periodic functions, Dirichlet's condition, Fourier series of periodic functions with period 2π and arbitrary period $2c$. Fourier series of even and odd functions. Half range Fourier Series, Practical harmonic Analysis and Problems.</p> <p>Self study: Complex form of Fourier series. Applications: The Fourier series has many such applications in harmonic analysis, vibration analysis,acoustics, optics etc. Video Link: http://nptel.ac.in/courses.php?disciplineID=111</p>	10 Hrs
UNIT-III	
<p>Fourier transforms: Infinite Fourier transform, Infinite Fourier sine and cosine transforms, Inverse Fourier transforms, Inverse Fourier sine and cosine transforms, Convolution theorem for Fourier transform.</p> <p>Self study: Convolution theorem for Fourier transform Applications: Fourier Transformation (FT) has huge application in studying to study vibrations in building/structures. Any kind of spectroscopy applied in chemical engineering (CE) is based in Fourier techniques. Video Link: http://nptel.ac.in/courses.php?disciplineID=111</p>	10 Hrs
UNIT-IV	

<p>Numerical solution of ordinary differential equations: Numerical solution of first order and first degree; Taylor's series method, modified Euler's method, Runge-Kutta method of fourth-order. Differential Equations of second order: Runge-Kutta method and Milne's Predictor and Corrector method.</p> <p>Self study: Adams- Bash forth predictor and corrector methods Applications: Numerical Methods are used to provide „approximate“ results for the differential equation problems being dealt with and their necessity is felt when it becomes impossible or extremely difficult to solve a given problem analytically. Video Link: http://nptel.ac.in/courses.php?disciplineID=111</p>	10 Hrs
UNIT-V	
<p>Optimization Techniques: Linear Programming, Mathematical formulation of linear programming problem (LPP), Graphical Method, Simplex Method , Dual simplex methods and Big M methods.</p> <p>Self study: Two phase simplex methods. Applications: Linear Programming is used in a variety of fields including food and agriculture, engineering, transportation problems, manufacturing and energy. Video Link: http://nptel.ac.in/courses.php?disciplineID=111</p>	10 Hrs

Course Outcomes: After completing the course, the students will be able to	
CO1	Use Laplace transform and inverse transforms techniques in solving differential equations.
CO2	Know the use of periodic signals and Fourier series to analyze circuits and system
CO3	Demonstrate Fourier Transform as a tool for solving Integral equations.
CO4	Identify appropriate numerical methods to solve ODE.
CO5	Solve the mathematical formulation of linear programming problem.

Reference Books	
1.	B.S. Grewal, "Higher Engineering Mathematics" Khanna Publishers, 44 th Edition, 2013.
2.	Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley-India publishers, 10 th edition, 2014.
3.	Prof G.B.Gururajachar "Engineering Mathematics-III , Academic Excellent series Publications, 2016-17
4.	Ramana B. V., "Higher Engineering Mathematics", Tata McGraw-Hill, 2006.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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

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

Semester End Examination (SEE):

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

Total marks: 50+50=100

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

High-3, Medium-2, Low-1

Semester: III		
BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY (Theory)		
Course Code: MVJ21CV32		CIE Marks: 50
Credits: L:T:P: 4:0:0		SEE Marks: 50
Hours: 50L		SEE Duration: 3 Hrs.
Course Learning Objectives: The students will be able to		
1	Recognize the good materials for the building construction	
2	Supervise different types of masonry	
3	Select type of materials, design and supervise suitable types of walls, floor and roof.	
4	Gain knowledge about damp proofing, formwork, scaffolding, shoring and underpinning with suitable engineering measures.	
5	Select the suitable sustainable materials for building construction	

UNIT-I	
<p>Functions of buildings and structure in general - Various components of a building (Online mode) - Loads on buildings as per IS 875, IS 1893 and NBC.</p> <p>Building Materials: Bricks-Composition, Classification, Manufacturing Process, Tests. Stones- Requirements and Classification. Timber-Classification, Defects, Qualities, Seasoning, Industrial Timber, Concrete – Ingredients, Cement – Types.</p> <p>Laboratory Sessions/ Experimental learning: (Self Learning)</p> <ul style="list-style-type: none"> • Verification of dimensions of different types of brick • Determination of water absorption of brick • Determination of efflorescence of brick • Find the soundness and hardness of brick <p>Applications: (Self Learning)</p> <ul style="list-style-type: none"> • Assess quality of bricks <p>Video link / Additional online information: (Self Learning)</p> <ul style="list-style-type: none"> • Masonry materials: https://nptel.ac.in/courses/105102088/ 	10 Hrs
UNIT-II	
<p>Masonry: Definition and terms used in masonry. Strength of masonry. Brick masonry- characteristics and requirements of good brick masonry , Bonds in brick work, Header, Stretcher, English, Flemish bond- Stone masonry- Requirements of good stone masonry, Classification- Ashlar, Rubble- coursed, uncoursed.</p> <p>Laboratory Sessions/ Experimental learning: (Self Learning)</p> <ul style="list-style-type: none"> • Arrange bricks according to different bonds- Header, stretcher, English and Flemish. Identify various types of stone masonry in the campus. <p>Applications: (Self Learning)</p> <ul style="list-style-type: none"> • Select suitable masonry for a structure. <p>Video link / Additional online information: (Self Learning)</p>	10 Hrs

