SVKM's Narsee Monjee Institute of Management Studies
Mukesh Patel School of Technology Management & Engineering

Program: B. Tech. Integrated (Civil Engineering)				**Semester :** IV	
Course/ Module: Strength of Materials				**Module Code :** BTICI04001	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks – 50)**	**Term End Examinations (TEE) (Marks- 100 in Question Paper)**
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50

Outcomes:

After completion of this course, students would be able to:

1. Calculate the stresses produced in the deformable bodies
2. Determine the failure criteria when body is subjected to various stresses
3. Evaluate the deformations of the various determinate beams
4. Carry out testing of different metals and determine the material properties

Detailed Syllabus: (Per session plan)

Unit	Description	Duration
1.	**Tension, Compression and Shear:** Mechanical properties of materials such as elasticity, plasticity and creep, Linear Elasticity, Hooke's Law and Poisson's ratio, normal stress and strain, shear stress and strain, Allowable stresses and allowable loads, factor of safety, material constants.	04
2.	**Axially Loaded Members:** Changes in the length of members having uniform and non-uniform cross-section, statically indeterminate members, thermal effects, misfits and pre-strain, tri-axial state of stress.	08
3.	**Torsion:** Torsional deformation of a circular bar of linearly elastic materials, non-uniform torsion, transmission of power by circular shaft, statically indeterminate torsional members.	06
4.	**Shear Force and Bending Moments in beams:** Types of beams, loads and reactions, shear force and bending moments, relationships between loads, shear force and bending moments, shear force and bending moment diagrams for beams with and without internal hinges.	10
5.	**Stresses in beams:** Pure bending and non-uniform bending, curvature and longitudinal strains in beams, normal stresses in beams having linearly elastic materials, composite beams, shear stresses in beams, shear stress variation across the section for rectangular, circular, triangular, flanged sections having at least one axis of symmetry, design of beams for bending and shear.	10

6.	**Analysis of stresses:** Plane stress, stresses on inclined sections, principal stresses and maximum shear stresses, Mohr's circle for plane stress	07
	Total	**45**

Text Book:

1. James M. Gere, Barry J. Goodno, "Mechanics of Materials – SI Edition", *Cengage Learning, 2012*

Reference Books:

1. Andrew Pytel, Jaan Kiusalaas, "Mechanics of Materials – Second Edition", *Cengage Learning, 2011.*
2. Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf, "Mechanics of Materials – Third Edition", *Tata McGraw Hill*, 2008.
3. William Nash, Merle Potter, "Schaum's Outline of Strength of Materials, Fifth Edition", *McGraw Hill Professional, 2010*

Any other information: NIL

Details of Internal Continuous Assessment (ICA)
Test Marks: 20
Term Work Marks: 30

Details of Term work:

1. Minimum five assignments covering the prescribed syllabus
2. Report of minimum six experiments performed in the laboratory as per below:
   - Tension test on mild steel rod.
   - Tension test on tor steel rod.
   - Bend and re-bend test on bars.
   - Transverse test on cast iron specimen.
   - Shear test on cast iron specimen.
   - Torsion test on mild steel / cast iron specimen.
   - Brinell hardness test on metal specimens.
   - Rockwell hardness test on metal specimens.
   - Charpy impact test on metal specimens.
   - Izod impact test on metal specimens.

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Program: B. Tech. Integrated (Civil Engineering)				Semester: IV	
Course/ Module: Surveying - I				Module Code : BTICI04002	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks – 50)	Term End Examinations (TEE) (Marks- 100 in Question Paper)
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50

Outcomes:

After completion of this course, students would be able to:

1. Describe the measurement techniques in different types of surveys
2. Take measurements for plotting the positions of distinctive features and carry out calculations from the observations of surveying
3. Operate different instruments used in surveying for carrying out basic surveying and levelling

Detailed Syllabus: (Per session plan)

Unit	Description	Duration
1.	**Introduction:** Definitions, principle, Various types of surveys – based on methods and instruments, classifications, uses, necessity and use of various scales and verniers. Different types of ranging, tapes, chains, Linear measurements, approximate, direct, optical and electronic methods, Chain surveying, minor instruments for setting out right angle.	08
2.	**Compass Surveying:** Definitions, Principle, Different Types- prismatic, surveyor, Bearings-whole circle, reduced, fore and back bearings, declination, local attraction, plotting of compass survey by different methods and their corrections, Errors, Precautions.	05

