SVKM's NMIMS

Mukesh Patel School of Technology Management & Engineering

Program: MBA. Tech. (All Branches)				Semester: I	
Course: Engineering Mathematics-I				Code: MBAB01001	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	0	2	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To impart knowledge of complex numbers and its applications to solve Engineering problems.
- To provide an understanding of Principles of Vector Algebra, Single variable and Multivariable Calculus.

Outcomes:

After successful completion of this course, students will be able to:

- Execute the concepts of complex number, hyperbolic functions, Mean value theorems, partial derivatives of functions and vector products to solve Engineering problems.
- Express functions in series using Taylor's and Maclaurin's expansion, and evaluate limits of indeterminate forms using L'Hospital's Rule and gradient, directional derivative, curl and divergence.
- Find partial derivatives of functions and carry out the knowledge to error and approximations, maxima and minima.
- Applications to partial derivatives and vectors to solve real life problems.

Detailed Syllabus:

Unit	Description	Duration
1.	**Complex Numbers:** DeMoivre's theorem, Roots of complex numbers, Expansion of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$ and $\cos\theta$, Expansion of $\sin^n\theta$, $\cos^n\theta$ in terms of sine or cosine of multiples of θ, Hyperbolic functions, Separation of Real and Imaginary Parts, Inverse hyperbolic functions, Logarithm of a complex number.	12
2.	**Mean value theorems, Series expansion and Indeterminate forms:** Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's formula, Maclaurin series. Indeterminate forms: $\frac{0}{0}, \frac{\infty}{\infty}, 0\times\infty, \infty-\infty, 0^0, \infty^0, 1^\infty$ L'Hospital's rule.	08
3.	**Partial Derivatives and its applications:** Partial Derivatives of two variable and three variable functions, Partial derivative of composite function, Homogeneous functions in two or three variables, Euler's theorem.	15

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	Applications: Errors and approximations, Maxima and minima in 2 variables, Constrained maxima minima- Lagrange's multiplier method with one or two constraints.	
4.	**Vectors:** Scalar and vector triple products, Product of four vectors, Curves in space, Differentiation of a vector function of a single scalar variable, Theorems on derivatives, concept of tangent vector, Scalar and Vector Point Functions, gradient, Directional derivative, Curl and Divergence. **Applications:** velocity of a moving particle, potential field, Irrotational and Solenoidal Fields.	10
	Total	**45**

Text Books:

1. Erwin Kreyszig (2010), Advanced Engineering Mathematics, *Wiley Eastern, 10th edition.*

Reference Books:

1. Andreescu Titu, Andrica Dorin (2014), Complex Numbers from A to ....Z, *Birkhauser Basel Publishers, 2nd edition.*
2. Thomas, Calculus (2014), *Pearson Education, 7th edition.*
3. Howard Anton (2012), "Calculus", *Wiley, 10th edition.*
4. B.V.Ramana (2010), "Higher Engineering Mathematics", *Tata McGraw Hill, 1st edition.*
5. Alan Jeffrey (2003), Handbook of Mathematical Formulas and Integrals, *Academic Press, 3 edition.*

Term Work:

As per institute norms.

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SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: MBA. Tech. (All Branches)				Semester: I	
Course: Engineering Chemistry				Code: MBAB01002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorials Hours per week	Credit	Theory (3 Hrs) (70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To familiarize with concepts on hardness of water, treatment of water for human consumption & industrial applications.
- To introduce the students to concepts of lubricant technology and important engineering materials like polymers, liquid crystals and nanomaterials.
- To acquaint importance and application of theories of corrosion science.
- To understand the various energy resources and its conservation.

Outcomes:

- Apply water technologies and corrosions combating to industrial problems.
- Identify energy resources and tackle e-waste.
- Solve numerical problems based on water treatment methods, analysis of fuels, and lubricant quality parameters.
- Utilize concepts of polymers, nanomaterials, liquid crystals in real engineering scenario.

Detailed Syllabus

Unit	Description	Duration
1.	**Water Technology:** Hardness of water. Determination of hardness of water by EDTA titration. Numerical based on hardness of water and EDTA method. **Softening Methods:** Hot and Cold Lime-Soda Method, Zeolite Method and Ion-Exchange Method. Numerical based on lime-soda and Zeolite method. **Drinking water purification:** Removal of microorganisms, by adding bleaching powder, chlorination (no breakpoint chlorination), Ozonization, Desalination by Reserve Osmosis, Ultrafiltration.	08
2.	**Polymers:** Introduction and definition of important terms - monomer, polymer, polymerization, degree of polymerization, tacticity, and melting-glass transition temperature. **Plastics**: Thermosetting & Thermoplastics, Compounding of plastics, Preparation, properties and applications of commercial plastics (PF, PMMA) **Elastomers:** Natural rubber, drawbacks of natural rubber,	07

	Vulcanization of rubber. Preparation, properties and applications of commercial elastomers (Buna-S, Isocyanate rubber) **Speciality polymers:** Conductive polymers, Self-healing plastics. Applications of specialty polymers.	
3.	**Important Engineering Materials:** i) **Nanomaterials:** Structure, properties, applications of CNTs, Fullerenes, Graphite. ii) **Liquid Crystals:** Definition, Classification, properties with applications.	02
4.	**Corrosion:** Dry or Chemical corrosion, Wet or Electro chemical corrosion. Types of corrosion: concentration cell corrosion, galvanic corrosion, waterline corrosion, pitting corrosion, intergranular corrosion, stress corrosion. Factors influencing rate of corrosion. (with respect to nature of the metal and the environment of the metal) **Corrosion control:** i) Cathodic protection techniques ii) Protective coatings: (a) Metallic coatings-(Electroplating, galvanizing, tinning, metal cladding) (b) Organic coatings - (Paints, Varnishes-constituents and their functions)	08
5.	**Fuels and Combustion:** Definition, Classification, characteristics. Calorific value - Theoretical & Experimental (Bomb calorimeter). **Solid Fuel:** Coal, proximate and ultimate analysis, Numerical based on analysis of coal. (Dulong formula) and bomb calorimetry. **Liquid fuels:** Mining of Petroleum, Cracking, Reforming, Knocking in IC engines, anti-knocking agents (TEL and MTBE), octane number of petrol, cetane number of diesel. **Gaseous fuel:** (LPG, CNG) Composition, properties and application. Numerical problems based on Combustion of fuels (Calculation of air/oxygen requirement (solid/gaseous fuels and flue gases)	09
6.	**Environmental Aspects of Chemistry:** i) **Green Chemistry:** Principles of green chemistry with examples, (Numerical Problems, based on Atom economy) ii) **E-Waste: Definition,** Classification and Management of e-waste.	04
7.	**Lubricants**: Definition, Mechanism of lubrication, Properties-Viscosity, viscosity index, flash & fire, cloud & pour points, oiliness, saponification and acid value (Numericals based on saponification & acid value.	07

	Total	45

Text Books:

1. Jain.P.C (2014), Jain M, Engineering Chemistry, D*hanpat Rai & Co (Pvt.) Ltd, New Delhi, 16th ed,*.
2. Palanna.O.G. (2009), Engineering Chemistry, T*ata McGraw Hill Education. Pvt. Ltd, 1st Edition.*
3. Mallick Abhijit (2012), Chemistry for engineers; *1st ed, Viva Books.*
4. Joshi Payal (2016), Experiments in Engineering Chemistry, *1st ed, I.K.International Publishing.*

Reference Books:

1. O.V.Roussak, H.D.Gesser (2013), Applied Chemistry: A Textbook of Engineers and Technologists, *2nd ed, Springer Science.*
2. Beran J. A. (2014), Laboratory Manual for Principle of General Chemistry *10th ed, John Wiley.*

Term work consists of the following:

1. 2 Tests and at least 10 experiments.

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: MBA. Tech. (All Branches)				Semester: I	
Course: Basic Electrical Engineering				Code: MBAB01003	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit Hours per week	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- Understand and solve simple ac and dc electrical and magnetic circuits using different theorems and laws.
- To get a basic understanding of the working principle and applications of motors.
- To impart hands-on experience in assembling and testing circuits.
- Get exposed to inter disciplinary engineering disciplines.

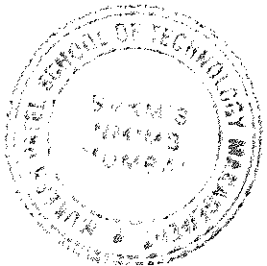
Outcomes:

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

- To analyze and solve simple dc & ac circuits using network theorems & ac fundamentals.
- Assemble and conduct experiments on bread board.
- Function on multidisciplinary teams.

Detailed Syllabus:

Unit	Description	Duration
1.	**D.C Circuit (only independent sources)** Series and Parallel connection, Star Delta Conversion, Source Transformation, Kirchoff's laws, Mesh and Nodal Analysis, Superposition theorem, Thevenin's theorem, Norton's theorem & Max Power Transfer theorem.	12
2.	**AC Fundamentals** Alternating quantities, RMS & Average values, form factor, frequency, crest factor, series combination of R-L, R-C & RLC (with resonance) & parallel circuits (with resonance). Three phase circuit. Concept of balanced load and analysis with phasor diagram. Expression for total power, KW, KVAR & KVA.	12
3.	**Magnetic Circuit** Laws of magnetic force, definitions of field intensity, magnetic potential, flux & flux density, permeability, intensity of magnetization & susceptibility. Simple and composite magnetic circuits, comparison between electric and magnetic circuits, leakage flux, Faraday's laws of electromagnetic induction, induced emf, self inductance, mutual inductance, coefficient of magnetic coupling, inductances in series and parallel.	08



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4.	**Single phase transformer** Emf equation, determination of efficiency & regulation by direct loading. Estimation of regulation and Efficiency by OC & SC test.	08
5.	**DC and AC Motors** DC Motor: Construction and working principle, types of motors, DC motor characteristics, applications. AC Motor: Construction and working principle of 3 phase induction motor, applications.	05
	Total	**45**

Text Books:

1. Vincent Del Toro (2010), Electrical Engineering Fundamentals, *Prentice Hall India Learning Pvt. Ltd., 2nd Edition.*

Reference Books:

1. Harry Cotton (1967), Principles of Electrical Technology, *Pitman Publishers, 7th Edition.*
2. Cathey, Nasar & Prabhat Kumar, Schaum's Outlines (2010) - Basic Electrical Engineering, *Tata McGraw Hill Education Pvt. Ltd, 3rd Edition.*
3. B. L. Theraja (2004), Fundamentals of Electrical Engineering and Electronics, S. *Chand & Co., 2nd Edition.*

Term Work:

1. At least ten laboratory experiments
2. Two term tests
3. Assignments based on the whole syllabus, duly recorded and graded.

SVKM's NMIMS

Mukesh Patel School of Technology Management & Engineering

Program: MBA. Tech. (All Branches)				Semester: I	
Course: Engineering Mechanics-I				Code: MBAB01004	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To develop thorough understanding of physical and mathematical principles
- To get acquainted with the various systems of forces
- To acquire the knowledge of principle of virtual work
- To know the concept of pin jointed frames
- Inculcate the ability to conduct experiments for better understanding of various principles

Outcomes:

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

- Determine the resultant / equilibrant of various coplanar force systems.
- Analyse the system of forces in equilibrium.
- Analyse the beams using the principle of virtual work.
- Evaluate the internal forces in determinate pin jointed frames.
- Conduct experiments for better understanding of various principles.

Detailed Syllabus:

Unit	Description	Duration
1.	**System of Coplanar forces:** Introduction to coplanar & non-coplanar force system, forces and their components, resultant of coplanar force system - concurrent forces, parallel forces, non-concurrent non-parallel system of forces, moment of force about a point, couple, Varignon's theorem.	07
2.	**Equilibrium of coplanar force system:** Meaning of equilibrium, free body diagrams, equilibrium of concurrent, parallel and non-concurrent non-parallel (general) system of forces and couples. Types of supports, determination of reactions at supports for various types of determinate beams.	07
3.	**Forces in space:** Rectangular components of forces in space, Resultant of concurrent forces, moment of a force about a point, moment of a force about a given axis, resultant of general force system, Equilibrium of a particle in space.	08
4.	**Analysis of pin jointed plane trusses:** Perfect truss, method of joints, method of section	07

5.	**Friction:** Laws of friction, angle of friction, angle of repose, cone of friction, Equilibrium of bodies on rough horizontal and inclined plane, application to problems involving wedges, ladder. Belt friction, flat belts on the flat pulleys.	10
6.	**Principle of virtual work:** Application to determine the reactions of determinate beams with / without internal hinges	06
	Total	**45**

Text Book:

1. Beer & Johnson (2011), "Engineering Mechanics", *Tata McGraw Hill.*
2. R. C. Hibler (2004), "Engineering Mechanics", *McMillan Publishers*

Reference Books:

1. F. L. Singer (1954), "Engineering Mechanics", *Harper & Raw Publication*
2. D. S. Kumar (2009), "Engineering Mechanics", *Tata McGraw Hill*
3. Macklin & Nelson (2012), "Engineering Mechanics", *Tata McGraw Hill*
4. A. K. Tayal (2008), "Engineering Mechanics", *Umesh Publication*

Term Work:

Term work should consists of the following

1. Minimum five assignments covering the prescribed syllabus.
2. Report of minimum six experiments performed from the list given below.

List of Experiments:

1. To find reactions of simply supported beam (Parallel force system)
2. To verify polygon law of forces (Concurrent & non-concurrent force system)
3. To verify Lami's theorem using simple jib crane
4. Equilibrium of non-concurrent non parallel force system
5. To verify moment equilibrium condition using bell crank lever
6. To determine coefficient of friction using friction plane
7. To determine coefficient of friction using angle of repose method
8. Simple Screw Jack

SVKM's NMIMS

Mukesh Patel School of Technology Management & Engineering

Program: MBA. Tech. (All Branches)				Semester: I	
Course: Computer Programming – I				Code: MBAB01005	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
2	2	0	3	--	Scaled to 50 marks

Pre-requisite: Nil

Objectives:

- To enable the students to understand the basic concepts of programming and help them build programming logic.
- To help them understand programming constructs like input/output, statements, operators, expressions, decision making and branching, looping, arrays, functions, structures, unions and pointers.

Outcomes:

After Successful completion of this course students will be able to

- Illustrate Flowchart and Algorithm for given Problem.
- Develop and Execute C Programs using Basic Programming Constructs.
- Implements C Program using various Data Types and Functions.
- Solving Programming Problem using Pointers.