<ul style="list-style-type: none"> • https://nptel.ac.in/courses/105102088/ 	
UNIT-III	
<p>Plastering and Pointing: Mortar for masonry (Types and Uses), Purpose, Materials, method of plastering and pointing. Defects in Plastering.</p> <p>Painting: Purpose, Types, Technical terms, Ingredients and defects. Preparation and applications of paints to new and old plastered surfaces, wooden and steel surfaces.</p> <p>Varnish: Characteristics and types</p> <p>Laboratory Sessions/ Experimental learning: (Self Learning)</p> <ul style="list-style-type: none"> • Identify the defects in plastering <p>Applications: (Self Learning)</p> <ul style="list-style-type: none"> • Measure the condition of painting against water proofing <p>Video link / Additional online information: (Self Learning)</p> <ul style="list-style-type: none"> • https://nptel.ac.in/courses/105102088/ 	10 Hrs
UNIT-IV	
<p>Formwork: Introduction to formwork, mivan shuttering,</p> <p>Scaffolding – Types, Shoring and under Pinning.</p> <p>Roof – Functions, Flat roof, pitched roof, roofing materials</p> <p>Damp proofing in ground floor</p> <p>Floor – Flooring materials</p> <p>Thermal Performance, Fire resistance and acoustic of buildings</p> <p>Laboratory Sessions/ Experimental learning: (Self Learning)</p> <ul style="list-style-type: none"> • Diagnose causes of dampness in a building <p>Applications:(SelfLearning)</p> <ul style="list-style-type: none"> • Take suitable measures to improve functional performance and durability of structure. <p>Video link / Additional online information: (Self Learning)</p> <ul style="list-style-type: none"> • https://nptel.ac.in/courses/105102088/ 	10 Hrs
UNIT-V	
<p>Sustainable materials and alternatives- Cement concrete blocks, stabilized mud blocks, AAC blocks</p> <p>Steel in construction- Factors affecting physical properties, uses, market forms of steel</p> <p>Plastics- classification, properties, FRP</p> <p>Glass- Composition, manufacturing, varieties of glass</p> <p>Laboratory Sessions/ Experimental learning: (Self Learning)</p> <ul style="list-style-type: none"> • Identify various materials used in the residential building and institutional building. <p>Applications: (Self Learning)</p> <ul style="list-style-type: none"> • Select sustainable and alternative materials according to the requirement. <p>Video link / Additional online information: (Self Learning)</p> <ul style="list-style-type: none"> • https://nptel.ac.in/courses/105102088/ 	10 Hrs

Course Outcomes: After completing the course, the students will be able to	
CO1	Identify various components and requirement needed for building construction.
CO2	Assess strength and stability of masonry.
CO3	Select suitable materials for Plastering, Painting and pointing
CO4	Restate the different types of roofing and flooring materials
CO5	Select the sustainable materials for construction

Reference Books	
1.	"Building Materials", S.K.Duggal, (Fourth Edition) 2012, New Age International Publishers
2.	"Building Construction", Dr. B.C.Punmia, Er. Ashok Kumar Jain, Dr. Arun Kumar Jain, (Elevent Edition) 2016, Laxmi Publications (P) ltd.,2016, New Delhi.
3.	"Fundamentals of Building Construction: Materials and Methods", Edward Allen, Joseph Iano, (Seventh Edition) 2019,Wiley Publishers
4.	"Building and Construction Materials: Testing and Quality Control", M. L. Gambhir, 2014, McGraw Hill Education Pvt. Ltd

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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

Semester End Examination (SEE):