3.	**Levelling and Contouring:** Definitions, technical terms, uses, details of levels such as dumpy, tilting and auto levelling staff, Temporary and permanent adjustments of dumpy and auto level, corrections curvature, refraction, combine and sensitiveness, reciprocal levelling, collimation and rise & fall method, errors, precautions. Contour – definitions, objectives, contour interval, horizontal equivalent, uses and characteristics of contour lines, methods of plotting contours, direct and indirect methods of contouring, Contour gradient.	12
4.	**Computation of Area and Volume:** Area of a irregular figure by Trapezoidal rule, Mid-ordinate rule, average- ordinate rule, Simpson's rule, various coordinate methods, planimeter. Computation of volume by trapezoidal and prismoidal formula.	05
5.	**Theodolite Surveying:** Objective, various parts of transit theodolite, technical terms, temporary and permanent adjustments of a transit, measuring horizontal and vertical angles, methods of repetition and reiteration, computation of latitude and departure, balancing of traverse by Bow-Ditch's transit rule, third rule and modified transit rules, missing data problems, Precautions in using theodolite, errors in theodolite survey, use of latitude and departure for area calculation, Gales traverse table.	10
6.	**Plane Table Surveying:** Definitions, uses and advantages, Different methods of plane table surveying, Two point problem, Errors in plane table survey, use of telescopic alidade.	05
	Total	**45**

Text Book:

1. Kanetkar and Kulkarni, "Surveying and Levelling", Vol - I and II, *Pune Vidyarthi Griha, Pune* , 2011.
2. N. N. Basak,"Surveying and Levelling", *Tata McGraw Hill, 2010.*

Reference Books:

1. Dr. K. R. Arora, "Surveying" vol - I, II & III", *Standard Book House, New Delhi, 2009.*
2. Dr. B.C. Punmia, Ashok K. Jain, Arun K. Jain, "Surveying Vol. - I, II & III", *Laxmi Publications (P) Ltd., New Delhi, 2005.*

Any other information: NIL

Details of Internal Continuous Assessment (ICA)
Test Marks: 20

Term Work Marks: 30

Details of Term work:

Term work should consists of the following:

1. Minimum five assignments covering the prescribed syllabus
2. Report of minimum six experiments performed in the laboratory as per below:
   - Introduction to measuring instruments
   - Chain Survey- chain and cross staff survey
   - Compass survey
   - Levelling - By height of instrument and rise & fall method
   - Theodolite - Measurement of horizontal and vertical angle
   - Theodolite traversing
   - Plane table surveying
   - Various minor instruments used in surveying
   - Use of planimeter for measuring area of irregular figures

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MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT ★ SVKM'S NMIMS MUMBAI

Program: B. Tech. Integrated (Civil Engineering)				**Semester :** IV	
Course/ Module: Engineering Geology				**Module Code:** BTICI04003	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks – 50)**	**Term End Examinations (TEE) (Marks- 100 in Question Paper)**
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50

Outcomes:

After completion of this course, students should be able to:

1. Explain the relevance of Geology in Civil Engineering
2. Differentiate various types of minerals, rocks with their suitability
3. Discuss the procedure for geological investigation for some of the Civil Engineering Projects

Detailed Syllabus: (Per session plan)

Unit	Description	Duration
1.	**Introduction:** Scope of Geology, Brief history of formation of earth and earth crust, internal constitutions of earth, relationship of geology to Civil Engineering **Physical Geology:** Introduction, Effect of natural agencies (wind, running water, sub surface water, lakes, oceans, glaciers, organisms, volcanoes, earth quakes) taking part in changing the surface of the earth, Earthquake Belts in India **Structural Geology:** Introduction, Causes of Development of Structures, Structural Elements - Folds, Faults, Joints, Unconformity, Dip, Strike, Outcrop Patterns, Outliers and Inliers, Importance of Structural Elements in Civil Engineering operations.	08
2.	**Mineralogy:** Introduction, Definition of Mineral and Crystal, Mode of Formation of Minerals, Common Rock-Forming Minerals and their Abundance, Different Methods of Study of Minerals, Significance of different Physical Properties in Mineral	10

