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

Program: B. Tech. Integrated (All Branches)					Semester: I
Course: Communication Skills					Code: BTIAB01001
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorials Hours per week	Credit Hours per week	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norm (50 Marks)
2	0	2	3	Scaled to 70 marks	Scaled to 30 marks

Course Objectives:

- To equip students with basic concepts, theories and barriers of communication.
- To build learners confidence in interpersonal communication by reinforcing the basics of vocabulary building.
- To enhance the learners communication skills by giving adequate exposure in reading, writing, listening and speaking skills along with the related sub-skills.
- To strengthen their overall language and communication for better technical writing and presentations.

Course Outcomes:

After successful completion of the course student will be able to:

- Identify, interpret and formulate appropriate responses to various forms of communication.
- Apply spoken and written skills in the English language in different scenarios of interpersonal communication especially in the domain of technical and business communication.
- Demonstrate good comprehension, inference making, vocabulary building, paraphrasing and summarizing.
- Equipped for various professional challenges by effective practice of technical writing and presentations.
- Communicate better through various methods as per the need of the hour.

Detailed Syllabus:

Unit	Description	Duration
1.	**Understanding Communication**: 1.1 Need and nature of communication 1.2 Meaning, definitions and theories of communication 1.3 Elements and process of communication 1.4 Characteristics and objectives of communication 1.5 Methods of communication (oral, written, formal, informal, verbal, and non-verbal) 1.6 Networks of communication (horizontal, vertical, diagonal, and grapevine) 1.7 Barriers to communication	12

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2.	**Vocabulary Building:** 2.1 Word formation processes (prefix, suffix, acronyms) 2.2 Pairs of confused words 2.3 Antonyms and synonyms 2.4 One word substitutes 2.5 Proverbs	03
3.	**Techniques to Improve Communication**: 3.1 Reading & comprehension skills (strategies for rapid reading, skimming, scanning, paraphrasing, inferring meanings from contexts) 3.2 Writing skills (7Cs of effective writing, development of paragraph, summary and precise writing, effective sentences 3.3 Listening skills (definition, process, benefits, types, poor listening habits, barriers, effective listening) 3.4 Speaking skills (extempore and prepared speaking, basics of making an effective business presentation)	08
4.	**Letter Writing:** 4.1 Importance of formal written communication 4.2 Layouts (complete block, modified block, semi block) 4.3 Types (request, enquiry, order, complaint, claims & adjustment, and replies to all these)	05
5.	**Technical Writing**: 5.1 What is technical writing? 5.2 Framing definitions 5.3 Technical description of an object 5.4 Technical description of a process	02
	Total	**30**

Text Books:

1. Dr. Meenakshi Raman and Dr. Sangceta Sharma (2012), 'Communication Skills', *Oxford University Press, Third Edition.*

Reference Books:

1. Bovee Thill Schatzman (2012), 'Business Communication Today', *Pearson edu, Seventh Edition.*
2. Dr. R.V. Lesikar and Dr. M. F. Flatley (2005), 'Basic Business Communication', *Tata McGraw Hill, Tenth Edition.*

Term Work:

1. Three assignments on Theory of Communication
2. Two assignments on Vocabulary Building
3. Two practical sessions on speech
4. Two practical sessions on presentations
5. One practical session on writing
6. One practical session reading comprehension

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Program: B. Tech. Integrated (All Branches)					Semester: I
Course: Mathematics-I					Code: BTIAB01002
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 familiarise students with the concept of functions, limits and continuity.
- To provide an understanding of Trigonometric and Inverse Trigonometric functions.
- To introduce calculus and impart knowledge of basic techniques in differential and integral calculus.

Outcomes:

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

- Identify the type of function and also compute derivatives of functions.
- Apply basic facts, concepts and principles of trigonometry to solve physical problems.
- Define limit, test for existence of limit and examine continuity of a function.
- Apply the knowledge of first and second order derivatives to analyse the function.
- Explore types and algebra of matrices.