Total marks: 50+50=100

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

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

Semester: III		
GEOLOGY AND GEOINFORMATICS (Theory)		
Course Code: MVJ21CV33		CIE Marks: 50
Credits: L:T:P: 2:1:0		SEE Marks: 50
Hours: 30L+10T		SEE Duration: 3 Hrs.
Course Learning Objectives: The students will be able to		
1	To outline the internal structure and composition of the earth and learn about geo-morphological agents such as river, wind, sea waves, and their implications in implementing civil engineering projects by the application of Topographic maps	
2	To illustrate the various properties, occurrence, uses of minerals and rocks in various industries	
3	To assess knowledge about the structures of the rocks and their considerations in the selection of site for dams, tunnels, bridges and highways	
4	To understand the basic concepts of Remote Sensing	
5	To recognize various Geographical Information System (GIS) method	

UNIT-I	
Introduction to Geology, Geomorphology and Seismology: Introduction: Geology in civil engineering, branches of geology; Understanding the earth, internal structure and composition and Introduction to Plate tectonics. Landforms – Classification, Rock weathering, types and its effects on Civil Engineering Projects. Watershed management, Floods and their control, River valley, Drainage pattern – parameters and development; Coastlines and their engineering considerations. Earthquake – Causes and Effects, Seismic waves, Engineering problems related to Earthquakes, Earthquake intensity, Richter Scale, Seismograph, Seismic zones- World and India, Tsunami – causes and effects. Early warning system. Reservoir Induced Seismicity; Landslides – causes and their control. Video link / Additional online information: Geology - Introduction: http://nptel.iitm.ac.in/video.php?subjectId=105105106 http://nptel.iitm.ac.in/courses.php?branch=Civil	8 Hrs
UNIT-II	
Mineralogy and Petrology: Minerals: Properties that affect the strength of minerals. Physical properties and chemical composition of following minerals - <i>Quartz, Feldspars</i> (orthoclase and plagioclase), <i>Micas</i> (biotite and muscovite), <i>Amphibole</i> (hornblende), <i>Pyroxene</i> (augite and hypersthene), <i>Gypsum, Calcite, Clay minerals</i> (kaolinite) and their chemical formulae.	8 Hrs.

<p>Introduction to petrology: Rock Cycle, broad classification of rocks. Igneous Petrology: Plutonic, Hypabyssal and Volcanic rocks, Structure, Texture and Classification of Igneous rocks. Study of common rock types prescribed in practical work and their engineering applications. Sedimentary Petrology: Rock weathering, Genetic classification of secondary rocks and grain size classification and Textures, Sedimentary Structures, Diagenesis Process. Study of common rock types prescribed in practical work and their engineering applications. Metamorphic Petrology: Agents, Types of metamorphism, Texture and structures. Study of common rock types prescribed in practical work and their engineering applications.</p> <p>Video link / Additional online information: Mineralogy & Petrology: http://nptel.iitm.ac.in/video.php?courseId=1055&p=1 http://nptel.iitm.ac.in/video.php?courseId=1055&p=3</p>	
UNIT-III	
<p>Structural and Engineering Geology: Structural Geology: Outcrop, stratification, dip and strike relation, Unconformity, joints their types and genesis Faults and folds with their types and causes, Engineering consideration of joints, folds and faults Geotechnical investigations for civil engineering projects: Study of toposheets and geological maps, importance of lithological and structural features studies for the construction of Dams, Reservoirs, Tunnels, Bridges and Highways Stratigraphy: Principles of Stratigraphy – Fundamentals of Lithostratigraphy, Bio-Stratigraphy and Chrono-stratigraphy; Introduction to the physiographic and tectonic subdivisions of India; Geotechnical site characterization, Geotechnical and land use mapping, Decision making in regional land use, Geological problems in construction of underground structures in Karnataka Regional Geology.</p> <p>Video link / Additional online information: Structural Geology & Engineering importance: http://nptel.iitm.ac.in/video.php?courseId=1055&p=4</p>	8 Hrs.
UNIT-IV	
<p>Introduction to Remote Sensing: Introduction: Introduction to Remote Sensing: Definition - History & Concepts - Electromagnetic Radiation (Source, Mode of Energy transfer, Radiation Principles, Black body radiation); Electro Magnetic Radiation (EMR): EMR Spectrum - EMR Interaction with Atmosphere (Absorption, Scattering & Atmospheric windows) - EMR Interaction with Earth surface (Absorption & reflection) - Spectral Response pattern - Energy budgeting in Remote Sensing.</p>	8 Hrs.