Detailed Syllabus:

Unit	Description	Duration
1.	**C programming Language:** History of C, Program Development Life Cycle, Compiling and executing C Program, Algorithms and Flow Charts.	02
2.	**The Components of C Program:** Program's Components, Variables and Constants, Data Types, Statements Operators and Expressions	03
3.	**Fundamentals of I/O:** Formatted Input and Formatted output	02
4.	**Basic Program Control:** Decision Making and Branching, Decision Making and Looping: For, While and Do-while , Nested Looping	05
5.	**Arrays:** One Dimensional Array declaration and Initialization, Multidimensional Array, Dynamic Array.	03
6.	**Character Arrays & Strings:** Declaration and Initialization of String, Reading and Displaying String, Arithmetic Operations on Characters, Putting String Together, String Comparing, String Handling Functions.	02
7.	**Functions:**	04

	Need of User defined functions, Definition and declaration of functions Returns values and their types, Function calls, Categories of functions and Recursion	
8.	**Understanding Pointers:** What is Pointer, Pointers and Simple Variables, Pointers and Array, Pointers and String, Passing Arrays to Functions, Passing Pointers to functions	05
9.	**Structures & Unions:** Simple Structure, Complex Structure: Containing Arrays, Structures & Arrays of Structure, Structures and Pointers, Union	04
	Total	**30**

Text Book:

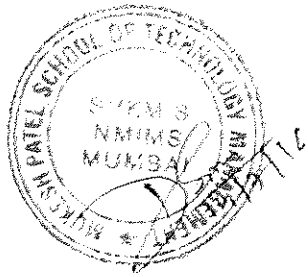
1. Programming in ANSI C E. Balaguruswamy, *Tata McGraw Hill, 6th Edition,* 2012

Reference Books:

1. Programming in C Ashok N Kamthane, *Pearson Educations, 2nd Edition,* 2011.
2. Mastering CK. R. Venugopal, S. R. Prasad, *Tata McGraw Hill, 2nd Edition,* 2015

Term Work:

1. Two Test and at Least 10-Experiments covering the entire syllabus.



SVKM's NMIMS

Mukesh Patel School of Technology Management & Engineering

Program: MBA. Tech. (All Branches)				Semester: I	
Course: Workshop Practice				Code: MBAB01006	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorials Hours per week	Credit	Practical	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
0	4	0	2	--	Scaled to 50 marks

Objectives:

- To impart hands on experience of different workshop practice on various trades.
- To impart knowledge of basic tools used for different workshop jobs.
- To introduce basic concepts of electrical and electronic instruments and its applications

Outcomes:

After successful completion of the course, students should be able to

- Select appropriate tools for workshop jobs
- Decide suitable joining process required for the jobs.
- Carry out basic electrical wiring.
- Prepare PCB layout

Detailed Syllabus

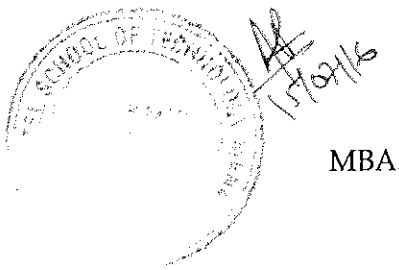
Unit	Description	Duration
1.	**Fitting:** Use and setting of fitting tools for chipping, instructions for safety in various Workshop Trades, cutting, filing, Marking, centre punching, drilling, tapping.	12
2.	**Carpentry:** Use and setting of carpentry hand tools like hacksaws, jackplanes, chisels and gauges for construction of various joints. Wood turning Demonstration. Term work to include one job involving a joint.	12
3.	**Fabrication of Metals and Plastics:** Edge preparation for welding jobs. Arc welding for different jobs like lap welding of two plates, butt-welding of plates Use of hand tools for sheet metal fabrication. Sheet metal fabrication of jobs involving cutting, shearing, bending, edge folding, soldering, brazing etc.	12
4.	**PCB Laboratory Exercises:** Layout drawing, positive and negative film making, PCB etching and drilling, tinning and soldering techniques	12
5.	**Wiring:** Study of cables used in Electrical & Electronic transmissions. Study of Electrical Fittings – Switches, Plugs, Holders, Connectors, Earthing	12

	Electrical Wiring for lighting and appliances Series & Parallel Connections.	
	Total	60

Term Work:

Minimum one job on each of the following:

1) Fitting
2) Carpentry
3) Welding
4) Sheet metal
5) Plastics
6) Wiring



SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: MBA. Tech. (All Branches)				Semester: I	
Course: Constitution of India				Code: MBAB01007	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorials Hours per week	Credit	Theory	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
2	0	0	0	--	Scaled to 50 marks

Objectives:

- To understand the basic aspects of the constitution of India, the evolution, the directive principle & important provisions.
- To understand the implications of important constitutional provision on Business and Professionals

Outcomes:

- This will enable students to understand fundamental political principles, procedures, powers and duties of a government.
- Students will know their rights as a citizen of India

Detailed Syllabus

Unit	Topics	Duration
1.	The Constitution, its evolution including history of freedom struggle	05
2.	Fundamental rights and duties, exceptions with examples, individual responsibilities & duties, application to Business	05
3.	Directive principles of the state policy, it's emphasis & it's impact on future legislation, in particular as related to business	05
4.	Parliamentary procedures and practices	05
5.	Centre, State Relations, Procedures in the legal relationship, Emergency provisions under article 370 & 371, safeguards for minorities, , Services under the Union and States, application to business	05
6.	Voting behaviour in India and present political scene. Responsibilities of Business in relation to the Constitution.	05
	Total	**30**

Prescribed Text:

1. Dr. Durga Das Basu, (2011) Introduction to the Constitution of India. *Lexis Nexis.*

Reference Book:

1. N. A. Palkhiwala, (1999). "We the People": India: The Largest Democracy. *UBS Publishers & Distributors Ltd.*

Term work

1. Class Test/ Assignments/ Case studies/ Projects/ Presentations.

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Mukesh Patel School of Technology Management & Engineering

Program: MBA. Tech. (All Branches)				Semester: II	
Course: Engineering Mathematics-II				Code: MBAB02001	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorials Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	0	2	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

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

Outcomes:

After successful completion of this course students will be able to :

- Solve problems based on matrices, Beta and Gamma functions, differential equations and multiple integrals.
- Evaluate Beta and Gamma function and their relations.
- Analyse suitable methods to solve differential equations and multiple integrals.
- Relate the concepts of matrices, Beta and Gamma functions, differential equations and multiple integrals to solve engineering problems.

Detailed Syllabus:

Unit	Description	Duration
1.	**Prerequisites:** Idea of curve tracing in Cartesian and polar forms with respect to the curves: Straight lines, Circles, Parabolas, Ellipse, Hyperbolas, Astroid, Cardioids and Lemniscates of Bernoulli. Concepts of solid geometry: Planes, Spheres, Cones, Cylinders, Ellipsoids and Paraboloids.	02
2.	**Matrices:** Introduction ,Types of matrices- Symmetric, Skew-Symmetric, Hermitian, skew-Hermitian, Orthogonal and Unitary, Adjoint of a matrix, Inverse of a matrix using adjoint method, Rank of a matrix, Rank by Normal form and Echelon form.	06
3.	**Beta and Gamma functions:** Definition of Beta and Gamma functions and their properties; Relation between Beta and Gamma functions; Duplication formula.	06
4.	**Differential Equations:** First order and first degree Exact differential equations and those which can be reduced to Exact form by use of integrating factor (four rules), Linear differential equations and equations reducible to linear form.	16

	Solutions 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 $= e^{ax}, \sin(ax+b), \cos(ax+b), x^m, e^{ax}V(x), xV(x)$. Cauchy's homogenous linear differential equation and Legendre's differential equation, Method of variation of parameters. **Applications of differential equations in modelling:** First-order Equations, Free Mechanical Oscillations, Forced Mechanical Oscillations.	
5.	**Multiple Integrals:** **Double Integration** - Introduction , Double integration in Cartesian and Polar Co-ordinates, Evaluation of integrals over a given region, Change of order of integration, concept of Jacobians, Change of Co-ordinate system, Area and Mass of a lamina and volume. **Triple Integration** - Evaluation in Cartesian, Cylindrical and Spherical Co-ordinates, Volume.	15
	Total	**45**

Text Books:

1. Robert Wrede (2010), Murray Spiegal, *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. G. Birkhoff and G.C.Rota, Ordinay Differential Equations (2003), *4th Edition, Wiley Singapore Edition.*
3. Alan Jeffrey (2003), Handbook of Mathematical Formulas and Integrals, *Academic Press, 3rd Edition.*
4. Murray R. Spiegel (2009), Schaum's Outline of Advanced Mathematics for Engineers and Scientists (*Schaum's Outline Series*).

Term Work:

As per institute norms.

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SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: MBA. Tech. (All Branches)				Semester: II	
Course: Engineering Physics				Code: MBAB02002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorials Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To enable students to understand the basic principles of advanced physics theory and practice.
- To enhance the student's ability to meet the needs of engineering applications
- To impart training to help the students develop skill sets for creating entities from basic and applied sciences.

Outcomes:

After Successively completion of this course, student will be able to

- Discuss different mechanical, electrical and thermal properties of materials; describe different cubic lattices, their parameters and defects observed in the crystals. Hence illustrate X - Ray diffraction techniques to identify crystal structure.
- Classify the solids according to energy bands; explain the theory of pn junction, biasing and calculate the conductivity, carrier concentration and position of Fermi level for semiconductors.
- Discuss the concepts of motion of charge in electric and magnetic field, demonstrate its applications and manipulate the displacement of electron.
- Describe the concept of interference, diffraction, mechanism of laser beam generation, working principle of optical fiber, their applications and calculate different related parameters.
- Discuss different production methods of ultrasonic waves and its application in the field of engineering.
- Explain the concept of superconductivity, types of superconductors, and their applications. Also calculate the critical parameters of superconductors.

Detailed Syllabus:

Unit	Description	Duration
1.	**Crystal Structure:** Structure of cubic crystals (SC, BCC, FCC), Miller indices, planes and direction, ligancy and critical radius ratio in ionic crystal. Imperfections: point, line, surface & volume (introductory). Determination of crystal structure using X-ray diffraction techniques.	06
2.	**Semiconductors Physics:** Formation of energy bands and classification of solids into conductors, semiconductors and insulators. Intrinsic and	06

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	extrinsic semiconductors. Fermi levels in semiconductor, energy gap and its temperature dependence. Physics of semiconductor junction. Hall Effect and application.	
3.	**Electricity and magnetism:** Motion of charges in electric and magnetic fields. Application of electric and magnetic field to determine e/m. Electrostatic focusing system. Magnetostatic focusing system, CRO and its uses.	06
4.	**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 (Mathematical derivation not expected). Diffraction grating, resolving power of grating, dispersive power of grating.	06
5.	**LASER:** Spontaneous and stimulated emission. Population inversion. Pumping, Lasing action. Ruby Laser, He-Ne Laser, CO2 Laser, Semiconductor Laser, Applications. **Fiber Optics:** Total internal reflection. Principle and working of optical fibers. Different types of optical fibers: Step index single mode, Step index multimode and graded index multimode fibers. NA for step index fiber, V Number, Dispersion and Losses in optical fiber, Applications.	08
6.	**Ultrasonics:** Production of ultrasonic waves by magnetostriction and piezo electric methods. Applications of Ultrasonic: Echo sounding (SONAR), thickness measurement, cavitation, non-destructive testing and flaw detection.	04
7.	**Superconductors:** Theoretical Explanation of super conductors: BCS Theory. Meissner effect. Josephson effect. Type-I & Type-II Superconductors. Properties and uses of superconductors.	04
8.	**Properties of materials:** Mechanical and physical properties: Stress, Strain, Strength, Stiffness, Hardness, Toughness, Elasticity, Ductility, Malleability, Fatigue, Creep, Density, Melting point, stress strain behavior of different materials. Plastic deformation: tensile properties, free stress and strain, hardness Electrical Properties: electrical conductivity, electrical resistivity, ferroelectricity, piezoelectricity, Dielectric strength	05

	Thermal properties: heat capacity, thermal expansion, thermal conductivity, thermal stresses.	
	Total	**45**

Text Books:

1. Dattu R Joshi (2010), "Engineering Physics", *Tata McGraw Hill 1st Edition.*
2. M.N. Avadhanulu, P.G. Kshirsagar (2013), "A Textbook of Engineering Physics" *S.Chand Publication, 9th Edition.*

Reference Books:

1. Arther Beiser (2009), "Concept of Modern Physics", *Tata McGraw Hill, 6th edition.*
2. R.K.Gaur and S.C.Gupta (2003), "Engineering Physics", *Dhanpat Rai & Co., New Delhi.*
3. Ajoy Ghatak (2009), "Optics", *Tata McGraw Hill, 4th Edition.*
4. James F.Shackelford and Madanapalli K. Muralidhara (2007), "Materials Science for Engineers" *Pearson Education, 6th edition.*
5. Halliday and Resnick (2008), Fundamentals of Physics- *Wiley India, 8th edition.*
6. Jenkins and White (2011), "Optics", *MC Graw Hill, 4th Edition.*

Term Work:

Term work consists of

1. Class test papers
2. Assignments covering syllabus (Minimum 2)
3. Report of lab experiments performed (Minimum 10)
4. Viva Examination

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14/7/16

SVKM's NMIMS
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Program: MBA. Tech. (All Branches)				Semester: II	
Course: Basic Electronics				Code: MBAB02003	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- Understand the construction, working principle, characteristics and simple applications of basic electronic devices.
- Understand the application of these devices in making advanced circuits like amplifiers and oscillators.
- To impart hands-on experience in assembling and testing circuits.
- Get exposed to inter disciplinary engineering disciplines.