	Identification, Diagnostic Physical Properties. **Study of Common Rock Forming Minerals:** Quartz Family, Feldspar Family, Augite, Hornblende, Biotite, Muscovite, Calcite, (Properties, Behaviour, Engineering Significance), Significance of Clay Minerals (Fundamentals of process of formation of ore minerals (Coal and Petroleum – Their Origin and occurrence in India)	
3.	**Petrology:** Introduction, Shell Structure of Earth, Definition of Rocks, Classification of Rocks, Sequence of Formation of Different Groups of Rocks, Rock Cycle, Civil Engineering Importance of Petrology. Igneous Rocks – Forms of Igneous Rocks- Plutonic & Hypabasal, Common Igneous Rocks and relation of their Constituent Minerals, Classification of Igneous Rocks, Structure and Textures, Suitability of Igneous Rocks for Building and Foundation, Megascopic Description of Common Igneous Rock Types, Descriptive Study of Common Sedimentary Rocks (Sandstone, Limestone, Shale, Conglomerate, and Breccias) Sedimentary Rocks – Introduction, Classification of Sedimentary Rocks, Common Structures and Textures of Sedimentary Rocks, Descriptive Study of Common Sedimentary Rocks (Granite, Syenite, Diorite, Dolomite, Gabbro, Pegmatite, Dolerite and Basalt. Metamorphic Rocks – Introduction, Metamorphism, Common Structures and Textures of Metamorphic Rocks, Classification of Metamorphic Rocks, Descriptive Study of Common Metamorphic Rocks (Quarzite, Marble, Slate, Thyllite, Gniess, Schist).	11
4.	**Stratigraphy:** Principle of stratigraphy and co-relation, geological time scale, physiographic divisions of India – study of formations occurring in peninsular India.	08
5.	**Ground water:** Sources and zones, water table, unconfined and perched, springs, Factors controlling water bearing capacity of rocks, pervious and impervious rocks, cone of depression and its use in civil engineering, Methods of artificial recharge of ground water,	08

	geology of percolation tank. **Geophysical Investigation:** Necessity, Methods of surface and sub-surface investigations, Importance of Electrical Resistivity Method, Seismic Refraction Method, Preliminary geological investigations, Use of aerial photographs and satellite imageries in civil engineering projects **Engineering Geology:** Geology of dam sites, reservoirs, roads, bridge sites and tunnels (broad outlines), Stability of hills slopes, landslides, their causes and precautions against them	
	Total	**45**

Text Book:

1. Singh Parbin, "Engineering and General Geology", *S. K. Kataria and Sons, 2012.*

Reference Books:

1. K. Mukherjee, "Textbook of Geology", *The World Press Pvt. Ltd.*, 2010.
2. P. C. Varghese, "Engineering Geology for Civil Engineer", *PHI Learning Private Limited,2012.*
3. N. Chenna Kesavullu, "Textbook of Engineering Geology", *Mac Millan Publisher India Ltd.,2009*

Any other information: NIL

Details of Internal Continuous Assessment (ICA)
Test Marks: 20
Term Work Marks: 30

Details of Term work:
Term work should consists of the following:

1. Minimum five assignments covering the prescribed syllabus
2. Report of experiments performed in the laboratory as per below:
   - Study of physical properties of the minerals.
     a. Megascopic identification of rock forming minerals – crystalline, crypto-crystalline and amorphous silica and their varieties, Orthoclase, Microcline, Plagioclase, Muscovite, Biotite, Hornblende, Asbestos, Augite, Olivine, Tourmaline, Garnet, Natrolite, Actinolite, Calcite, Dolomite, Gypsum, Corundum, Talc, Fluorite, Kyanite, etc.
     b. Megascopic identification of ore forming minerals - Bauxite, Graphite,

Galena, Pyrite, Hematite, Magnetite, Chalcopyrite, Chromite, coal

- Identification of rocks –
  a. Megascopic identification of Igneous rocks : Granite and its varities, Synite, Dionite, Gabbro, Pegmatite, Porphyry, Dolerite, Rhyolite, Pumice, Trachyte, Basalt and its varieties, Volcanic Breccia, Volcanic Tuffs.
  b. Megascopic identification of Sedimentary rocks : Conglomerate, Breccia, Sandstone and its varieties, Shales, Limestone, Melliolite, Laterite,
  c. Megascopic identification of Metamorphic rocks: Slate, Phyllite, Mica, Schists, Hornblende schists, Granite gneiss and its varieties, Augen gneiss, Marbles and quartzite.
- Study of Structural geological maps

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SCHOOL OF TECHNOLOGY MANAGEMENT * MUKESH PATEL * SVKM'S NMIMS MUMBAI

Program : B. Tech. Integrated (All Branches)				Semester : IV	
Course/ Module: Engineering Mathematics-II				Module Code : BTICI04004	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks – 50)	Term End Examinations (TEE) (Marks- 100 in Question Paper)
3	0	2	4	Marks Scaled to 50	Marks Scaled to 50

Objectives:

- To provide an understanding of Matrices and differential equations in technical subjects.
- To impart knowledge of Beta & Gamma functions and double integrals, its applications to solve engineering problems.