Video link / Additional online information: Introduction to Remote Sensing: www.youtube.com/watch?v=YU9XphJqi6k&list=PLnts6bz5xbzEjSVZP40SUiWxOu0IFNp9c www.youtube.com/watch?v=4KWsbsJW9pU&list=PLnts6bz5xbzEjSVZP40SUiWxOu0IFNp9c&index=2	
UNIT-V	
<p>Introduction to Geographical Information System (GIS): Definition - Usefulness of GIS - Components of GIS - Computer Hardware, Software Modules and Organizational Context of GIS. Data Structure: Data Structure in GIS - Types of Data (Points, Lines and Polygons) - Data Base Structures (Raster Data Structures and Vector data Structures) - Data Conversion (Vector to Raster and Raster to Vector).</p> <p>Video link / Additional online information: Introduction to GIS & Method of Georeferencing: www.youtube.com/watch?v=wi6CxQqVgaI&list=PLnts6bz5xbzEjSVZP40SUiWxOu0IFNp9c&index=12 www.youtube.com/watch?v=ebXzHp7HNQg&list=PLnts6bz5xbzEjSVZP40SUiWxOu0IFNp9c&index=13</p>	8 Hrs.

Course Outcomes: After completing the course, the students will be able to	
CO1	Students will able to find and relate the knowledge of geology and its role in Civil Engineering
CO2	Students will recommend the various earth's materials such as mineral, rocks and water in civil engineering practices
CO3	The students will investigate the significance of geological investigations for civil engineering projects and site selection as well as for the preparation of feasibility reports and others
CO4	Collect data and delineate various elements from the satellite imagery using their spectral signature
CO5	Analyze different features of ground information to create raster or vector data

Reference Books	
1.	Basudeb Bhatta, "Remote Sensing and GIS", OUP India, 2021, Pages.752
2.	Bangar, K.M, "Principles of Engineering Geology", Standard Publishers Distributors, New Delhi, 2020, Pages.451
3.	M.P Billings, "Structural Geology", Pearson Education, 2016, Pages.624
4.	S Kumar, "Basics of remote sensing & GIS", Laxmi Publication, 2016, Pages.140
5.	Parbin Singh, "Text Book of Engineering and General Geology", Published by S.K. Kataria & Sons, New Delhi, 2013, Pages.600

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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

Semester End Examination (SEE):

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

Total marks: 50+50=100

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

Semester: III		
SOLID MECHANICS & LABORATORY (Theory and Practice)		
Course Code: MVJ21CV34		CIE Marks:50+50
Credits: L:T:P: 3:0:1		SEE Marks: 50 +50
Hours:40 L+ 26 P		SEE Duration: 03+03 Hours
Course Learning Objectives: The students will be able to		
1	Provide basic knowledge in mechanics of materials so that the students can solve real engineering problems and design engineering systems.	
2	Explain the basic concepts of the stresses and strains for different materials	
3	State the development of internal forces and resistance mechanism for one dimensional and two-dimensional structural element.	
4	Evaluate the behaviour of torsional members.	
5	Evaluate the behaviour of columns and struts.	

UNIT-I	
<p>Concepts of Stress and Strain: Properties of materials, Normal stress, Shear stress, Normal strain, Hooke's law, Poisson's ratio. Stress-strain diagram of ductile and brittle materials, Factor of safety. Elongation of uniform bar and tapering bar due to self-weight.</p> <p>Compound bars, Elastic constants and their relationship.</p> <p>Video link / Additional online information:(Self Learning)</p> <ul style="list-style-type: none"> • https://nptel.ac.in/courses/105105108/ • https://nptel.ac.in/courses/105/102/105102090/ 	8 Hrs
UNIT-II	
<p>Compound Stresses: Two-Dimensional Stress Problems:Principal stresses, maximum shear stresses, Mohr's circle of stresses and its construction.</p> <p>Stresses in Pressure Vessels: Introduction, Thin cylinders subjected to internal pressure, Hoop stresses, Longitudinal stress and change in volume,Lame's Equation.</p> <p>Video link / Additional online information: (Self Learning)</p> <ul style="list-style-type: none"> • https://nptel.ac.in/courses/105105108/ • https://nptel.ac.in/courses/105/102/105102090/ 	8Hrs
UNIT-III	
<p>Beam Statics: Definition of bending moment and shear force, sign conventions, relationship between load intensity, bending moment and shear force. Shear force and bending moment diagrams for concentrated, uniformly distributed, linearly varying load, concentrated moments for determinate beams.</p> <p>Video link / Additional online information: (Self Learning)</p> <ul style="list-style-type: none"> • https://nptel.ac.in/courses/105105108/ • https://nptel.ac.in/courses/105/102/105102090/ 	8Hrs