Outcomes:

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

- Design simple circuits using diodes, BJTs and FETs
- Compare different classes of power amplifiers
- Select components based on data sheet parameters
- Assemble and conduct experiments on bread board
- An ability to function on multidisciplinary teams

Detailed Syllabus:

Unit	Description	Duration
1.	**Diode and its Applications:** Introduction to Semiconductor Diode Theory, DC Analysis and Models of diode, AC Equivalent Circuits of diode. Diode Types: photodiode, Light-Emitting Diode, Schottky Barrier Diode, Zener Diode, Temperature Effects, Understanding Manufacturer's Specifications. Applications: Rectifier Circuits - Half Wave and Full Wave Rectification, Filter circuits, Ripple Voltage and Diode Current. Zener Diode Circuits - Zener diode as voltage regulator. Clipper and Clamper Circuits.	14
2.	**Bipolar Junction Transistor:** Basic Bipolar Junction Transistor, Transistor Structures, NPN Transistor: Forward-active Mode Operation, PNP Transistor: Forward-active Mode Operation, Circuit Symbols and Conventions, Current-Voltage Characteristics, Non ideal Transistor Leakage Currents and Breakdown, DC Analysis of Transistor Circuits. Basic Transistor Application: Switch, Amplifier. Bipolar Transistor Biasing – Bias Stability, Fixed Bias, Collector-	12

	to-Base Bias, Voltage Divider Bias. Understanding Manufacturer's specifications. BJT amplifier frequency response. Figure of merit of an amplifier.	
3.	**Field Effect Transistor:** Junction Field-Effect Transistor & MOSFET- symbols, Drain and Transfer characteristics & study of different parameters. JFET Biaisng Methods (fixed bias, voltage divider bias and self bias). FET amplifier frequency response. Figure of merit of an amplifier.	10
4.	**Output Stages and Power Amplifiers:** Introduction to Power Amplifiers, difference between voltage and power amplifier, ac load line, characteristic and efficiency of Class A,B, AB, C and Push Pull amplifier.	05
5.	**Oscillators:** Positive feedback and basic Principles for Oscillation, Classification of transistor oscillators: Phase-Shift Oscillator, Wien-bridge Oscillator, Colpitts Oscillator, Hartely Oscillator, Crystal Oscillator.	04
	Total	**45**

Text Books:

1. Donald A. Neamen (2001), Electronic Circuit Analysis and Design, *McGraw Hill International, 2nd Edition.*
2. David A. Bell (2008), Electronic Devices & Circuits, *Prentice Hall India Pvt. Ltd, 5th Edition.*

Reference Books:

1. Donald Schilling & Charles Belove (1989), "Electronic Circuits Discrete and Integrated", *McGraw Hill International, 3rd edition.*
2. Martin Roden (2002), Gordon Carpenter, William Wieserman, "Electronic Design", *Shroff.Publishers, 4th edition.*
3. Robert Boylestad & Louis Nashelsky (2007), "Electronic Devices & Circuit Theory", *Pearson Education India - 9th Edition.*
4. B.L. Theraja (2004), "Fundamentals of Electrical Engineering and Electronics", *S. Chand & Co., 2nd Edition.*

Term Work:

1. At least ten laboratory experiments.
2. Two term tests.
3. Assignments based on the whole syllabus, duly recorded and graded.

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SVKM's NMIMS
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Program: MBA. Tech. (All Branches)				Semester: II	
Course: Engineering Drawing				Code: MBAB02004	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Practical (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	4	0	5	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To introduce different curves used in engineering
- To acquire the concepts of projections of an object
- To develop competence in correct expression of the visualized objects.
- To familiarize the students with the use of drafting software in engineering drawing and concepts of orthographic projections

Outcomes:

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

- Draw the different curves used in engineering
- Draw the projections of points, lines, planes and solids.
- Generate drawings with the help of computer software
- Draft the orthographic, isometric and oblique projections of a machine components

Detailed Syllabus:

Unit	Description	Duration
1.	Engineering Curves: Conics-Parabola, Ellipse, Hyperbola. Involutes, Cycloidal Curves: Cycloid, Epicycloid, Hypocycloid. Spirals, Helix.	08
2.	Projection of Points & Lines inclined to both the Reference Planes including HT, VT. Projection of Planes inclined to both the Reference Planes, Auxiliary Planes.	08
3.	Projection of Right regular Solids: Regular Polyhedrons (Tetrahedron, Hexahedron), Prisms, Pyramids, Cylinders, Cones inclined to both the reference Planes. Sections of solids cut by inclined planes.	10
4.	Development of Lateral surfaces of solids cut by inclined plane and curved plane	04
5.	Orthographic Projections, Sectional views of Orthographic Projections	06
6.	Isometric Projections	04
7.	Oblique Projections :-Auxiliary views of Machine parts	03
8.	Introduction to Machine Parts: Types of nuts, bolts, screws, studs and riveted joints	02
	Total	**45**

Text Book:

1. N.D.Bhat (2007), "Elementary Engineering Drawing", *Charotar Publishing House.*

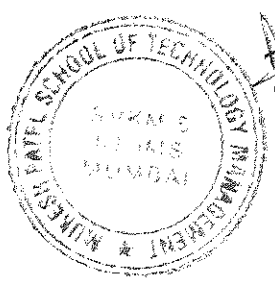
Reference Books:

1. M.B.Shah & B.C.Rana (2005), "Engineering Drawing", *Pearson Education.*
2. T.Jeyapovan (2005), "Engineering Drawing and Graphics", *Vikas Publishing House Pvt. Ltd.*
3. H.G.Phakatkar (2011), "Engineering Graphics", *Nirali Prakashan.*
4. K.Venugopal (2007), "Engineering Drawing and Graphics", *New Age International Publishers.*
5. K.L.Narayana & P.Kannaiah (1988), "Engineering Graphics", *Tata McGraw-Hill Co. Ltd., New Delhi.*
6. Giesecke, Mitchell, Spencer & Hill (2008), "Technical Drawing", *Macmillan Publishing Co. Inc. New York.*

Term Work:

Term work should consists of the following

1. Two A2 size drawing sheets comprising minimum 3-4 problems on each unit.
2. Total eight computer drafted A3 size drawing sheets consisting of 2 to 3 problems on each module and class assignments.



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SVKM's NMIMS

Mukesh Patel School of Technology Management & Engineering

Program: MBA. Tech. (All Branches)				Semester: II	
Course: Engineering Mechanics-II				Code: MBAB02005	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	0	2	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To know the concept of centroid and moment of Inertia
- To get acquainted the dynamic system in equilibrium and the motion characteristics of particles
- To study the forces developed on bodies in motion

Outcomes:

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

- Determine the centroid and moment of Inertia of a plane area
- Evaluate the velocity, acceleration and displacement of a moving body
- Analyse the forces developed on the moving body

Detailed Syllabus

Unit	Description	Duration
1.	**Centroid and moment of inertia:** Centroid and moment of inertia of thin wires & plane areas, parallel axis theorem. Introduction to polar moment of inertia, product of inertia and mass moment of inertia.	07
2.	**Kinematics of particle:** Velocity and acceleration in terms of rectangular coordinate system, rectilinear motion, motion along plane curved path, tangential and normal component of acceleration, acceleration - time , velocity- time graphs and their uses, relative velocity, projectile motion, simple harmonic motion.	12
3.	**Kinematics of rigid bodies:** Translation, pure rotation and plane motion of rigid bodies, instantaneous centre of rotation for the velocity for bodies in plane motion, link mechanisms (upto two links).	06
4.	**Kinetics of particles:** Newton's laws of motion, D'Alembert's principle, equation of dynamic equilibrium, linear motion, curvilinear motion. **Kinetics of rigid bodies:** D'Alembert's principle for bodies under translational motion, rotational motion about a fixed axis and plane motion. Application to motion of bars, cylinders, spheres.	10
5.	**Energy and Momentum principles:** Work done by a force, potential and kinetic energy, power, work energy equation, principle of conservation of energy, momentum, principle of	10

	conservation of momentum, impact of solid bodies, elastic impact, semi-elastic impact and plastic impact.	
	Total	**45**

Text Book:

1. Beer & Johnson (2011), 'Engineering Mechanics', *Tata McGraw Hill.*
2. R. C. Hibler (2004), "Engineering Mechanics", *McMillan Publishers.*

Reference Books:

1. F. L. Singer (1954), 'Engineering Mechanics', *Harper & Raw Publication.*
2. D. S. Kumar (2009), "Engineering Mechanics", *Tata McGraw Hill.*
3. Macklin & Nelson (2012), "Engineering Mechanics", *Tata McGraw Hill.*
4. A. K. Tayal (2008), "Engineering Mechanics", *Umesh Publication.*

Term Work:

Term work should consists of the following

1. Minimum seven assignments covering the prescribed syllabus.

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Program: MBA. Tech. (All Branches)					Semester: II
Course: Computer Programming-II					Code: MBAB02006
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
2	2	0	3	--	Scaled to 50 marks

Pre-requisite: Nil

Objectives:

- To enable the students to understand the basic concepts of object oriented programming and help them build programming logic.
- To help them build classes and understand the re usability of classes.

Outcomes:

After successful completion of this course, students will be able to:

- Develop and execute C++ program using basic programming constructs, various data types and functions.
- Implement object oriented concepts classes, objects, constructor, destructor, operator overloading, type conversion.
- Implement object oriented concepts inheritance, virtual functions and polymorphism.
- Implement the concepts of file handling and generic programming using templates.

Detailed Syllabus:

Unit	Description	Duration
1.	**Principles of Object Oriented Programming:** Software Crisis, Software Evolution, Basic Concepts of OOP	02
2.	**Beginning with C++:** What is C++?, Applications of C++, Structure of C++ Program, Creating, Compiling, Linking	02
3.	**Tokens, Expressions and Control Structures:** Basic Data Types, User Defined Data Types, Derived Data Types, Variables, Operators in C++, Scope Resolution Operator, Manipulators, Control Structures	03
4.	**Functions in C++:** Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Default Arguments, Function Overloading, Friend and Virtual Functions	04
5.	**Classes and Objects:** Specifying a Class, Memory Allocation for Objects, Static Members, Arrays of Objects, Objects as Function Arguments, Returning Objects	02
6.	**Constructors & Destructors:** Constructors, Constructors with Default Arguments, Dynamic	03

	Initialization of Objects, Copy Constructor, Dynamic Constructors, Destructors	
7.	**Operator Overloading & Type Conversions:** Overloading Unary Operators, Overloading Binary Operators, Overloading Binary Operators Using Friends, Rules for Overloading Operators, Type Conversion	03
8.	**Inheritance:** Defining Derived Classes, Single Inheritance, Making Private member Inheritable, Multilevel, Multiple, Hierarchical, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes	04
9.	**Virtual Functions and Polymorphism:** Need for Virtual Functions, Pointer to Derived Class Object, Pure Virtual Functions, Dynamic or Late Binding	03
10.	**File Handling:** Files and Streams, Opening and Closing a File, Sequential I/O Operations	02
11.	**Templates:** Function Templates, Class Templates	02
	Total	**30**

Text Book:

1. E. Balaguruswamy (2011), "Programming in C++", *Tata McGraw Hill Education, 5th Edition.*

Reference Books:

1. Herbert Schildt, "The Complete Reference C++", *Tata McGraw Hill Education, 4th Edition, 2003.*

Term Work:

As per Department and Institute Norms for Term-work.

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Program: MBA. Tech. (All Branches)				Semester: II	
Course: Communication Skills				Code: MBAB02007	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
2	0	2	3	Scaled to 70 marks	Scaled to 30 marks

Objectives:

To familiarize students on the following:

- To maintain good linguistic competence through accuracy in pronunciation, stress, word accent, intonation and grammar and vocabulary.
- To increase students' ability to improve and utilize the skills necessary to be a competent interpersonal communicator, increase the students understanding of his or her own communication behaviour and that of others.
- To help students and professionals coming from different fields to comprehend the finer nuances of communication skills and to realize their communication potential.

Outcomes:

The students will be able to:

- To acquire strategic competence to use spoken and written language in a wide range of communication strategies and respond appropriately in different sociocultural and professional contexts.
- To familiarize students with business writing of organizations and develop in them an ability to critically analyze them.
- To help students cultivate the habit of reading passages and improving their reading skills and comprehension, inferring meanings and summarizing.
- To provide an insight in to the understanding of technical writing.

Detailed Syllabus:

Unit	Description	Duration
1.	**Communication theory:** Meaning, Definitions, components, objectives, Importance of communication for Engineers, Methods and Importance of Communication (Oral Written And Non- Verbal). Barriers to Communication.	12
2.	**Vocabulary Building:** Synonyms and Antonyms, One-word substitutes.	02
3.	**Techniques to improve communication:** 3.1 Reading Skills - Reading, comprehending, scanning, skimming, inferring meanings from contexts. 3.2 Speaking Skills - Voice Modulation, Good Pronunciation,-	04

	Speaking without Fear, -Extempore & Prepared Speaking, role play in different situations. 3.3 Listening Skills - Barriers to Listening, Listening & Note Making. 3.4 Writing Skills - Effective Sentences & Paragraphs-, Summarizing. The 7 C's of effective writing.	
4.	**Business Correspondence:** Principles of correspondence, Language, Style, Types of formats, Complete Block/ Modified block/ and Semi block Types of letters: Request letters, Enquiry letters and Reply to Enquiries (Enquiry for a product, services, or information, asking for quotation, placing an order, and replies to same). Letters of Claim and Adjustments.	10
5.	**Technical Writing:** Framing Definitions, writing instructions, Types of expositions, (Description of an object and Explanation of a process).	02
	Total	**30**

Prescribed Text:

1. Dr. Meenakshi Raman and Dr. Sangeeta Sharma, (2008). *Communication Skills.* Oxford University Press.

Reference Books:

1. R.C Sharma and Krishna Mohan (2002), Business Correspondence and Report Writing, *Tata McGraw Hill Publications, 3/e.*
2. Meenakshi Raman and Prakash Singh (2006), Business Communication, *Oxford University Press.*
3. Ronald B. Adler and George Rooman (2006), Understanding Human Communication. *Oxford University press, 9/e.*
4. Rai Urmila, Rai S.M. (1989), Business Communication. *Himalaya Publishing house.*
5. K K Sinha (2000), Business Communication.
6. Kitty O Locker, Stephen Kyo Kaczmarek (2013), Business Communication: Building Critical Skills, *Mc Graw Hill.*

Term Work:

List of Assignments:

1. 2 assignments on vocabulary topics.
2. 3 assignments on techniques to improve communication.
3. 1 Practical session through self-introductory speeches.
4. 3 assignments on Communication Theory.
5. 4 assignments on Business Correspondence.
6. 2 assignments on Technical Writing.
7. 2 practical sessions on speech.
8. 2 class test based on all the topics.

SVKM'S NMIMS
Mukesh Patel School of Technology Management & Engineering

Program : MBA. Tech. (All Branches)				Semester : III	
Course : Engineering Mathematics - III				Code : MBAB03001	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorials Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	0	2	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To provide an understanding of matrices to solve Engineering problems.
- Impart knowledge of Laplace transforms and Fourier series.

Outcomes:

After successful completion of this course, the students will be able to:

- Solve problems using Matrices, Laplace transforms and Fourier series.
- Apply Matrices, Laplace transforms, Fourier series to Engineering problems.
- Analyses the concept of Matrices, Laplace transforms and Fourier series.