Detailed Syllabus:

Unit	Description	Duration
1.	**Sets and Functions** Definition of set and function , types of functions	04
2.	**Trigonometry** Relation between degree and radian, Trignometric ratios of compound, allied and multiple angles, factorisation and defactorisation, Inverse trigonometric functions, properties of triangle: sine, cosine, projection and tangent rules.	10
3.	**Limits and continuity** Limits, Method of factorization, rationalisation , Infinity type , Limits based on formula, continuity .	07
4.	**Derivatives and its applications** Derivatives for exponential, logarithmic, implicit, inverse, parametric, composite functions, increasing decreasing functions, maxima and minima, concavity and points of inflection.	13
5.	**Matrices and determinants** Definition, Algebra of matrices, types of matrices, determinant, properties of determinant, minors and cofactors, adjoint and	11

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	inverse of a square matrix., concept of elementary row and column operations, inverse by row operations.	
	Total	**45**

Note: All theorems without proof.

Text Books:

1. Howard Anto (2011), "Calculus, A new Horizon", *X^th edition, John Wiley & Sons.*

Reference Books:

1. B. S. Grewal (2010), Engineering Mathematics, *Khanna Publishers, 13th Edition.*
2. S. P. Deshpande (2010), Mathematics for polytechnic students, *Pune Vidyarthi Griha Prakashan.*

Term Work:

1. Minimum ten tutorials to be taken.
2. At least one assignment to be taken.

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Program: B. Tech. Integrated (All Branches)				Semester: I	
Course: Physics-I				Code: BTIAB01003	
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 Norm (50 Marks)
2	2	0	3	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To enable the students to understand the basic principles of Physics.
- 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 the successful completion of this course, the student will be able to

- Analyse dimensions of physical quantities and identify errors in measurements.
- Examine the forces acting on the bodies in the equilibrium state.
- Evaluate a physical problem to determine the relevant parameters and approximation schemes to be used within the framework of the fundamental laws of nature.
- Demonstrate use of appropriate mathematical techniques and concepts to obtain quantitative solutions to problems in physics.
- Discuss the basic wave theory and the resonance phenomenon.

Unit	Description	Duration
1.	**Physical World and Measurement:** Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures. Dimensions of physical quantities, dimensional analysis and its applications.	04
2.	**Laws of motion:** Intuitive concept of force. Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces. Static and kinetic friction, laws of friction, rolling friction, lubrication. Dynamics of uniform circular motion: Centripetal	06

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	force, examples of circular motion (vehicle on level circular road, vehicle on banked road).	
3.	**Properties of matter:** Elasticity, Stress, Strain, Elastic coefficient, Hook's Law, Stress strain curve, **Modes of transformation of heat**: Conduction, law of thermal conductivity, coefficient of thermal conductivity, good conductors of heat & insulators with suitable examples, applications of conduction. Convection, applications of convection. Radiation, applications of radiation. **Gas laws:** Gas Laws: Boyle's law, Charles law, Gay lussac's law (Statement and mathematical equation only) Perfect gas equation (PV=RT) (No derivation), specific heat of a substance, SI unit, specific heat of gas at constant volume (CV) specific heat of gas at constant pressure (CP), ratio of specific heat, Mayer's relation between CP and CV, isothermal process, adiabatic process, difference between isothermal process and adiabatic process.	07
4.	**Properties of Liquids:** **Fluid friction:** Pressure, pressure-depth relation ($P = \rho h g$), atmospheric pressure, Pascal's law, Archimedes's principle. Viscous force, definition of viscosity, velocity gradient, Newton's law of viscosity, coefficient of viscosity and its SI unit. Streamline and turbulent flow with examples, critical velocity, Reynold's number and its significance. Up thrust force, terminal velocity, Stokes law, and derivation of coefficient of viscosity by Stoke's method, effect of temperature and adulteration on viscosity of liquid. **Surface tension:** Cohesive and adhesive force, Laplace's molecular theory of surface tension, Surface Tension: definition and unit, effect of temperature on surface tension. Angle of contact, Capillarity and examples of capillary action, derivation of expression for surface tension by capillary rise method, applications of surface tension.	07
5.	**Wave Motion:** Definition of a wave, wave motion, wave velocity, wave period, wave frequency, wave length, vibratory motion, periodic motion, amplitude of a vibrating particle, derivation of $v = n \lambda$. Simple harmonic motion (SHM), examples of SHM, equation of SHM, expression of velocity and acceleration of a body executing SHM. Types of progressive waves: transverse and longitudinal waves with Examples. Stationary wave, formation of stationary wave,	06