UNIT-IV	
<p>Bending and Shear Stresses in Beams: Introduction, pure bending theory, Assumptions, derivation of bending equation, modulus of rupture, section modulus, flexural rigidity. Expression for transverse shear stress in beams, Bending and shear stress distribution diagrams for circular, rectangular, 'I', 'T' and Symmetrical Built-up sections.</p> <p>Video link / Additional online information: (Self Learning)</p> <ul style="list-style-type: none"> • https://nptel.ac.in/courses/105105108/ • https://nptel.ac.in/courses/105/102/105102090/ 	8Hrs
UNIT-V	
<p>Columns and Struts: Introduction, short and long columns. Euler's theory; Assumptions, Derivation for Euler's Buckling load for different end conditions, Limitations of Euler's theory.</p> <p>Torsion in Circular Shaft: Introduction, pure torsion, Assumptions, derivation of pure torsion, derivation for rigidity and polar modulus, Power transmitted by solid and hollow circular shaft.</p> <p>Video link / Additional online information: (Self Learning)</p> <ul style="list-style-type: none"> • https://nptel.ac.in/courses/105105108/ • https://nptel.ac.in/courses/105/102/105102090/ 	8Hrs
LABORATORY EXPERIMENTS	
<ol style="list-style-type: none"> 1. Determination of Tensile strength of mild steel by Tension test. 2. Determination of Compressive strength of mild steel by Compression test. 3. Determination of Compressive strength of cast iron by Compression test. 4. Determination of Torsional strength by Torsion test on mild steel circular sections. 5. Bending Test on Wood under Third point loading. 6. Determination of Ultimate Shear Strength Test on Mild steel. 7. Determination of Impact strength by Impact test on Mild Steel (Charpy & Izod). 8. Estimation of surface resistance by Hardness tests on ferrous and non-ferrous metals- Brinell's & Rockwell. 9. Compression Test on Brick 10. Flexure Test on Tiles 	

Course Outcomes: After completing the course, the students will be able to	
CO1	Restate the concepts of stress and strain at a point as well as the stress-strain relationships for homogeneous, isotropic materials.
CO2	Evaluate the behaviour and strength of structural elements under the action of compound stresses and Analysis of stresses for Thin & Thick Pressure Vessels.
CO3	Compute shear force and bending moment in loaded statically determinate beams
CO4	Compute bending and shear stresses in beams subjected to simple bending
CO5	Describe the critical buckling load of prismatic columns with different end conditions and able to compute torsional stress induced in circular members

Reference Books	
1.	"Strength of Materials",B.S. Basavarajaiah, P.Mahadevappa,3 rd Edition, 2010,University Press (India) Pvt. Ltd.
2.	" Elements of Strength of Materials",D.H. Young, S.P. Timoshenko ,5 th Edition (Reprint 2014),East West Press Pvt.Ltd.
3.	"A Textbook of Strength of Materials",R K Bansal,4th Edition,Laxmi Publications, 2010.
4.	" Strength of Materials",S.S. Rattan ,2nd Edition (Sixth reprint 2013),McGraw Hill Education (India) Pvt. Ltd.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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

Laboratory- 50 Marks

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

Semester End Examination (SEE):

Total marks: 50+50=100

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

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

Laboratory- 50 Marks

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

CO-PO Mapping

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

Semester: III		
GEODETIC INFORMATION & PRACTICES (Theory and Practice)		
Course Code: MVJ21CV35		CIE Marks:50+50
Credits: L:T:P: 3:0:1		SEE Marks: 50 +50
Hours: 40 L+ 26 P		SEE Duration: 03+03 Hours
Course Learning Objectives: The students will be able to		
1	Provide basic knowledge about principles of surveying for location, design and construction of engineering projects	
2	Develop skills for using surveying instruments including, leveling instruments, plane tables, theodolite, compass	
3	Make students to familiar with cooperative efforts required in acquiring surveying data and applying fundamental concepts to eliminate errors and set out the works	
4	Provide information about new technologies that are used to abstracting the information of earth surface	
5	Provide basic knowledge about principles of surveying for location, design and construction of engineering projects	