Detailed Syllabus

Unit	Description	Duration
1.	**Matrices:** Linear dependence and independence of rows and columns of a matrix over real field, System of linear homogeneous and non-homogeneous equations, Characteristic equation, Eigen values and Eigen vectors of a square matrix, Cayley-Hamilton Theorem, Similar Matrices, Diagonalization of a Matrix, Functions of a Square Matrix, Quadratic Forms.	12
2.	**Laplace transform:** Definition, Laplace transform of $1, e^{at}, \sin at, \cos at, \sinh at, \cosh at, t^n$, First shifting theorem, Change of scale property, $L\{t^n f(t)\}, L\left\{\frac{f(t)}{t}\right\}, L\left\{\int_0^t f(u)du\right\}, L\{f^n(t)\}$, Evaluation of Inverse Laplace using partial fraction, Convolution Theorem, Laplace transforms of Periodic functions, Unit step functions, Second shifting theorem , Dirac delta functions and their Laplace Transform. **Application**: Solve initial and boundary value problems involving ordinary differential equations.	20

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3.	**Fourier Series:** Orthogonality and Orthonormality, Periodic function, Trigonometric Series, Dirichlet's conditions, Euler's formulae (Derivation of Fourier coefficients a_0, a_n, b_n is not expected), Fourier series for the interval $[\alpha, \alpha+2\pi]$ and $[\alpha, \alpha+2c]$, Function having points of discontinuity, Even and Odd functions, Half range sine and cosine expansions, Parseval's identities.	13
	Total	**45**

Text Books:

1. Michael Greenberg (2013), Advanced Engineering Mathematics, *Pearson New International Edition, 2nd Edition.*

Reference Books:

1. P.P.G.Dyke (2005), An Introduction to Laplace Transforms and Fourier Series, *Springer.*
2. Larry C. Andrews (1999), Bhimsen K, Shivamoggi, Integral Transforms for Engineers *(SPIE Press).*
3. Lokenath Debnath, Dambaru Bhatta (2006), Integral Transforms and their Applications, *2nd Edition.*
4. Seymour Lipschuts (1991), Schaum's Outline of Theory and Problems of Linear Algebra, *Schaum's Outline Series.*

Term Work:

As per institute norms.

Program: MBA Tech. (Civil Engineering)				Semester : III	
Course : Surveying-I				Code : MBCI03002	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To impart knowledge of the basic surveying and levelling
- To determine the positions of distinctive features of the earth's surface by relative distances, heights, directions and angles
- To operate surveying instruments

Outcomes:

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

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

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction:** Definitions, principle, Various types of surveying - 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 (2011),"Surveying and Levelling", Vol I and II, *Pune Vidyarthi Griha, Pune*
2. N. N. Basak (2010),"Surveying and Levelling", *Tata McGraw Hill*

Reference Books:

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

Term Work:

Term work should consists of the following

1. Minimum five assignments covering the prescribed syllabus.
2. Report of minimum six experiments performed from the list given below.

List of Experiments

1. Introduction to measuring instruments
2. Chain Survey- chain and cross staff survey
3. Compass survey
4. Levelling - By height of instrument and rise & fall method
5. Theodolite - Measurement of horizontal and vertical angle
6. Theodolite traversing
7. Plane table surveying
8. Various minor instruments used in survey engineering
9. Use of planimeter for measuring area of irregular figures

Program: MBA Tech. (Civil Engineering)				Semester : III	
Course : Strength of Materials				Code : MBCI03003	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To impart knowledge of the behaviour of the deformable bodies subjected to different types of loads
- To determine the failure criteria when body is subjected to various stresses
- To understand the concept of deformations
- To identify the different tests to be performed on metals

Outcomes:

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

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

Detailed Syllabus:

Unit	Description	Duration
1.	**Axial force, shear force and bending moment in beams:** Axial force, shear force & bending moment diagrams for statically determinate beams including beams with internal hinges for different types of loading, relationships between rate of loading, shear force and bending moment.	07
2.	**Stress & strain:** Stress, yield stress, ultimate stress, shear stress, factor of safety, strain, modulus of elasticity (E), modulus of rigidity (G), bulk modulus (K), Poisson's ratio, relationship between elastic constants, bars of varying sections, stresses in composite section, temperature stresses	06
3.	**Simple theory of bending:** Flexure formula for beam, simple problems involving the application of flexure formula, section modulus, moment of resistance of a section, flitched/ composite beams.	06

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4.	**Shear stress in beams:** Distribution of shear stress across plane sections used commonly for beams, shear connectors.	04
5.	**Simple theory of torsion:** Torsion of circular shafts - solid and hollow, stresses and strains in shaft when transmitting power	04
6.	**Bending moment combined with axial loads:** Application to members subjected to eccentric loads, core of the section. Problems on chimneys, retaining walls, etc.	04
7.	**Principal stresses:** General equations for transformation of stress, principles planes and principal stresses, maximum shear stress, determination using Mohr's circle.	07
8.	**Thin cylindrical and spherical shells:** Stresses and strains in thin cylindrical and spherical shells subjected to internal pressure	03
9.	**Deflections of beams:** Deflection of cantilever, simply supported and overhanging beams for different types of loadings using double integration method and Macaulay's method.	04
	Total	**45**

Text Book:

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

Reference Books:

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

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 from the list given below:

List of Experiments:-

1. Tension test on mild steel rod
2. Tension test on tor steel rod
3. Bend and re-bend test on bars
4. Transverse test on cast iron specimen
5. Shear test on metal specimens
6. Torsion test on mild steel / cast iron specimen
7. Load deflection test on metal specimens
8. Brinell hardness test on metal specimens
9. Rockwell hardness test on metal specimens
10. Charpy impact test on metal specimens
11. Izod impact test on metal specimens

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Mukesh Patel School of Technology Management & Engineering

Program: MBA Tech. (Civil Engineering)				Semester : III	
Course : Building Materials and Construction				Code : MBCI03004	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	2	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To impart the knowledge of various building materials
- To know the various building construction processes

Outcomes:

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

- Differentiate various building materials in terms of their types, properties, defects, processes and uses
- Describe various building construction processes

Detailed Syllabus:

Unit	Description	Duration
1.	**Requirements of Building Materials and Products:** Functional, Aesthetical And Economical. **Study of Properties of Materials:** Physical, Mechanical, Chemical, Biological and other Engineering Properties. **Stone:** Types, Properties, Testing, Qualities of Good Stones, Quarrying (definition, important considerations, tools, machines, process), Surface Finishing, Preservative Treatments. **Binder material:** Lime, Cement: Physical Properties and Manufacturing Process, Plaster of Paris, Type and their uses.	8
2.	**Timber:** general, classification, Structure, Processing, Felling, Seasoning, Conversion, defects in timber, Qualities of good timber, strength of timber, decay of timber, preservative treatments and wood composites	7
3.	**Paints:** Characteristics of Good Paints, objective of painting, Constituents, Types, Process of Painting, Failure of Paints, Defects in Painting. Varnishes: Characteristics of ideal varnish, ingredients, types, process, distempering (properties, ingredients, process), white washing and colourwashing (properties, ingredients, process).	4
4.	**Glass:** Raw Material, Manufacturing Process, Types and Uses **Metal and alloys:** Ferrous and Non Ferrous Metals and Alloys, Aluminum, Tin , Zinc, Nickel, (Types Properties and Uses) and Anti-Corrosive Treatment	5

5.	**Structural clay products**: Bricks, Roofing Tiles, Ceramic Tiles, (Raw Materials And Manufacturing Process, Properties, Types, Uses). Concrete Blocks, Flooring Tiles, Paver Blocks (Raw Materials And Manufacturing Process, Properties, Types, Uses) **Mortar And Concrete**: Ingredients, Types, Preparation And Uses **Miscellaneous materials:** Asbestos, Ashpalt, Plastic, Bitumen, Flyash, Rubber (Properties, Uses and Types).	9
6.	**Types of structures:** framed, load bearing and composite structures. Suitability and economic aspects of each type and components of each type. **Masonry construction**: Classification and Bonding in stone, brick and concrete blocks. **Floors and roofs:** Types of floors, floor finishes and suitability. Types of roofs, wooden and steel trusses, roof coverings and drainage **Formwork:** materials used, design considerations, slip form shuttering, centering and staging, scaffolding **Staircase:** types, size and location, layout, design considerations **Masonry finishes:** Pointing, Plastering and Painting	12
	Total	**45**

Text Books:

1. S. K. Duggal (2009), "Building Materials", *New Age International*

Reference Books:

1. P.C. Varghese (2007), "Building Construction", *PHI Leaning Pvt. Ltd.*
2. P.C. Varghese (2005), "Building Materials", *PHI Leaning Pvt. Ltd.*
3. S.C. Rangawala (2012), "Engineering Materials", *Charotar Publishing House Pvt. Ltd.*
4. S.C. Rangawala (2009), "Building Construction", *Charotar Publishing House Pvt. Ltd.*

Term Work:

Term work should consists of

1. Minimum five assignments covering the prescribed syllabus
2. Detailed sketches of various components of buildings

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Program: MBA Tech. (Civil Engineering)				Semester : III	
Course : Fluid Mechanics				Code : MBCI03005	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To impart knowledge of different properties of fluids
- To inculcate the concept of fluid statics, kinematics and dynamics.
- To make students aware of different flow measuring devices
- To introduce the laminar flows and liquids in equilibrium

Outcomes:

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

- Explain the different Properties of fluids
- Differentiate the fluid statics, kinematics and dynamics
- Measure flow using different measuring devices
- Analyze laminar flow and liquids in equilibrium

Detailed Syllabus:

Unit	Description	Duration
1.	**Properties of Fluids** Mass density, weight density, specific gravity, specific volume, viscosity, compressibility, bulk modulus, surface tension, capillary action, vapour pressure, types of fluids, basic concepts.	05
2.	**Fluid Statics** Pascal's Law, Pressure variation in fluid at rest, absolute, atmospheric, gauge pressure, measurement of pressure, and hydrostatic forces on plane and curved surfaces. Buoyancy and flotation: Archimedes's principle, Metacentre, Metacentric height, equilibrium of floating and submerged bodies.	08
3.	**Fluid Kinematics and Dynamics** Description of fluid flow: Lagrangian method, Eulerian method, Streamlines, pathlines, streaklines, classification of fluid flows, continuity equation, rotational flow, rotation and vorticity, velocity and stream function. Circulation, flow net. Eular's equation, Bernoulli's theorem, its application to real fluid	08

4.	**Flow measurement** Venturimeter, nozzle meter, pitot tube, rotameter. Orifices: Hydraulic coefficients, small and large orifices, time of emptying of tank through orifices. Mouthpieces: External, convergent, Borda's mouthpiece. Notches and weirs: rectangular, triangular, Cipolleti weirs, velocity of approach, end contraction	10
5.	**Liquids in relative equilibrium** Uniform linear acceleration, liquid container subjected to constant horizontal and vertical acceleration, constant rotation with vertical axis.	06
6.	**Laminar flow** Reynold's experiment, Critical velocity, Steady laminar flow through circular pipes, annulus, parallel plates: stationary and moving, kinetic correction factor, momentum correction factor, Dash pot	08
	Total	**45**

Text Book:

1. Modi P.M. and Seth S.M. (2011), "Hydraulics and Fluid Mechanics", *Standard Book House*

Reference Books:

1. Bansal R.K. (2011), "Hydraulics and Fluid Mechanics", *Laxmi Publications*
2. Subramanaya K., (2008), "Theory and Applications of Fluid Mechanics", *Tata McGraw Hill*

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 from the list given below:

List of Experiments:-

1. Verification of Archemedies principle
2. Verification of Bernoulli's theorem
3. Calibration of Rotameter
4. Determination of metacentric height
5. Calibration of Orifice
6. Calibration of notches
7. Calibration of Venturimeter
8. Calibration of broad crested weir
9. Calibration of submerged weir
10. Calibration of nozzlemeter
11. Reynold's experiment

Program: MBA Tech. (Civil Engineering)				Semester : III	
Course : Engineering Geology				Code : MBCI03006	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	0	3	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To impart knowledge of importance of Geology in Civil Engineering
- To impart knowledge of different types of Rocks and their application in Civil Engineering
- To make students aware of Geological Investigations required for some of the Civil Engineering Projects

Outcomes:

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

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

Detailed Syllabus:

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 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)	10
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, geology of percolation tank.	08

	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 Books:

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

Reference Books:

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

Term Work:

Term work should consists of following

1. Minimum eight assignments covering the prescribed syllabus

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Program: MBA Tech. (Civil Engineering)				Semester : IV	
Course : Surveying-II				Code : MBCI04001	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To impart knowledge of the tacheometric survey and its purposes
- To explain different curves in Civil Engineering
- To study working of the modern equipments for the surveying jobs
- To study various special surveying techniques in the execution of the field projects

Outcomes:

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

- Determine the horizontal and vertical distances using tachometric survey
- Describe the procedure for setting up of curves in field
- Operate modern equipments for surveying
- Execute various special surveying techniques in the field projects

Detailed Syllabus:

Unit	Description	Duration
1.	**Tacheometric surveying:** Principles and uses, advantages, stadia formula, different methods of tacheometer, subtense bar method, location details by tacheometer, stadia diagram and tables, error and accuracy in tacheometric survey.	12
2.	**Curves:** Definitions of different terms, necessity and types of curves, Simple circular curves and compound curves, linear methods of setting out of curves, Angular methods for setting out of curves, two theodolite and Rankine's deflection angle methods, Reverse and transition curves, their properties and their advantages, design of transition curves, shift, spiral angle, Composite curves , setting out of curve by angular method, composite curve problems, Vertical curves - definitions, geometry and types, tangent correction and chord gradient methods, sight distance on a vertical curve, difficulties in setting out curves and solutions for the same.	15

3.	**Modern Surveying instruments:** Electronics in surveying, general principles used in the instruments. Electronic distance measurements - types, principles, applications in surveying, corrections for field observations, Electronic digital theodolite - types, uses and application, Total Station, Use of computer in survey work for level computation and plotting contour plan ,Introduction to GPS	07
4.	**Precision Levelling:** Precise level and levelling staff, field procedure for precise levelling, field notes.	04
5.	**Setting out works:** General horizontal and vertical control, setting out the foundation plan for load bearing and framed structure, batter board, slope and grade stakes, setting out with theodolite, Setting out culvert, Setting out centre line for tunnel, transfer of levels of underground work, Project / route survey for bridge, dam and canal. Checking vertically of high rise structures.	07
	Total	**45**

Text Books:

1. Kanetkar and Kulkarni (2011),"Surveying and Levelling", Vol I and II, *Pune Vidyarthi Griha, Pune*
2. Dr. K.R. Arora (2009)," Surveying " vol.I, II & III", *Standard Book House, New Delhi*

Reference Books:

1. Dr. B.C. Punmia, Ashok K. Jain, Arun K. Jain (2005), "Surveying" Vol .I,II and III , *Laxmi Publications (P) Ltd., New Delhi*
2. N. N. Basak (2010),"Surveying and Levelling", *Tata McGraw Hill*

Term Work:

Term work should consists of the following

1. Minimum five assignments covering the prescribed syllabus
2. Report of minimum six experiments performed from the list given below:

List of Experiments :

1. Determination of Tacheometric constants.
2. Height and distance calculation using tacheometric formulae.
3. To set out circular curves by linear method.
4. To set out circular curve by angular method.
5. Setting out a simple foundation plan in the field.
6. Study of modern surveying instruments.
7. Determination of RL and horizontal distance of object by one plane method.
8. Determination of RL and horizontal distance by of object by two plane method.