Outcomes:

After completion of this course, students would be able to:

- Solve system of linear equations
- Evaluate problems using Beta and Gamma functions
- Analyse suitable method to solve differential equations
- Relate the concepts of double integral to solve engineering problems.

Detailed Syllabus: (Per session plan)

Unit	Description	Duration
1.	**Matrices:** Rank of a matrix, Rank by Normal form and Echelon form, Reduction of a matrix A to normal form PAQ, Linear dependence and independence of rows and columns of a matrix over real field. **Applications:** Solving system of linear homogeneous and non-homogeneous equations using Cramer's rule, matrix inversion method, reduction to echelon form.	12
2.	**Beta and Gamma functions:** Definition of Beta and Gamma functions and their properties; Relation between Beta and Gamma functions; Duplication formula.	08
3.	**Ordinary Differential Equations:** Definition of differential equation, order and degree of differential equation, formulation of differential equation. **Solution of differential equation of first order and first degree:** Variable separable method, reducible to variable separable method, Homogeneous differential equation, reducible to homogeneous differential equation, exact differential equation	15

	and those which can be reduced to exact form using integrating factor (four rules), Linear differential equations, Bernoulli's differential equation. **Solution of Linear differential equations of higher order with constant coefficients:** Complementary functions, Particular integrals of the differential equations of the type $f(D)y = X$ where $X = e^{ax}, \sin(ax+b), \cos(ax+b), x^m, e^{ax}V(x), xV(x)$. Applications of differential equations in modelling: First-order Equations, Free Mechanical Oscillations, Forced Mechanical Oscillations.	
4.	**Double Integration:** Double integration in cartesian and polar co-ordinates, evaluation of integrals over a given region, change of order of integration, change of co-ordinate system, application of double integration to compute area, mass of a lamina and volume.	10
	Total	**45**

Text Books:

1. Robert Wrede (2010), Murray Spiegel, *Schaum's Outline of Advanced Calculus, Third Edition.*
2. B. S. Grewal (2013), "Higher Engineering Mathematics", *Khanna Publishers.*

Reference Books:

1. Erwin Kreyszig (2010), "Advanced Engineering Mathematics", *Wiley Eastern Ltd, 10th edition.*
2. Howard Anton (2012), "Calculus", *Wiley, 10th edition.*
3. G. Birkhoff and G. C. Rota, Ordinary Differential Equations (2003), *4th Edition, Wiley Singapore Edition.*
4. Alan Jeffrey (2003), Handbook of Mathematical Formulas and Integrals, *Academic Press, 3rd edition.*

Any other information: NIL

Details of Internal Continuous Assessment (ICA)
Test Marks: 20
Term Work Marks: 30

Details of Term work:
As per institute norms.

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Program: B. Tech. Integrated (All Branches)				Semester: IV	
Course/ Module: Engineering Physics				Module Code : BTICI04005	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks – 50)	Term End Examinations (TEE) (Marks- 100 in Question Paper)
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Objectives

- To enable the students understand the basic principles of physics, making them meet the needs of engineering and technology.

Outcomes

After completion of this course, student would be able to:

- Apply the concept of interference, diffraction in various engineering applications.
- Understand the quantization effect in reduced dimensional materials and their consequences.
- Implement the concepts of clean energy for power generation.
- Illustrate the usage of nanomaterial in various applications.

Detailed Syllabus: (Per session plan)

Unit	Description	Duration
1.	**Optics:** Interference: Analytical treatment of interference. Interference in thin film in reflected system. Wedge shaped film. Newton's rings and applications. Diffraction: Fraunhoffer's diffraction at single slit, double slits, N Parallel slits (multiple slits). Diffraction grating, resolving power of grating, dispersive power of grating.	08
2.	**Quantum physics:** The origin of quantum theory, Blackbody radiation, Wein's law, Rayleigh- Jeans Law, Stefen's law, Plank's theory, dual nature of radiation. Wave nature of Matter: De Broglie's hypothesis, Davisson-Germer Experiment, the double slit experiment with particles, the need for a wave function, Born's interpretation of the wave function. Wave Packets and Uncertainty Principle: General statement of Heisenberg's Uncertainty Principle, Energy-Time and Position-momentum uncertainty relation and its applications.	08
3.	**Energy technology :** Need for clean energy, different methods for obtaining clean energy viz. nuclear energy (including basics of nuclear physics like	06