UNIT-I	
<p>Introduction to Surveying Introduction, Importance of surveying to Civil Engineering, Concepts of plane and geodetic surveying, Principles of surveying, Plans and maps, Meridians, Bearings, Dip, Declination, Local attraction, Calculation of bearings and included angles.</p> <p>Introduction to Modern Instruments Electromagnetic spectrum, Electromagnetic distance measurement, Total station, Lidar scanners for topographical survey.</p> <p>Compass surveying: Prismatic and surveyor's compasses, temporary adjustments.</p> <p>Video link / Additional online information: https://nptel.ac.in/content/storage2/courses/105107122/modules/module10/html/33-16.html</p>	8 Hrs.
UNIT-II	
<p>Introduction to Levelling Principles and basic definitions, Types of Levels, Types of adjustments, Types of levelling - Simple, Differential, Fly, Reciprocal, Profile, Cross sectioning, Booking of levels - Rise & fall and H. I methods (Numerical).</p> <p>Areas and volumes Measurement of area – by dividing the area into geometrical figures, area from offsets, mid ordinate rule, trapezoidal and Simpson's one third rule, co-ordinates, introduction to planimeter, digital planimeter.</p> <p>Video link / Additional online information: https://nptel.ac.in/courses/105107122/</p>	8 Hrs.

http://nptel.ac.in/courses/Webcourse/contents/IIT%20Bombay/Mathematics%20I/ TOC- middle-M8.html	
UNIT-III	
<p>Theodolite Surveying: Theodolite and types, fundamental axes and parts of theodolite, temporary adjustments of transit theodolite, Horizontal and Vertical angle measurements by repetition and reiteration.</p> <p>Trigonometric levelling: Single and Double plane for finding elevation of objects Computation of distances and elevations using Tacheometric method and Numericals.</p> <p>Contours Contours and their characteristics, Methods of contour plotting, Interpolation, application of contours.</p> <p>Video link / Additional online information: https://nptel.ac.in/courses/105107122/</p>	8 Hrs.
UNIT-IV	
<p>Curve Surveying: Curves – Necessity – Types, Simple curves, Elements, Designation of curves, Setting out simple curves by linear methods (numerical problems on offsets from long chord & chord produced method), Setting out curves by Rankine’s deflection angle method (Numerical problems). Compound curves, Elements, Design of compound curves, Setting out of compound curves (numerical problems). Reverse curve between two parallel straights (numerical problems on Equal radius and unequal radius). Transition curves.</p> <p>Video link / Additional online information: https://nptel.ac.in/courses/105104101/</p>	8 Hrs.
UNIT-V	
<p>Aerial Photogrammetry Introduction, Uses, Aerial photographs, Definitions, Scale of vertical photograph, Ground Co-ordinates, Relief Displacements (Derivation), Ground control, Procedure of aerial survey, overlaps and mosaics, Stereoscopes, Derivation Parallax.</p> <p>Introduction to GIS Definition of GIS, Key Components of GIS, Functions of GIS, Spatial data, spatial information system Geospatial analysis, Integration of Remote sensing and GIS and Applications in Civil Engineering(transportation, town planning).</p> <p>Video link / Additional online information:</p> <ul style="list-style-type: none"> • https://www.digimat.in/nptel/courses/video/105104167/L04.html • https://swayam.gov.in/nd1_noc19_ce34/ • https://nptel.ac.in/courses/105103176/ 	8 Hrs.

LABORATORY EXPERIMENTS

1. (a) Measurements of distances using tape along with horizontal planes and slopes, direct ranging
(b) Setting out perpendiculars. Use of cross staff, optical square
2. Measurements of bearings / directions using prismatic compass, setting of geometrical figures using prismatic compass
3. Measurement of bearings of sides of a closed traverse and adjustment of closing error by Bowditch method
4. Determination of distance between two inaccessible points using compass and accessories
5. Determination of reduced levels of points using dumpy level/auto level (simple leveling)
6. Determination of reduced levels of points using dumpy level/auto level (differential leveling and inverted leveling)
7. Determination of difference in elevation between two points using Reciprocal leveling and to determine the collimation error
8. Conducting profile leveling, cross sectioning and block leveling. Plotting profile and cross sectioning in excel. Block level and contour by using Total Station
9. Measurement of horizontal angle by repetition and reiteration methods and Measurement of vertical angles using theodolite
10. Determination of horizontal distance and vertical height to a base inaccessible object using theodolite by single plane and double plane method.
11. Determination of distance and elevation using tachometric surveying with horizontal and inclined line of sight.
12. Conducting Closed traverse surveying using Theodolite and applying corrections for error of closure by transit rule.
13. Demonstration of Minor instruments like Clinometer, Ceylon Ghat tracer, Box sextant, Hand level, Planimeter, nautical sextant and Pentagraph.
14. Plotting of Layout for the Street by using Plane Table Survey

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

CO1	Execute survey using compass.
CO2	Find the level of ground surface and Calculation of area and volumes
CO3	Operate theodolite for field execution
CO4	Estimate the capacity of reservoir
CO5	Interpret satellite imageries