SVKM'S NMIMS
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Program: MBA Tech. (Civil Engineering)				Semester : IV	
Course : Structural Analysis - I				Code : MBCI04002	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	2	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To impart knowledge of the behaviour of different structures subjected to different types of loads
- To evaluate the internal forces developed in different structures under various loads
- To determine the failure criteria when body is subjected to various stresses to study rolling loads and its effect on the structures
- To understand the plotting of influence line diagrams for beams
- To resolve the arches and cables and suspension bridges subjected to loads

Outcomes:

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

- Determine the internal forces developed in various structures subjected to various loads
- Calculate the deformations in various structures subjected to various loads.
- Evaluate stresses for rolling loads and its effect on the structures
- Plot the influence lines diagrams for beams
- Analyse the arches and cables and suspension bridges subjected to loads

Detailed Syllabus:

Unit	Description	Duration
1.	**Axial force, shear force and bending moment in frames:** Axial force, shear force and bending moment diagrams for statically determinate frames with and without internal hinges	06
2.	**General theorems:** Theorems relating to elastic structures, principle of virtual work. Strain energy in elastic structures, stresses due to axial load & impact load. Complementary energy, Castigliano's theorem, Betti's and Maxwell's reciprocal theorems, principle of superposition	04

3.	**Deflection of statically determinate structures:** Deflection of cantilevers, simply supported and overhanging beams for different types of loadings using following methods: Moment area method, Conjugate beam, Principle of virtual work (unit load method) and Castigliano's theorem. Deflection of determinate pin jointed and rigid jointed frames by principle of virtual work (unit load method) and Castigliano's theorem.	10
4.	**Influence lines for statically determinate structures:** Influence lines for cantilevers, simply supported, overhanging beams and pin jointed truss, criteria for maximum shear force and bending moment at a section, absolute maximum shear force and bending moment under moving loads (udl and series of point loads) for simply supported beams.	08
5.	**Three hinged arch:** Determination of normal thrust, radial shear force and bending moment for three hinged parabolic and segmental arches.	06
6.	**Cables and suspension bridges:** Simple suspension cable, minimum and maximum tensions in the cable supported at same and at different levels, anchor cable, cable supports, suspension cable with three hinged stiffening girder, shear force and bending moments at any section of the stiffening girder.	06
7.	**Columns and Struts:** Short and long/slender columns, Concept of buckling in slender columns subjected to axial loads, Euler's and Rankine's design formulae for columns with different support conditions.	05
	Total	**45**

Text Book:

1. Reddy C. S. (2007), "Basic Structural Analysis - Second Edition", *Tata McGraw Hill*

Reference Books:

1. G. S. Pandit, S. P. Gupta (2007), "Structural Analysis – A Matrix Approach", *Tata McGraw Hill*
2. John Benson Wilbur, Charles Head Norris (2012), "Elementary Structural Analysis", *Literary Licensing*
3. R. C. Hibbeler (2008), "Structural Analysis – Second Edition", *Pearson*
4. Aslam Kassimali (2011), "Matrix Analysis of Structures - Second Edition", *Cengage Learning*

Term Work:

Term work should consists of the following

1. Minimum seven assignments covering the prescribed syllabus

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Program: MBA Tech. (Civil Engineering)				Semester : IV	
Course : Hydraulic Engineering				Code : MBCI04003	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To impart knowledge of flow through pipes and open channels
- To acquire knowledge of flow networks
- To get acquainted with the dimensional analysis and ideal fluid flow

Outcomes:

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

- Explain the flow through pipes and open channels
- Analyze the flow network
- Discuss the dimensional analysis and ideal flow

Detailed Syllabus:

Unit	Description	Duration
1.	**Flow Through Pipes:** Loss of head through pipes, Darcy Weisbach equation, minor losses, total energy line, hydraulic energy line, pipes in series, pipes in parallel, equivalent pipes, siphons, power transmission through pipes, power transmission through nozzles.	12
2.	**Pipe Network:** Hardy cross method, branching of pipes, three reservoir problem, water hammer in pipes.	08
3.	**Flow Through Open Channel:** Classification of channels, Uniform flow, Chezy's formula, Manning's formula, Prismatic and non-prismatic channels, hyraulically efficient channel cross-section, Velocity distribution in open channels, pressure distribution in open channels, Applications of Bernoulli's equation to open channel flow.	06
4.	**Non - Uniform Open Channel Flow:** Specific energy and discharge curve, applications of specific energy, Momentum principle, application to open channel flow, specific force, small waves and surges in open channels, gradually varied flow, control section, hydraulic jump, location of hydraulic jump.	06

5.	**Dimensional Analysis:** Dimensional homogeneity, Buckingham's π theorem, Rayleigh's method, dimensionless groups, similitude, model studies, distorted & undistorted models.	08
6.	**Ideal Fluid Flow:** Uniform flow, source and sink, free vortex flow, superimposed flow, doublet, flow past half bodies, Rankine's body and cylinder only.	05
	Total	**45**

Text Book:

1. Modi P.M. and Seth S.M. (2011), "Hydraulics and Fluid Mechanics", *Standard Book House*
2. Subramanaya K.(2011), "Flow in Open Channels", *Tata McGraw Hill*

Reference Books:

1. Bansal R.K. (2011), "Hydraulics and Fluid Mechanics", *Laxmi Publications*
2. Subramanaya K., (2008), "Theory and Applications of Fluid Mechanics", *Tata McGraw Hill*

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 from the list given below:

List of Experiments

1. Losses in pipes due to sudden contraction
2. Losses in pipes due to sudden expansion
3. Losses in pipes due to bends
4. Losses in pipes due to valves
5. Major losses in pipes
6. Study of gradually varied flow
7. Hydraulic jump
8. Calibration of standing wave flume

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Program: MBA Tech. (Civil Engineering)				Semester : IV	
Course : Building Design and Drawing - I				Code : MBCI04004	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (4 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
1	4	0	3	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To acquire knowledge of the Principles of Planning of residential buildings
- To impart knowledge of building bye laws
- To impart knowledge of preparation of different drawings for residential building

Outcomes:

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

- Draw the working plans of residential buildings
- Explain Principles of Planning of residential buildings
- Design the various units for residential buildings

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction:** Introduction: Types, importance and significance of building drawings, Commonly used symbols, Conventions and Abbreviations, Scales: Definition, Scales used for various types of drawings, Title, Margins and size of letters as per IS: Sizes of various standard papers, Layout of various views on drawing paper.	2
2.	**Building bye-laws** Building bye-law for residential buildings, Following important bye-laws : Plot area & Built-up area, Size of rooms, Margins, Heights, Passages, Ventilation, Circulation, Open space, Water supply & sanitary, Electrification, Fire safety, General safety, Lifts, Environment Approval procedure with respect to bye-laws	3
3.	**Principles of planning** For residential buildings: Principles of planning such as room dimension, area, heights, privacy, ventilation, access, circulation, economy, drainage, aspect, prospect, orientation, grouping etc.	2

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4.	**Details of building drawing** Site plan: Drawing of details, Line plan, Layout plan, Detailed plan, Services plan, Elevation (Plan showing drainage, Section water supply and electricity Foundation plan lines), Importance and purpose of preparing above drawings., Details to be shown and location of the details, Scales used in above drawings	3
5.	**Planning residential buildings** Given situations & plot area; prepare detailed drawing of a single storied residential building (Load Bearing & RCC) i.e line plan, detailed plan, elevation and section of the building, Given situations & plot area; prepare detailed drawing of a two storied residential building (Load Bearing & RCC) i.e line plan, detailed ground floor plan, first floor plan, second floor plan, design of stair case, elevation and section, Other plans and tables required to be submitted for approval	3
6.	**Building components** Draw sketches of floors and floorings, roofs and roof coverings, false ceiling, doors, windows, ventilators	2
	Total	**15**

Text Books:

1. Shah M. G., Kale C. M., Patki S. Y. (2007), "Building Drawing", *Tata McGraw Hill*

Reference Books:

1. Dr. N Kumara Swamy and A. Kameswara Rao (2012), "Building Planning and Drawing", *Charotar Publishing House Pvt. Ltd.*
2. Bureau of Indian Standards (2005), "National Building Code of India", *BIS Publications*
3. Development Control Rules of Metropolitan Cities

Term Work:

Term work should consists of following

1. Planning and design of two residential buildings designed as
   - Load bearing structure having ground plus one floor with pitched roof
   - RCC framed structure having ground plus one floor
2. Minimum four A1 size drawing sheets - Working Drawing, drawn independently for the two structures designed as mentioned above, showing floor plans and sections

Program: MBA Tech. (Civil Engineering)				Semester : IV	
Course : Concrete Technology				Code : MBCI04005	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To impart the knowledge of properties of the fresh and hardened concrete
- To carry out mix design of concrete
- To study different types of concretes and their ingredients
- To conduct different tests for concrete

Outcomes:

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

- Identify the properties of ingredients of concrete and its effect on the performance of the concrete
- Perform the mix design of concrete
- Determine different properties of fresh and hardened concrete with the help of different tests for concrete

Detailed Syllabus:

Unit	Description	Duration
1.	**Properties of Aggregates:** Properties of coarse and fine aggregates and their influence on concrete, types of cement and their use, physical properties of 33 Grade, 43 Grade, 53 Grade ordinary Portland cement, Portland Pozzolana cement, rapid hardening Portland cement, hydrophobic cement, low heat Portland cement and Sulphate Resisting Portland cement as per relevant I.S. codes	08
2.	**Grades of Concrete:** Concrete for ordinary work, light weight concrete, high density concrete, workability, durability and strength requirements, effect of w/c ratio, acceptability criteria, laboratory testing of fresh and hardened concrete, concreting under special conditions, work in extreme weather conditions, under-water concreting.	07

3.	**Concrete Mix Design:** Mix design for compressive strength by I.S. methods, Road Note method and British method, mix design for flexural strength.	05
4.	**High Performance Concrete:** Constituents of high grade concrete, various tests and application of high performance concrete.	05
5.	**Admixtures:** Plasticizers, retarders, accelerators and other admixtures, test on admixtures, chemistry and compatibility with concrete.	05
6.	**Ready Mix Concrete:** Requirements of RMC, transit mixer details, mix design of RMC.	05
7.	**Concrete for Repairs and Rehabilitation of Structures:** Polymer concrete, fiber reinforced concrete, polymer impregnated concrete, polymer modified cement concrete/mortar and ferro-cement, different tests.	05
8.	**Non-Destructive Testing of Concrete:** Hammer test, ultrasonic pulse velocity test, load test, carbonation test, ½ cell potentiometer test, and corrosion test for steel, core test and relevant provision of I.S. codes.	05
	Total	**45**

Text Book:

1. A. M. Neville (2012), "Basic Structural Analysis - Second Edition", *Tata McGraw Hill*

Reference Books:

1. M. L. Gambhir (2006), "Concrete Technology - Third edition", *Tata McGraw Hill*
2. M. S. Shetty (2005), "Concrete Technology: Theory and Practice", *S. Chand*
3. A. R. Santhakumar (2006), "Concrete Technology", *Oxford University Press India*

Term Work:

Term work should consists of the following

1. Minimum five assignments covering the prescribed syllabus
2. Report of minimum eight experiments performed in the laboratory from the list given below:

List of Experiments

1. Study of properties of fine and coarse aggregates
2. Physical properties of cement
3. Effect of w/c ratio on workability (slump cone, compaction factor, V-B test, flow table)
4. Effect of w/c ratio on strength of concrete
5. Mix design in laboratory
6. Non destructive testing of concrete – some applications (hammer, ultrasonic)
7. Secant modulus of elasticity of concrete & indirect tensile test on concrete
8. Study of admixtures & their effect on workability and strength of concrete
9. Modulus of rupture of concrete
10. Permeability test on concrete
11. Tests on polymer modified concrete/mortar
12. Tests on fiber-reinforced concrete

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Program: MBA Tech. (Civil Engineering)				Semester : V	
Course : Structural Analysis - II				Code : MBCI05001	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	2	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart knowledge of the different structures subjected to different types of loads
- To evaluate the deformations in a structure due to temperature variation
- To analyse the structures subjected to various loads

Outcomes:

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

- Determine the indeterminacy of various structures commonly occurring in practice
- Calculate the deformations in various structures subjected to temperature change
- Analyse the indeterminate structure by flexibility and stiffness method

Detailed Syllabus:

Unit	Description	Duration
1.	**General:** Types of structures occurring in practice and their classification. Stable and unstable structure, static and kinematic determinacy and indeterminacy of structure. Symmetric structure, symmetrical and anti-symmetrical loads, distinction between linear and non-linear behaviour of material and geometric non-linearity.	06
2.	**Deflection of statically determinate structures:** Deflection due to temperature changes, application to beams, pin jointed frames and rigid jointed frames.	05

3.	**Analysis of indeterminate structures by flexibility method:** Flexibility coefficients and their use in formulation of compatibility equations. Theorem of three moments, Castigliano's theorem of least work, application of above methods to propped cantilevers, fixed beams, continuous beams. Simple pin jointed frames including effect of lack of fit for members. Simple rigid jointed frames and two hinged parabolic arches.	17
4.	**Analysis of indeterminate structures by stiffness method:** Stiffness coefficients for prismatic members and their use for formulation of equilibrium equations, direct stiffness method, slope deflection method, Moment distribution method. Application of the above methods to indeterminate beams and simple rigid jointed frames, rigid jointed frames with inclined member but having only one translational degree of freedom in addition to rotational degree of freedom including the effect of settlement of supports.	17
	Total	**45**