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	examples of stationary wave, characteristics of stationary waves, free and forced vibrations with examples. **Resonance:** definition of resonance, examples of resonance, formula to calculate velocity of sound by resonance tube method.	
	Total	**30**

Text Books:

1. R. K. Gaur and S. C. Gupta (2008), Engineering Physics, *Dhanpat Rai & Co., New Delhi.*
2. Paul G. Hewitt (2009), Conceptual Physics, *Pearson education.*

Reference Books:

1. David Halliday, Robert Resnick, Jearl Walker (2009), Fundamentals of Physics, *Asian Books Pvt. Ltd., New Delhi, 14th edition.*
2. Verma, H. C. (2010), Concepts in Physics, *Bharti Bhawan Ltd., New Delhi, 3rd edition.*

Term work:

Term work should consist of following

1. Report of minimum seven experiment
2. Report of minimum two assignment covering the prescribed syllabus

List of Experiments:

1. To find the thickness of wire using a screw gauge.
2. To find volume of solid cylinder and hollow cylinder using a Vernier caliper.
3. To find the surface tension of a liquid by capillary rise method.
4. Determination of coefficient of viscosity using Stokes' method,
5. Using a simple pendulum, plot L-T and L-T^2 graphs. Hence find the effective length of seconds
   pendulum using appropriate graph
6. Calculate velocity of sound by resonance tube method.
7. Experiment based on gas laws.
8. Determination of Coefficient of restitution for rubber and sponge.
9. Determine the relationship between the length of a stretched string and the frequencies at which resonance occurs at a constant tension.
10. Determination of Coefficient of Viscosity of water by Poiseuille's method.
11. Determination of velocity of sound in air using Kundt's tube.

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Program: B. Tech. Integrated (All Branches)				Semester: I	
Course: Chemistry-I				Code: BTIAB01004	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorials Hours per week	Credit	Theory (3hrs, 70 Marks)	Internal Continuous Assessment As per Institute Norms (50 Marks)
2	2	0	3	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To introduce basic principles of chemistry- atom structure, acid-base theories, electrochemistry.
- To familiarize with the concepts and applications of water technologies, engineering materials like metals, alloys and understand corrosion.

Outcomes:

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

- Develop interest in the fundamental structure of matter, which governs the properties of matter.
- Interpret the acid-base theories for solving various chemical reactions.
- Apply principles of electrochemistry in various real time problems.
- Understand water technologies applied in industries.
- Examine the nature of engineering materials like metals and alloys along with their composition.
- Describe concepts of corrosion theories and various methods to control corrosion.

Detailed Syllabus:

Unit	Description	Duration
1.	**Atom Structure:** Dalton's Atomic Theory, Rutherford's Scattering Experiment, Bohr's Theory of an atom, Orbits and orbitals, shapes of s, p, d orbitals, Pauli's exclusion principle, Hund's rule, Aufbau principle, Electronic configuration of first twenty elements, Definition and types of valency - electrovalency, covalency, co-ordinate valency.	07
2.	**Water:** Sources of water, Impurities in water, hardness of water, causes of hardness, Numerical problems based on hardness calculations, Estimation of hardness of water by EDTA method, Numerical problems based on EDTA method. Disadvantages of hard water – for domestic and industrial purposes, Steam.	06