Reference Books

1.	S.K. Duggal - Surveying Vol. II, Tata McGraw Hill Ltd ,Reprint 2015
2.	K.R. Arora, "Surveying Vol. 1" Standard Book House, New Delhi. – 2010
3.	Chang, K , "Introduction to Geographic Information Systems", Tata McGraw-Hill Publishing Co. Ltd, 2008
4.	George Joseph, "Fundamentals of Remote Sensing", University Press, 2003
5.	Kanetkar T P and S V Kulkarni, Surveying and Levelling Part I, Pune Vidyarthi Griha Prakashan, 1988

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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

Laboratory- 50 Marks

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

Semester End Examination (SEE):

Total marks: 50+50=100

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

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

Laboratory- 50 Marks

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

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

Semester: III		
SAMSKRUTHIKA KANNADA		
(Theory)		
Course Code: MVJ21KAN36		CIE Marks: 50
Credits: L:T:P: 1:0:0		SEE Marks: 50
Hours: 15L		SEE Duration: 02 Hrs.
Course Learning Objectives: This course will enable students to understand Kannada and communicate in Kannada language		

UNIT-I	
೧. ಕನ್ನಡ ಭಾಷೆ-ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ. ೨. ಭಾಷಾ ಪ್ರಯೋಗಲಗ್ನಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ	3 Hrs
UNIT-II	
೧. ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ ೨. ಪತ್ರ ವ್ಯವಹಾರ.	3 Hrs.
UNIT-III	
೧. ಆಡಳಿತ ಪತ್ರಗಳು. ೨. ಸರ್ಕಾರದ ಆದೇಶ ಪತ್ರಗಳು	3 Hrs.
UNIT-IV	
೧. ಸಂಕೀಪ್ತ ಪ್ರಬಂಧರಚನೆ, ಪ್ರಬಂಧ ಮತ್ತು ಭಾಷಾಂತರ ೨. ಕನ್ನಡ ಶಬ್ದಸಂಗ್ರಹ	3 Hrs.
UNIT-V	
೧. ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ ೨. ಪಾರಿಭಾಷಿಕ ಆಡಳಿತ ಕನ್ನಡ ಪದಗಳು ಮತ್ತು ತಾಂತ್ರಿಕ/ಕಂಪ್ಯೂಟರ್ ಪಾರಿಭಾಷಿಕ ಪದಗಳು.	3 Hrs.

Reference Books	
1.	Adalitha Kannada – Dr. L Thimmesh, Prof. V Keshav Murthy

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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

Semester End Examination (SEE):

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

Total marks: 50+50=100

Semester: III		
BALIKE KANNADA (Theory)		
Course Code: MVJ21KAN36		CIE Marks: 50
Credits: L:T:P: 1:0:0		SEE Marks: 50
Hours: 15L		SEE Duration: 02 Hrs.
Course Learning Objectives: This course will enable students to understand Kannada and communicate in Kannada language		

UNIT-I	
Vyavharika Kannada –Parichaya (Introduction to Vyavharika Kannada)	3 Hrs
UNIT-II	
Kannada Aksharamaale haagu uchcharane(Kannada Alphabets and Pronunciation)	3 Hrs.
UNIT-III	
Sambhashanegaagi Kannada Padagalu (Kannada Vocubulary for Communication).	3 Hrs.
UNIT-IV	
Kannada Grammar in Conversations(Sambhasaneyalli Kannada Vyakarana)	3 Hrs.
UNIT-V	
Activities in Kannada	3 Hrs.

Reference Books	
1.	Adalitha Kannada – Dr. L Thimmesh, Prof. V Keshav Murthy

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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

Semester End Examination (SEE):

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

Total marks: 50+50=100

Semester: III		
BUILDING LAYOUT PLANNING (Ability Enhancement Course)		
Course Code: MVJ21CVA37		CIE Marks: 50
Credits: L:T:P: 1:0:2		SEE Marks: 50
Hours: 30		SEE Duration: 02 Hrs.
Course Learning Objectives: The students will be able to		
1	State basic vastu components required for the house	
2	Explain the scientific reason for the vastu	
3	Prepare the list of activities involved in the layout planning	
4	Plan the effective layout for the residential building	
5	List the activities involved in setting out of buildings in the field	

UNIT-I	
Basics of Vastu: Introduction, Relation with vastu to civil engineering, vastu tips, place and direction indications, dimensions and placing of doors and windows as per vastu, scientific reasons for the vastu, things that should be in house and should not be in house	10 Hrs
UNIT-II	
Building Layout: Planning of Layout for Residential Building, Commercial Building, Temple, Hospital Building, Educational Institution	10 Hrs
UNIT-III	
Setting out of Building: Temporary Bench mark, Baseline, Horizontal Control, Vertical Control, Trenches, Reduced level excavation	10 Hrs
UNIT-III	