Text Book:

1. Reddy C. S. (2007), "Basic Structural Analysis – Second Edition", *Tata McGraw Hill*

Reference Books:

1. G. S. Pandit, S. P. Gupta (2007), "Structural Analysis – A Matrix Approach", *Tata McGraw Hill*
2. John Benson Wilbur, Charles Head Norris (2012), "Elementary Structural Analysis", *Literary Licensing*
3. R. C. Hibbeler (2008), "Structural Analysis – Second Edition", *Pearson*
4. Aslam Kassimali (2011), "Matrix Analysis of Structures – Second Edition", *Cengage Learning*

Term Work:

Term work should consists of the following

1. Minimum seven assignments covering the prescribed syllabus

SVKM'S NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: MBA Tech.(Civil Engineering)				Semester : V	
Course : Geotechnical Engineering -I				Code : MBCI05002	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	2	0	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To acquire the knowledge of physical and engineering properties of different types of soils and their classification
- To provide ability of assessing soil parameters
- To gain knowledge about the basic soil investigation techniques

Outcomes:

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

- Identify the soils and their engineering behaviour
- Conduct different tests for assessing soil parameters
- To interpret the engineering behaviour of soil from the test results

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction** Definitions: soils, soil mechanics, soil engineering, rock mechanics, Geotechnical Engg: scope of soil engineering, comparison between soil & rock, Formation of Soil: Residual Soils and their zones, Transported soil and its Types	02

2.	**Basic definitions & relationship** Soil as three phase system in terms of weight, volume, void ratio, porosity, Definitions: moisture content, densities, unit weights, degree of saturation, void ratio, porosity, specific gravity, mass specific gravity etc. Relationship between volume-weight, void ratio-moisture content, unit weight-percent air voids, saturation-moisture content, moisture content-specific gravity etc., Determination of various parameters such as moisture content by Oven Dry Method, Sand Bath Method, Radio Active method, Specific gravity by Pycnometer method, Unit weight by core cutter method and sand replacement method.	06
3.	**Plasticity characteristics of soil** Introduction to definitions of: plasticity of soil, consistency limits - liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices, sensitivity of clay, Determination of: liquid limit, plastic limit, shrinkage limit, Use of consistency limits.	03
4.	**Classification of soils** Introduction of soil classification:, MIT Classification, Textural Classification, Unified Soil Classification, Indian standard soil classification system, Sieve and sedimentation analysis, particle size distribution- its use and interpretation, Identification: field identification of soils, general characteristics of soils in different groups.	05
5.	**Permeability of soils** Introduction to hydraulic head, Darcy's law, Discharge velocity and seepage velocity and relation between them, factors affecting permeability of soil, Determination of coefficient of permeability, Laboratory methods: constant head method, falling head method, Field methods: pumping-in test, pumping-out test, Permeability of stratified soils.	04
6.	**Seepage analysis** Introduction, stream and potential functions, characteristics of flow nets, graphical method to plot flow nets, use of flow nets, piping failure only introduction	03
7.	**Effective stress principle** Introduction, effective stress principle, nature of effective stress, effect of water table, Fluctuation of effective stress, effective stress in soils saturated by capillary action, seepage pressure, critical hydraulic gradient, quick sand condition.	03

8.	**Compaction of soils** Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Standard and Modified Compaction Tests, Factors affecting compaction, Compaction in the field, compaction specification and field control.	03
9.	**Consolidation of soils** Introduction , comparison between compaction & consolidation , initial , primary & secondary consolidation , Terzaghi's spring analogy for mechanism of consolidation, consolidation test results, basic definitions, Terzaghi's theory of consolidation, final settlement of soil deposits, consolidation settlement: one-dimensional method, secondary consolidation.	06
10	**Shear strength** Coulomb's Theory, Principal planes and principal stresses, Mohr's circle, important characteristics of Mohr's circle, Mohr-Coulomb theory, types of shear tests, direct shear test, merits & demerits of direct shear test , tri-axial compression tests, drainage conditions of UU, CU and CD tests, unconfined compression test, vane shear test.	05
11	**Soil Exploration** Introduction, methods of investigation, methods of boring, soil samplers and sampling, number and disposition of borings, borehole logs,	05
	Total	**45**

Text Books:

1. VNS Murthy,(2011) "Text Book of Soil Mechanics and Foundation Engineering", *CBS Publishers and Distributers Pvt. Ltd.*
2. Dr.Alam Singh, (2004) "Basic Soil Mechanics and Foundations", *CBS Publishers and Distributers Pvt. Ltd.*

Reference Books:

1. C. Venkatramaiah, (2012) "Geotechnical Engineering", *New age international Ltd.*
2. Gopal Ranjan & A. S. RAO, (2004) "Basic & Applied Soil Mechanics", *New age international Ltd.*

Term Work:

Term work should consists of

1. Minimum five assignments covering the prescribed syllabus
2. Experiments covering syllabus (Minimum six) from the following List of Experiments

List of Experiments:

1. Field density by core cutter method
2. Sand replacement method
3. Sieve analysis and particle size determination
4. Hydrometer analysis
5. Specific gravity determination by Pycnometer
6. Determination of Liquid Limit
7. Determination of Plastic Limit
8. Determination of Shrinkage Limit
9. Determination of co-efficient of permeability by Constant Head
10. Determination of co-efficient of permeability Variable Head Permeameter
11. Direct Shear Test
12. Free Swelling Index Test
13. Measurement of Swelling Pressure of Soil

Program: MBA Tech. (Civil Engineering)				Semester : V	
Course : Hydraulic Machinery				Code : MBCI05003	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	2	0	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart knowledge of impact of jet on stationary and moving plates
- To get acquainted the working principle of pumps and turbines
- To introduce the miscellaneous pumps and machines

Outcomes:

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

- Illustrate the impact of jet on stationary and moving plates
- Explain the working principle of reciprocating pumps, centrifugal pumps and turbines
- Differentiate between the pumps and other hydraulic machines

Detailed Syllabus:

Unit	Description	Duration
1.	**Impact of jets and jet propulsion:** Jet striking- stationary, moving, inclined and perpendicular flat plates, hinged flat plates, impact on stationary curved vane, series of curved vanes, jet propulsion of ships.	08
2.	**Turbines:** General layout of hydro-electric power plant, heads and efficiencies of turbine, classification, Pelton wheel, reaction turbine, Francis turbines, Kaplan turbine, draft tube theory, specific speed, unit quantities, characteristics curves, Governing of turbines, cavitations.	12
3.	**Centrifugal pumps:** Work done, heads and efficiencies, minimum speed series and parallel operation. Multistage pumps, specific speed, model testing, priming, characteristic curves, cavitation.	12

4.	**Reciprocating pumps:** Operating principle, slip, Variation of velocity and acceleration, Indicator diagram	08
5.	**Miscellaneous pumps and machines:** Gear pumps, air lift pumps and submersible pumps, Hydraulic press, hydraulic ram, hydraulic lift, hydraulic crane	05
	Total	**45**

Text Book:

1. Modi P.M. and Seth S.M. (2011), "Hydraulics and Fluid Mechanics", *Standard Book House*

Reference Books:

1. Bansal R.K. (2011), "Hydraulics and Fluid Mechanics", *Laxmi Publications*
2. Subramanaya K., (2008), "Theory and Applications of Fluid Mechanics", *Tata McGraw Hill*

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 from the list given below

List of Experiments :

1. Impact of jet on flat plate
2. Impact of jet on flat inclined plate
3. Impact of jet on curved plate
4. Performance of Pelton wheel turbine – full and half gate opening
5. Performance of Francis turbine
6. Performance of Kaplan turbine
7. Performance of Centrifugal pump
8. Performance of Gear pump
9. Performance of Reciprocating pump

Program: MBA Tech. (Civil Engineering)				Semester : V	
Course : Building Design and Drawing - II				Code : MBCI05004	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (-----)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
1	2	0	2	-----	Scaled to 50 marks

Objectives:

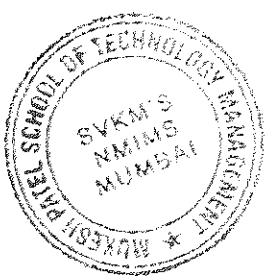
- To impart knowledge of planning and drawings of public buildings
  To introduce the concept of development of master plan of an area using the principles of town planning
- To impart knowledge for a perspective drawing

Outcomes:

- After successfully completion of this course, students should be able to
- Plan and develop the drawings of public buildings using available software
- Develop master plan of an area using the principles of town planning
  Prepare a perspective drawing of a simple structure

Detailed Syllabus:

Unit	Description	Duration
1.	Planning & design of public buildings such as; • Buildings for education: schools, colleges, institutions, libraries • Buildings for health and hospitality: hospitals, health centers, dispensaries, maternity homes, sanatoriums • Hostels, hotels, boarding houses, rest houses	08
2.	Architectural planning, massing and composition, concept of built environment and its application in planning Principles of modular planning, planning as recommended by National Building Organization	03
3.	Perspective drawing: one point and two point perspective	02



4.	Town planning: objectives and principles, master plan, road systems, zoning, green belt, slums, introduction to green buildings	02
	Total	**15**

Text Books:

1. Shah M.G., Kale C.M., Patki S.Y. (2007), "Building Drawing", *Tata McGraw Hill, Delhi*

Reference Books:

1. Dr. N Kumara Swamy and A Kameswara Rao (2012), "Building Planning and Drawing", *Charotar Publishing House Pvt. Ltd.*

Term Work:

Term work shall consist of A1 size drawing sheets using computer software giving details of minimum two different types of public buildings and one perspective drawing. The drawings should include following details: floor plans, elevation, typical section, roof plan, foundation plan, site plan, layout plan with drainage lines and any other typical details.

SVKM'S NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: MBA Tech. (Civil Engineering)				Semester : V	
Course : Irrigation Engineering				Code : MBCI05005	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	0	3	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart knowledge of different methods of irrigation and parameters related to them
- To make understand crop management from irrigation perspective
- To get acquainted with the capacity and yield of reservoir
- To understand the design criteria for canals
- To introduce the structures used in canal water management

Outcomes:

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

- Explain the different methods and parameters related to irrigation
- Describe crop management systems from irrigation perspective
- Evaluate reservoir capacity and yield of reservoir
- Design the canal in alluvial and non alluvial soils
- Discuss different outlet structures and energy dissipation devices

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction:** Irrigation, water resources in India, need of irrigation in India, development of irrigation in India, impact of irrigation on human environment, irrigation systems: minor and major, command area development. Irrigation systems and its classification, Irrigation methods(surface and sub-surface), factors affecting choice of method	04
2.	**Water requirement of crops:** Crops and crop seasons in India, cropping pattern, duty and delta, Quality of irrigation water. Soil water relationship: soil characteristics significant from irrigation considerations, root zone soil water, infiltration, consumptive use, irrigation requirement, frequency of irrigation. Methods of applying water	08

	to the fields: surface, sub-surface, sprinkler and drip irrigation. Waterlogging: causes, effects and remedial measures.	
3.	**Distribution systems:** Canal systems, alignment of canals, canal losses, estimation of design discharge. Lining of canals: economics of lining. Canal regulation works. Cross drainage works. Bandhara irrigation, inundation irrigation Drainage of irrigated land: necessity, methods.	10
4.	**Irrigation channels (silt theories):** Kennedy's theory, Kennedy's methods of channel design, silt supporting capacity according to Kennedy's theory, drawbacks in Kennedy's theory, Lacey's regime theory, Lacey's theory applied to channel design, comparison of Kennedy's and Lacey's theory, defects in Lacey's theory.	10
5.	**Dams and reservoirs:** Capacity of reservoirs, yield of reservoirs, reservoir regulation, classification of dams, design considerations and forces acting on gravity dams	08
6.	**Introduction to Spillways and energy dissipaters** Types of spillways and crest gates, energy dissipaters	05
	Total	**45**

Text Book:

1. Garg S.K. (2011), "Irrigation Engineering and Hydraulic Structures", *Khanna Publishers*

Reference Books:

1. Modi P.N.(2008), "Irrigation water resources and water power engineering", *Standard Book House*
2. Punmia B.C. (2011), "Hydraulics and Fluid Mechanics", *Laxmi Publications.*

Term Work:

Term work should consists of the following

1. Minimum seven assignments covering the prescribed syllabus

SVKM'S NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: MBA Tech. (Civil Engineering)				Semester : V	
Course : Environmental Engineering - I				Code : MBCI05006	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	2	0	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart knowledge of general layout of a water supply scheme
- To impart knowledge of the design of various units of Water Treatment System
- To make students aware of the causes, effects and control measures for Air pollution, Land pollution, Water pollution and Noise pollution

Outcomes:

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

- Prepare a layout of a water supply scheme
- Design various units of water treatment system
- Analyse the causes, effects and control measures for Air pollution, Land
- pollution, Water pollution and Noise pollution

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction:** Water supply systems - need for planned water supply schemes, components of water supply system and determination of their design capacities, distribution system of water, long term needs for towns/cities, surface and ground water sources, domestic storage of rain waters in drought prone areas. **Quality of water:** Physical, chemical, microbiological characteristic, standard limits for water potability, laboratory analysis, significance of results w.r.t. waterborne diseases, other quality parameters – DO, BOD, COD; stream pollution, Streeter-Phelp's equation. **Quantities of water:** Types of demands, total requirement of city, per capita demand and factors affecting it, effect on design capacities of water treatment and supply system, design period, population data and forecasting, design calculation of total water demand for various uses in a city/areas	12