	fission and fusion etc.) solar cells (including conventional and Nano material based solar cells), hydrogen fuels and wind mills. Advantages and limitations of each method.	
4.	**Introduction to Nanotechnology:** Definition of nanotechnology, quantum confinement effect [how the material properties differ as the size is reduced: Coloumb Blockade, Surface plasmon resonance, some basic Nano materials like carbon nanotubes, graphene, quantum dots, applications of nanotechnology (scratch resistance coatings, clothing, antimicrobial applications, drug delivery, IC technology), Nano-toxicity (basic idea). Scanning and Transmission electron microscopes, Scanning Tunneling Microscope, Atomic Force Microscope.	08
	Total	**30**

Text Books:

1. Jenkins and White (2013), Optics, *MC Graw Hill.*
2. Arther Beiser (2009), Concept of Modern Physics, *Tata McGraw Hill, 6th edition.*

Reference Books:

1. Halliday and Resnick (2014), Fundamentals of Physics, *Wiley India, 10th edition.*
2. L. I. Schiff (1968), Quantum Physics, *McGraw Hills.*
3. V. V. N. Kishore (2009), Renewable Energy Engineering and Technology – A Knowledge Compendium, *TERI Press.*
4. Sulabha K. Kulkarni (2011), Nanotechnology: Principles and Practices, *Springer.*
5. Richard P. Feynman (2011), Feynman lectures on physics, *The New Millennium Edition.*
6. Dattu R Joshi (2010), Engineering Physics, *Tata McGraw Hill, 1st Edition.*

Any other information: NIL

Details of Internal Continuous Assessment (ICA)
Test Marks: 20
Term Work Marks: 30

Details of Term work:
As per Institute norms.

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Program : B. Tech. Integrated (All Branches)				Semester : IV	
Course/ Module: Numerical Techniques				Module Code: BTICI04006	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks – 50)	Term End Examinations (TEE) (Marks- 100 in Question Paper)
3	0	2	4	Marks Scaled to 50	Marks Scaled to 50

Objectives:

- To bring awareness of various numerical techniques to solve Engineering problems.

Outcomes:

After completion of this course, students would be able to:

- Analyse error in numerical data.
- Solve algebraic, transcendental and system of linear equations using different numerical techniques.
- Understand the concept of interpolation and regression.
- Apply the techniques learnt in numerical differentiation and integration to solve engineering problems.
- Evaluate ordinary differential equation numerically.

Detailed Syllabus: (Per session plan)

Unit	Description	Duration
1.	**Introduction to Numerical Computing:** Introduction, Types of Errors: Absolute error, Relative error, Percentage error, Round-off error, Truncation error.	02
2.	**Roots of Equations:** Bisection Method, False Position Method, Newton-Raphson Method, Secant Method, Convergence of Numerical Methods.	10
3.	**Systems of Linear Algebraic Equations:** Gaussian Elimination Method, Gauss Jordan Method, Gauss Seidel Method, Jacobi Method.	06
4.	**Interpolation:** Finite Differences, Forward Differences, Backward Differences, Newton's Forward Interpolation, Newton's Backward Interpolation, Lagrange's Interpolation. Application of this technique to estimate data type such as income, distance, production etc.	07
5.	**Curve Fitting:** Method of Least Square to fit the straight line and the parabola.	03
6.	**Numerical differentiation & Integration:**	09

	Derivatives using Forward and Backward difference formula, Trapezoidal Rule for Numerical Integration, Simpson's 1/3 Rule, Simpson's 3/8 Rule. Application to estimate the distance covered in given time and volume of a solid.	
7.	**Solution to Ordinary differential equations:** Picard's method, Taylor series method, Euler's method, Fourth-Order Runge-Kutta method.	08
	Total	**45**

Text Books:

1. E. Balagurusamy (2008), Numerical Methods, *Tata-Mc Graw Hill.*

Reference Books:

1. S. S. Sastry (2007), Introductory methods of Numerical Analysis, *PHI, 5th edition.*
2. B. S. Grewal (2010), Numerical Methods in Engineering & Science with Programs in C & C+ +, *Khanna Publishers.*
3. John Heinbockel (2004), Numerical Methods for Scientific Computing, *Trafford Publishing.*

Any other information: NIL

Details of Internal Continuous Assessment (ICA)
Test Marks: 20
Term Work Marks: 30

Details of Term work:
As per institute norms.

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