Course Outcomes: After completing the course, the students will be able to	
CO1	Identify the vastu components for the house
CO2	Assess condition of vastu for the given layout
CO3	Develop the plan layout for the different kinds of building
CO4	Restate setting out procedure
CO5	Explain the step involved in building layout planning

Reference Books	
1.	"A practical approach to Vaastu Shastra", Col. Bhaskar Sarkar, Peacock Books, 2008, Chennai, ISSN: HYOR-1GS-X3GW
2.	"Building Construction", Dr. B.C.Punmia, Er. Ashok Kumar Jain, Dr. Arun Kumar Jain, (Elevent Edition) 2016, Laxmi Publications (P) ltd.,2016, New Delhi.
3.	"Fundamentals of Building Construction: Materials and Methods", Edward Allen, Joseph Iano, (Seventh Edition) 2019,Wiley Publishers

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

CIE for 50 marks, executed by way of tests (T) and assignments. A minimum of three quizzes are conducted along with tests. Test portion is evaluated for 40

marks and assignment is evaluated for 10 marks. The three tests are conducted for 40 marks each and the average of all the tests are calculated for 40. The marks for the assignments are 10 (2 assignments for 5 marks each). The marks obtained in test and assignment are added and report CIE for 50 marks.

Semester End Examination (SEE):

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

Total marks: 50+50=100

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

Semester: III		
Additional Mathematics-1 (Common to all branches)		
Course Code:	MVJ21MATDIP-I	CIE Marks:50
Credits:	L:T:P: 1:1:0	SEE Marks: 50
Hours:	30L+10T	SEE Duration: 3 Hrs
Course Learning Objectives: The students will be able to		
1	Familiarize the important and introductory concepts of Differential calculus	
2	Provide essential concepts integral calculus	
3	Gain knowledge of vector differentiation	
4	Learn basic study of probability	
5	Restate ordinary differential equations of first order and analyze the engineering problems.	

UNIT-I	
<p>Differential calculus: Recapitulation of successive differentiation -nth derivative -Leibnitz theorem (without proof) and Problems, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation, Taylor's and Maclaurin's series expansions-Illustrative examples.</p> <p>Video Link: http://nptel.ac.in/courses.php?disciplineID=111</p>	8 Hrs
UNIT-II	
<p>Integral Calculus: Statement of reduction formulae for the integrals of $\sin^n(x)$, $\cos^n(x)$, $\sin^n(x)\cos^n(n)$ and evaluation of these integrals with standard limits-problems. Double and triple integrals-Simple examples.</p> <p>Video Link: http://nptel.ac.in/courses.php?disciplineID=111</p>	8 Hrs
UNIT-III	
<p>Vector Differentiation: Scalar and Vector point functions, Gradient, Divergence, Curl, Solenoidal and Irrotational vector fields.</p> <p>Vector identities - $div(\phi \vec{A})$, $curl(\phi \vec{A})$, $curl(grad(\phi))$, $div(curl \vec{A})$.</p> <p>Video Link: http://nptel.ac.in/courses.php?disciplineID=111</p>	8 Hrs
UNIT-IV	
<p>Probability: Basic terminology, Sample space and events. Axioms of probability. Conditional probability – illustrative examples. Bayes theorem-examples.</p> <p>Video Link: http://nptel.ac.in/courses.php?disciplineID=111</p>	8 Hrs
UNIT-V	
<p>Ordinary Differential Equations of First Order: Introduction – Formation of differential equation, solutions of first order and first</p>	8 Hrs

degree differential equations: variable separable form, homogeneous, exact, linear differential equations.	
Video Link: http://nptel.ac.in/courses.php?disciplineID=111	

Course Outcomes: After completing the course, the students will be able to	
CO1	Apply the knowledge of calculus to solve problems related to polar curves and its applications
CO2	Apply the concept of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
CO3	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.
CO4	Understand the basic Concepts of Probability
CO5	Recognize and solve first-order ordinary differential equations occurring in different branches of engineering.

Reference Books	
1.	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43 rd Edition, 2013, .
2.	G. B. Gururajachar, Calculus and Linear Algebra, Academic Excellent Series Publication, 2018-19
3.	Chandrashekar K. S, Engineering Mathematics-I, Sudha Publications, 2010.

Continuous Internal Evaluation (CIE):

Theory for 50 Marks

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

Semester End Examination (SEE):

Total marks: 50+50=100

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