2.	**Collection and conveyance of water:** Types of intake structure, design of intake structure, estimation of fluid flows, engineering requirements of conduits with respect to their performance, types of conveyance system, hydraulic design of conveyance conduits, various materials of pipes, appurtenances, and issues associated with conveyance of water. **Pumps for lifting of water:** Types of pumps, selection of pumps, design of pumping main for conveyance of water, economical diameter of pumping main, pumping station	08
3.	**Treatment processes for water:** Treatment of water – types of impurities in water, treatment processes for their removal, typical flow – sheets, primary, secondary and tertiary treatments, options, mechanisms, parameters treated, treatment efficiencies, design of various units, disposal, limitations of conventional treatment.	12
4.	**Advanced treatments for water:** Water softening - lime soda and base exchange methods, principle reactions, design considerations, sludge disposal. **Miscellaneous treatments:** Removal of iron and manganese, taste, odour and colour, principles and methods, defluoridation, desalination (Principle reactions, design considerations, sludge disposal).	5
5.	**Environmental Pollution:** Definition, classification, causes, effects and control measures of following - air pollution, water pollution, soil pollution, noise pollution, marine pollution, thermal pollution, radioactive pollution, pesticide pollution, oil pollution. **Solid Waste Management:** Definition, classification, characteristics, segregation, storage, transportation and management practices and disposal method, role of an individual in prevention of pollution, pollution case studies. **Bio-Medical Waste Management:** Definition, classification, storage, transportation, treatment. **Hazardous Waste:** Definition, classification, sources, management - philosophy and options, treatment, safe disposal	8
	Total	**45**

Text Book:

1. P.N. Modi (2010), " Water Supply Engineering (Environmental Engineering - I)", *Standard Book House*

Reference Books:

1. Punmia B.C. (2011), "Environmental Engineering (Vol. -I), Water Supply Engineering", *Laxmi Publications*
2. Garg S.K. (2011), "Environmental Engineering (Vol. -I), Water Supply Engineering", *Khanna Publishers*
3. Jerry Nathanson, R. Schneiber (2014), "Basic environmental technology, water supply, waste management and pollution control", *Pearson publication*
4. CPHEEO manual on water supply and treatment (2005)

Term Work:

Term work should consists of

1. Design of water supply and treatment scheme for typical sources for a city/area
2. Experiments covering syllabus (Minimum six) from the following List of Experiments
3. Technical report on industrial visit on Water treatment plant

List of Experiments:

1. Determination of ph of sample
2. Determination of turbidity of sample
3. Determination of acidity of sample
4. Determination of alkalinity of sample
5. Determination of hardness of sample
6. Determination of chlorides content of sample
7. Determination of solids in a sample
8. Determination of biological oxygen demand in a sample
9. Determination of chemical oxygen demand in a sample
10. Determination of nitrate of water sample

SVKM'S NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: MBA Tech.(Civil Engineering)				Semester : VI	
Course : Geotechnical Engineering -II				Code : MBCI06001	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	2	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To acquire the knowledge of stability of slopes
- To get ability to carry out foundation analysis
- To gain knowledge about special foundation techniques

Outcomes:

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

- Identify the failure patterns of slopes
- Design shallow and deep foundations
- Analyze the stability of braced cuts and underground conduits

Detailed Syllabus:

Unit	Description	Duration
1.	**Stability of Slopes** Introduction, different factors of safety, analysis of finite and infinite slopes, types of slope failures, wedge failure, Swedish circle method, friction circle method, stability numbers and charts.	06
2.	**Lateral Earth Pressure Theories** Introduction: applications of earth pressure theories, different types of earth pressures - at rest, active and passive pressures, Rankine's earth pressure theory: Rankine's earth pressure theory, active earth pressure and passive earth pressure for horizontal and inclined backfill,Earth Pressure for cohesionless and cohesive soils, Coulomb's wedge theory: Coulomb's active pressure in cohesionless soils, expression for active pressure, Coulomb's passive earth pressure.	08

3.	**Bearing capacity of shallow foundations** Definitions of ultimate bearing capacity, gross, net and safe pressures, allowable bearing pressure, types of shallow foundations, modes of failures, Terzaghi's Bearing capacity Theory, concept behind derivation of equation, general bearing capacity equation, bearing capacity equations for square and circular footings, factors influencing bearing capacity, performance of footings in different soils, Vesic's chart, ultimate bearing capacity in case of local shear failure. Plate load test in detail with reference to IS 1888 and its applications and estimation of settlements, bearing capacity based on standard penetration test.	12
4.	**Axially loaded pile foundations** Introduction to pile foundations, necessity of pile foundation, classification of piles, construction methods of bored piles, concrete bored piles, driven cast in-situ piles, Pile capacity based on static analysis, piles in sand, piles in clay, dynamic methods and their limitations, in-situ penetration tests and pile load test as per IS 2911 specifications, negative skin friction, Pile groups, ultimate capacity of groups, settlement of pile groups in sand and in clays as per IS 2911 and critical depth method.	08
5.	**Underground conduits** Classes of underground conduits, load on a ditch conduit, settlement ratio, ditch condition and projection condition, imperfect ditch conduit.	04
6.	**Braced Cuts** Lateral Earth Pressure Distribution, Apparent pressure diagrams, deep cuts in sand, saturated clay, Bjerrum and Eide Method of Analysis	04
7.	**Reinforced soil** The mechanism, reinforcement (elements), reinforced-soil interaction, applications, reinforced soil embankments, simple problems.	03
	Total	**45**

Text Books:

1. VNS Murthy (2011), "Text Book of Soil Mechanics and Foundation Engineering", *CBS Publishers and Distributers Pvt. Ltd,*
2. Dr.Alam Singh (2004), "Basic Soil Mechanics and Foundations", *CBS Publishers and Distributers Pvt. Ltd.*

Reference Books:

1. Gopal Ranjan& A. S. RAO (2004), "Basic & Applied Soil Mechanics", *New age international Ltd.*
2. Hsai-Yang Fang (2002), "Foundation Engineering Hand Book", *Kluwer Academic Publishers*

Term Work:

Term work should consists of the following

1. Minimum seven assignments covering the prescribed syllabus

Program: MBA Tech. (Civil Engineering)				Semester : VI	
Course : Building Utilities and Services				Code : MBCI06002	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	0	3	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart the knowledge of the various Building Services & Utilities and their functions
- To make acquainted with the technical processes involved in building of these Building Services
- To illustrate the rules and regulations controlling the provisions of these Building Services

Outcomes:

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

- Identify different Building Services & Utilities required for smooth functioning of the buildings
- Explain the various Technical Processes involved in building up of these Building Services
- Discuss the rules and regulations controlling the provisions of these Building Services

Detailed Syllabus:

Unit	Description	Duration
1.	**Fire Safety Installation:** Causes of fire in buildings, Safety regulations, NBC- Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Heat and smoke detectors, Fire alarm system, snorkel ladder, Fire fighting pump and water storage, Dry and wet risers, Automatic sprinklers, fire chutes	08

2.	**Electrical Systems in Buildings:** Basics of electricity - Single / Three phase supply, Protective devices in electrical installations, Earthing for safety, Types of earthing, Types of wires, wiring systems and their choice, Planning electrical wiring for building, Main and distribution boards, Transformers and switch gears, Layout of substations	08
3.	**Principles of Illumination & Design:** Visual tasks, Factors affecting visual tasks, Modern theory of light and colour, Synthesis of light, Additive and subtractive synthesis of colour, Luminous flux, Candela, Solid angle illumination, Utilisation factor, Depreciation factor, MSCP, MHCP, Laws of illumination, Classification of lighting, Artificial light sources, Spectral energy distribution, Luminous efficacy, Colour temperature, Colour rendering, Design of modern lighting, Lighting for stores, offices, schools, hospitals and house lighting.	06
4.	**Air conditioning and HVAC systems:** Conventional system and its types, HVAC System- Ventilation, energy efficiency, air filtration and cleaning, Introduction to HVAC industry standards, Heating for comforts - boilers and furnaces.	06
5.	**Lifts:** Lift Act, Construction and Essential features of lifts, passenger traffic requirements, incoming, two way and outgoing traffic. **Escalators:** Essential features and components of escalators. Difference between lifts and escalators	05
6.	**Plumbing Systems in Building:** Plumbing services: Water distribution system, Storage tanks, types of pipes based on materials and their suitability, testing of pipes – hydraulic, odour, smoke tests, Service connection - size of service pipe, Water meter - size and installation, Valves - types and suitability, miscellaneous plumbing fixtures, pressure valves and pressure tanks in high rise buildings. Drainage system: different types of pipes and traps with their suitability, System of plumbing, Septic tank, Soak pit.	12
	Total	**45**

Text Books:

1. S. M. Patil (2008), "Building Services", *Prof. S. M. Patil and Mrs. Savita S. Patil*
2. V. K. Jain (2007), "Fire Safety in Building", *New Edge International Publication, New Delhi*

Reference Books:

1. George R. Strakosch (1998), "The Vertical Transportation Handbook", *John Willey and Sons*
2. Derek Philips (2000), Lighting modern buildings, *Architectural Press*

Term Work:

Term work should consists of the following

1. Minimum seven assignments covering the prescribed syllabus
2. Report on advanced construction activities based on site visit/available literature

Program:	MBA Tech. (Civil Engineering)			Semester : VI	
Course :	Environmental Engineering - II			Code : MBCI06003	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	2	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

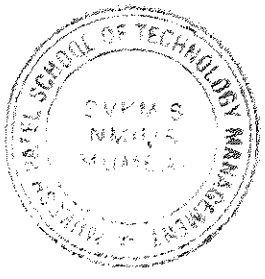
- To impart knowledge of general layout of a waste water collection and treatment scheme
- To impart knowledge of the designing of various units waste water treatment system
- To make students aware of eco-system
- To make students aware of preventive measures and legislative support for control and prevention of pollution

Outcomes:

- After successful completion of this course, students should be able to
- Prepare a general layout of a waste water collection and treatment scheme
- Designing of various units waste water treatment system
- Illustrate the preventive measures and legislative support for control and prevention of pollution

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Wastewater – Sewage:** Definition of sewage, Necessity of sewage treatment, Requirement of a sewage management system. Composition of sewage, **Characterization and Disposal:** Characteristics of sewage: Composition, chemistry of sanitary sewage, B.O.D., C.O.D., aerobic and anaerobic decomposition, Sewage Disposal: discharge of raw and treated sewage on land and water, standards for disposal, raw and treated sewage on land and water, limits of dilution, Self purification of streams: oxygen economy, sewage farming.	7



2.	**Sewage: Conveyance and Pumping:** Conveyance of Sewage: Sewers- shapes and materials of sewers, sanitary, estimation of peak runoff, estimation of sewage flow, types of flows, hydraulic design of various types of sewers , design of sewage pumping stations, appurtenances, and maintenance of sewers. **Rainwater Harvesting System:** Design of Rainwater Harvesting System, for Surface Runoff and Roof-Top Runoff , Treatment and Harvesting Methodology	8
3.	**Sewage Treatment:** Basic flow sheets and Unit Operations, Aims, methods of treatments and various flow-sheets for preliminary, primary, secondary and, tertiary treatment, screens, grit chambers, primary and secondary clarifiers, disposal of screenings and grit (Design considerations and design) **Biological treatment:** Treatment methods, principles, trickling filter operation, recirculation, activated sludge process and its modifications, hydraulic design of trickling filter and activated sludge process, sludge volume index, operational problems in activated sludge process and trickling filters, stabilization ponds **Sludge digestion:** Principles of anaerobic digestion, quantity and characterization of sludge, design of sludge digestion tanks, disposal of digested sludge, drying bed **Low cost sanitation:** Septic tanks and Imhoff tanks – principles, operation and suitability, design values, disposal of treated effluent	20
4.	**Ecosystems:** Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the Ecosystems - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems **Preventive Measures:** Basic human needs v/s over-consumerism; wastage, misuse and abuse of resources including energy, reuse, recycling and renovation techniques, mass education about environment, sustainable and eco-friendly development, legislative Support for environmental protection, Role of NGOs. Consumerism and waste products. Role of an individual in prevention of pollution **Disaster Management:** Causes, floods, earthquake, cyclone and landslides. **Indian Laws for Environmental Protection:** Environment Protection Act. Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wasteland reclamation, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation	10
	Total	**45**

Text Book:

1. P.N. Modi (2010), "Sewage Treatment & Disposal and Waste Water Engineering (Environmental Engineering - I)", *Standard Book House.*

Reference Books:

1. Punmia B.C. (2011), "Environmental Engineering (Vol. -I), Waste Water Engineering", *Laxmi Publications.*
2. Garg S.K. (2011), "Environmental Engineering (Vol. -II), Sewage Disposal and Air Pollution Engineering", *Khanna Publishers*
3. Jerry Nathanson, R. Schneiber (2014), "Basic environmental technology, water supply, waste management and pollution control", *Pearson publication*
4. CPHEEO manual on waste water and sewarage (2005)

Term Work:

Term work should consists of

1. Minimum seven assignments based on the prescribed syllabus
2. Technical report on industrial visit on Waste-water treatment plant

SVKM'S NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: MBA Tech. (Civil Engineering)				Semester : VI	
Course : Highway and Railway Engineering				Code : MBCI06004	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	2	0	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart the knowledge of highway planning, traffic engineering and railway engineering
- To study highway construction

Outcomes:

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

- Describe the highway planning, traffic engineering and railway engineering
- Design highways and railways

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction Scope of highway Engg:** Road development plans, Recent developments , Highway finance –BO (Build-operate-transfer), BOOT(Build-own-operate-transfer), Annuity, PPP, DBFO. **Highway Planning:** Geometric design of highways, testing and specifications of paving materials, design of flexible and rigid pavements. Numerical Examples	15
2.	**Traffic Engineering:** Traffic characteristics, theory of traffic flow, intersection design, traffic signs and signal design, highway capacity.	08
3.	**Highway Construction:** Highway materials, WMM roads, bituminous roads-BC, SDBC, DBM; concrete roads-DLC,PQC; soil stabilized road, MOST specifications. Highway Drainage: Necessity, surface and subsurface drainage, maintenance and repairs.	10

4.	**Railway Engineering:** Introduction – Advantages, classification, gauges. Railway Track. - Components & their functions, Cross-section, Stresses, coning of wheels, Wear & Creep of Rails, Failure, Joints, Fittings and fixtures, Ballast, Sleepers and Drainage. Geometric Design – Alignments, Gradient & Grade Compensation, Super elevation & negative super elevation, equilibrium cant & cant deficiency , Horizontal curves, and transition curves. Points and Crossing . Stations and Yards . Signalling and interlocking. Tractions and Tractive Resistance. Construction and Maintenance.	12
	Total	**45**

Text Book:

1. Khanna S.K. and C.E.G. Justo (2000), "Highway Engineering", *Nem Chand & Bros., Roorkee*
2. Saxena S.C. & Arora S.P. (2012), "A Text Books of Railway Engg.", *Dhanpat Rain & Sons*

Reference Books:

1. Gurucharan Singh (2003), "Highway Engineering", *Standard Publishers Distributors*
2. IRC: 76 (1979), "Tentative Guidelines for Structural Strength Evaluation of Rigid Airfield Pavements", *IRC, New Delhi*

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 from the list given below:

List of Experiments :

1. Impact test on aggregates
2. Abrasion test on aggregates
3. Crushing test on aggregates
4. Shape test on aggregates
5. Penetration test on bitumen
6. Ductility test on bitumen
7. Softening point test on bitumen
8. Viscosity test on bitumen

SVKM'S NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: MBA Tech.(Civil Engineering)				Semester : VI	
Course : Design of Steel Structures				Code : MBCI06005	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	2	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart the knowledge of basic procedure for designing steel beams using limit state method
- To develop skill for designing columns and column bases, steel trusses
- To recognise various end connections for beams and trusses and their design

Outcomes:

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

- Design the steel beams using single or built-up sections using limit state method
- Design columns and their bases
- Design steel trusses subjected to live load and wind load
- Design the various end connections for beams and trusses

Detailed Syllabus:

Unit	Description	Duration
1.	Introduction to types of steel, mechanical properties of steel, advantages of steel as structural material, design philosophies of Working Stress Method (WSM) and Limit State Method (LSM)	02
2.	Limit state method, limit state of strength and serviceability (deflection, vibration, durability, fatigue, fire), characteristics and design loads, Classification of cross section- plastic, compact, semi-compact and slender, limiting width to thickness ratio.	06
3.	Design of tension members with welded / bolted end connections using single and double angle sections by LSM, design strength due to- yielding of gross section, rupture of critical section and block shear.	04
4.	Design of compression members with welded / bolted end connections using single and double angle by LSM, design strength, effective length of compression members.	04

5.	Design of columns with single and built-up sections, design of lacing and batten plates with bolted and welded connections using LSM, column buckling curves, effective length, slenderness ratio, limiting values of effective slenderness ratio, buckling class of various cross sections.	04
6.	Design of slab base and gusseted base using bolted and welded connection by LSM, Effective area of a base plate.	04
7.	Design of members subjected to bending by LSM, design strength in bending, effective length, laterally supported and unsupported beams, single and built-up rolled steel sections using bolted and welded connections, shear lag effect, design for shear, web buckling and web crippling	06
8.	Introduction to bolted and welded connections by LSM, beam to beam and beam to column connections, design of framed, un-stiffened and stiffened seat connections.	09
9.	Truss: Determinate truss, imposed load on sloping roof, wind load on sloping roof and vertical cladding including effect of permeability and wind drag, analysis of pin jointed trusses under various loading cases, computation of forces in members, design and detailing of connections and supports, wind bracing for roof system, supported on columns.	06
	Total	**45**

Text Book:

1. N. Subramanian (2008), "Design of Steel Structures", *Oxford*
2. IS800 (2007), "General Construction in Steel - Code of Practice Third Revision", *BIS Publication*
3. IS 875 (1987), "Code of Practice for Design Loads Other Than Earthquake Loads", *BIS Publication*

Reference Books:

1. S. K. Duggal (2009), "Design of Steel Structure - 3rd Edition", *Tata McGraw-Hill Education*
2. S. S. Bhavikatti (2009), "Design Of Steel Structures (By Limit State Method As Per IS: 800 2007)", *I. K. International Pvt Ltd.*
3. Pasala Dayaratnam (2008), "Design Of Steel Structures", *S Chand*

Term Work:

The Term work shall consist of a Design report and detailed drawings drawn in pencil only on minimum of A – 1 (imperial) size drawing sheets on two projects as indicated below

i. Roofing system including details of supports
ii. Flooring system including Columns

Program: MBA Tech. (Civil Engineering)				Semester : VII	
Course : Theory of Reinforced Concrete and Prestressed Concrete				Code : MBCI07001	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 100 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	2	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart the knowledge of basic procedure for designing reinforced Concrete section using working stress method
- To develop skill for analysing different prestressed concrete sections

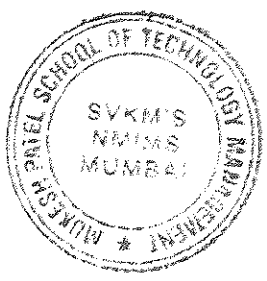
Outcomes:

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

- Analyse and design the beams using working stress method
- Analyse and design the columns using working stress method
- Design RCC Slabs
- Analyse the prestressed concrete sections

Detailed Syllabus:

Unit	Description	Duration
1.	Concept of reinforced concrete, working stress method of design for reinforced concrete, permissible stresses as per IS-456-2000, stress strain curve of concrete and steel, characteristics of concrete and steel reinforcement.	03
2.	Analysis and design of singly reinforced and doubly reinforced rectangular, Tee, Ell-beams for flexure by WSM, balanced, under reinforced and over reinforced sections.	06
3.	Design for shear and bond by WSM.	06
4.	Analysis and Design of rectangular and circular columns subjected to axial and bending by WSM.	06
5.	Design of one way and two way slab by WSM	06



6.	Prestressed Concrete: Basic principles of prestressed concrete, materials used and their properties, methods and systems of pre-stressing, concept of bonded and unbounded cables, losses in pre-stress, analysis of various types of sections subjected to pre-stress and external loads.	08
7.	General design principles: Concepts of centre of compression, kern of a section, efficiency of the section, pressure line and safe cable zone, principal tension in prestressed concrete members. Simple Design of prestressed concrete beams (no end block design)	10
	Total	**45**

Text Book:

1. S. N. Sinha (2007), "Reinforced Concrete Design", *Tata McGraw Hill*
2. N. Krishna Raju (2008),"Prestressed Concrete", *Tata McGraw Hill.*
3. H. J. Shah (2008), "Reinforced Concrete I & II", *Charotar Publishing House Pvt. Ltd..*

Reference Books:

1. Lin T. Y. (2008), "Prestressed Concrete", *John Wiley*
2. IS 456 (2000), "Code of Practice for Plain and Reinforced Concrete ", *BIS Publication*

Term Work:

Term work should consists of the following

1. Minimum seven assignments covering the prescribed syllabus

Program: MBA Tech. Civil Engineering					Semester : VII
Course : Construction Equipment and Techniques					Code : MBCI07002
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	2	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To learn about different types of standard/special equipments used in the construction industry
- Determine owning and operating costs, evaluate maintenance and repair costs
- Study various equipments related to earthmoving , drilling and blasting, pile driving, pumping, stone crushing, air compressors, equipment for moving materials
- Understanding the complex processes involved in the construction of tunnels.

Outcomes:

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

- Determine the optimal use of the equipment, owning, operating and maintenance & repair costs of the equipments
- Select the appropriate equipment based on construction activity
- Describe the tunnelling process and machinery involved in detail.

Detailed Syllabus:

Unit	Description	Duration
1.	**Construction equipment:** Standard types of equipment, special equipment, cost of owning and operating equipment, depreciation costs, economic life, factors affecting selection of construction equipment, balancing of equipment. Study of equipments with reference to available types and their capacities, operations and factors affecting their performance	06
2.	**Earthmoving and hauling equipment:** Earthmoving and hauling equipment: tractors and attachments, dozers and rippers, scrapers, shovels, draglines, trenching machines, clamshell, hoes, trucks and wagons, dumpers, dozers, trenching machines, rollers and compactors. Builder's hoists, forklifts, cranes, belt-conveyors, cableways, ropeways	08

3.	**Drilling and blasting equipment, Pile driving equipment and Stone crushing equipment:** • Bits, jackhammers, drifters, drills, blasting material, firing charge, safety fuse, electric blasting caps, drilling patterns, transporting and handling of explosives • Types, pile driving hammers: single acting and double acting, differential acting hammers, hydraulic and diesel hammers, vibratory pile drivers • Jaw, gyratory and cone crushers, hammer mills, roll crushers, rod and ball crushers, aggregate screens and screening plants, portable plants	07
4.	**Tunnelling:** Selection of alignment, methods of tunnelling in soft soils and in hard rock, tunnel boring machines, mucking, ventilation of tunnels, dust control, types of tunnel supports and sequence of lining operation.	08
5.	**Soil stabilization techniques:** Soil stabilization techniques: sand drains, stone columns, use of geotextiles and chemicals, diaphragm wall, rock anchors, foundation grouting.	06
6.	**Concrete:** Mass concreting, vacuum concrete, forms for concrete construction: slip forms, collapsible forms, forms for cantilevers, concrete mixers	08
7.	**Different types of cladding:** Fixing and maintenance arrangements	02
	Total	**45**

Text Book:

1. Peurifoy, Schexnayder, and Shapira (2010), "Construction Planning, Equipment and Methods", *McGraw Hill.*
2. S C Sharma (2002), "Constrution Equipment and Its Management", *Khanna Publications*

Reference Books:

1. C. B. Navalkar (2005), "Textbook on Explosive Engineering - Blasting Technology & Explosive Applications, Basics, State of the Art & Instrumentation", *SEMCONS Consultants*
2. S Seetharaman, Umesh (2000), "Construction Engineering & Management", *S Chand, New Delhi*

Term Work:

Term work should consists of the following

1. Minimum eight assignments covering the prescribed syllabus

SVKM's NMIMS
Mukesh Patel School of Technology Management and Engineering

Program: MBA Tech. (Civil Engineering)				Semester : VIII	
Course : Quantity Surveying, Estimation and Valuation				Code : MBCI08001	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	2	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart knowledge of estimates of buildings and its components
- To study rate analysis for various items of civil works
- To acquire the knowledge of the tender documents and its preparation
- To inculcate the knowledge of valuation of any civil works or property

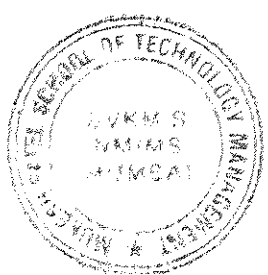
Outcomes:

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

- Give estimate for buildings and its components
- Work out rate analysis for various items of civil works
- Prepare tender documents and its preparation
- Valuate any civil works or property

Detailed Syllabus:

Unit	Description	Duration
1.	**Estimates:** Various types, their relative importance, factors to be considered, complete set of Estimate. Approximate estimates: importance, purpose, different methods. Use of CBRI Equations for the same. Methods of preparation of estimates for projects such as i) Building R.C.C., Load bearing ii) Road iii) Cross drainage work iv) Factory shed including steel truss	08
2.	**Methods of Building Estimate:** General Items of Works, Principle units of various items of work, General Items of works, Unit of measurement for different items of works and materials, different methods for estimating building works, Principle of estimating single and two roomed building, Estimate of an underground water tank, estimate of parapet wall applying three different methods of estimate .	08



3.	**Measurements for various items**: Use of relevant Indian Standard Specifications for the same, taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams **Material survey:** Approximate estimates of requirement of various materials for building works, percentage breakup of the cost, cost sensitive index, market survey of basic materials	08
4.	**Specifications:** types, requirements and importance, detailing of specifications for various items **Rate analysis:** purpose, importance and necessity of the same, factors affecting, task work.	08
5.	**Tender:** preparation of tender documents, importance of inviting tenders, contract types, relative merits, Prequalification. general and special conditions, termination of contracts, extra work and items, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance , insurance, claims, price variation, etc.	08
6.	**Valuation:** different terms used, the role of a valuer, purpose and necessity of the same. Capitalized Value, Years purchase ,sinking fund, depreciation, types of values, Purpose of valuation Different methods of valuation for i. open plots. ii. open plots with existing residential & commercial structures iii. lease hold properties Use of valuation tables and formulae	05
	Total	**45**

Text Book:

- M Chakraborty (2010), " Estimating, Costing, Specification and Valuation in Civil Engineering", *By Author - M. Chakraborty, Kolkata*

Reference Books:

- B. N. Dutta (1998), "Estimating, Costing, in Civil Engineering", *UBS Publishers' Distributors Pvt. Ltd.*
- B. S. Patil (2006), "Civil Engineering Contracts and Estimates", *Universities Press (India) Pvt. Limited*

Program: MBA Tech. (Civil Engineering)				Semester : VIII	
Course : Limit State Design of Reinforced Concrete Structures				Code : MBCI08002	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) as per Institute Norms (50 Marks)
3	0	2	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart knowledge of the basic design philosophies of reinforced concrete structures
- To get acquainted with the limit state method for designing RCC Structures
- To know the basic procedure for designing beams and slabs
- To understand the procedure for designing columns and footings

Outcomes:

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

- Describe basic design philosophies of reinforced concrete structures
- Design the beams of rectangular and flanged sections
- Design simply supported one way, two way and cantilever slabs
- Design columns and isolated column footings subjected to axial loads and moments

Detailed Syllabus:

Unit	Description	Duration
1.	**Ultimate Load Method:** Brief introduction to fundamentals of ultimate strength theory: curved stress distribution, compressive stress block, simplified rectangular stress block as per Whitney's approach, ultimate moment of resistance of singly reinforced section and doubly reinforced sections.	05
2.	**Limit State Method:** Introduction to limit state method of design as per IS 456 (latest edition): concepts of probability and reliability, characteristic loads, characteristic strength, partial safety factors for loads and materials, introduction to various limit states.	04
3.	**Limit State of Collapse - Flexure:** Limit state of collapse in flexure, shear and Limit state of serviceability in deflection and cracking , design of singly and doubly reinforced rectangular and T sections for flexure, design of members in shear and bond,	12

	design of beam subjected to bending and torsion. Requirements governing reinforcement detailing.	
4.	**Design of Slabs:** Design of simply supported one way, two way and cantilever slabs.	06
5.	**Limit State of Collapse - Compression:** Limit state of collapse compression for short and slender column. Members subjected to combined axial and uni-axial as well as biaxial bending. Development of interactive curves and their use in column design.	08
6.	**Design of Foundations:** Isolated square and rectangular footings subjected to axial load and moments.	10
	Total	**45**

Text Book:

1. Shah & Karve (2010), "Illustrated Reinforced Concrete Design", *Structure Publication, Pune*
2. IS456 (2000), "Code of Practice for Plain and Reinforced Concrete", *BIS Publication*

Reference Books:

1. Shah & Karve (2010), "Limit State Design - Reinforced Concrete", *Structure Publication, Pune*
2. Dayaratnam P (2008), "Limit State Design of Reinforced Concrete Structures", *Oxford & IBH*
3. Jain A K (2007), "Limit State design - Reinforced Concrete", *New Chand*
4. H.J. Shah (2008), "Reinforced Concrete Design", *Charotar Publisher*
5. Sinha & Roy (2013), "Fundamentals of Reinforced Concrete", *Charotar Publisher*

Term Work:

Term work should consists of the following

1. Minimum seven assignments covering the prescribed syllabus