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	generation in Boilers – Boiler Corrosion, Scales & Sludges, Caustic Embrittlement, Priming & Foaming.	
3.	**Electrochemistry:** Nernst theory, Mechanism of electrolysis, degree of ionization. Faraday's Laws of Electrolysis-Statements and numerical problems. Electroplating-Theory and applications.	04
4.	**Metals and Alloys:** Types of metals, properties of metals-Hardness, Ductility, Malleability, Tensile Strength, Machinability, Weldability, Soldering. Alloys: Introduction, Alloys of Al, Cu (brass, bronze) (Composition, properties and uses)	04
5.	**Corrosion:** Introduction, Dry or Chemical corrosion, Wet or Electro chemical corrosion. Types of corrosion: concentration cell corrosion, galvanic corrosion, differential aeration, waterline, stress corrosion. Factors influencing rate of corrosion. Corrosion control: i. Cathodic protection techniques. ii. Protective coatings: Metallic coatings (galvanizing, tinning, sherardizing).	05
6.	**Acids and Bases:** Theories of Acids and bases-Arrhenius theory, Bronsted-Lowry concept, Lewis theory, advantages of Lewis concept, Concept of pH, pH scale, buffers. Numerical problems based on hydrogen ion and hydroxyl ion concentration.	04
Total		**30**

Text Books:

1. Jain. P. C& Jain. M, Engineering Chemistry (2012), *Dhanpat Rai Publishing Co. New Delhi, 15th Edition.*
2. Rao. A. A (2007), Polytechnic Chemistry (Theory and Practical), *New Age International.*
3. Shete. S. D (2011), Applied Chemistry, *S. Chand & Co.*

Reference Books:

1. Ball. R.G (2009), Chemistry-Principles and Practice, *Cengage Learning Inc, 3rd edition.*
2. Weiner. S. A, Harrison. B (2010), Introduction to Chemical Principles-A Laboratory Approach, *7th edition, Cengage Learning.*

Term work consists of the following:

1. Two class tests.
2. Minimum eight lab experiments.

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Practical Experiments:

Sr. No.	List of Experiments
1.	Use of Analytical Balance and titrimetric glassware.
2.	Titration between Strong Acid and Strong Base using Phenolphthalein as indicator.
3.	Titration between $KMnO_4$ and Mohr's Salt [$FeSO_4.(NH_4)_2SO_4.6H_2O$]
4.	To determine total hardness of water sample.
5.	To determine chloride content in a given water sample.
6.	Determination of pH of different solutions.
7.	Drawing of electronic configuration of elements from Z = 1 to Z = 20. Drawing of Molecular structures of electrovalent and covalent compounds and + ve and ±ve ions.
8.	Preparation of various buffer solutions.
9.	To study corrosion of a given metal work piece.
10.	To determine Fe/Ni in steel sample.
11.	To determine iodine content in given table salt sample.
12.	To determine Zinc in brass sample.

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Program: B. Tech. Integrated (All Branches)				Semester: I	
Course: Basics of Computer System				Code: BTIAB01005	
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 create Awareness of information systems along with computer hardware, software and basic networking concepts.
- To familiarize with computer programming fundamentals.
- To create awareness of World Wide Web.

Outcomes:

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

- Differentiate among types of hardwares and softwares.
- Apply various data representations formats as per number system.
- Explain basic concepts of computer networks, operating systems, information systems and Internet.
- Design flowchart, algorithm and pseudo code for a given problem to be solved.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Computer:** Introduction, Digital and Analog computers, Characteristics of Computer, History of computer, Generation and classification of computers, The computer system, Applications of computer	02
2.	**Computer System Hardware:** Introduction, CPU, Memory Unit, Interconnection the units of computer, Inside a computer cabinet, Memory representation, Memory Hierarchy, CPU registers, Cache memory, Primary memory, Secondary Memory, Magnetic Tapes, Magnetic Disks, Optical Disks, Magnet0-Optical Disk, Input Output Unit, Input Devices and Output Devices.	04
3.	**Data Representation:** Introduction, Number System, Conversion from decimal to binary, octal, hexadecimal, Conversion of binary, octal, hexadecimal to decimal, Conversion of binary to octal, hexadecimal, Conversion of octal, hexadecimal to Binary.	04
4.	**Computer Network and Internet:** Introduction, Network Types – LAN, MAN, WAN, Network topologies, Network Devices, Wireless Networking, History of Internet, Connecting to Internet,	04

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	Internet Connections, Internet Address, Internet Services, Use of Internet	
5.	**Interaction of User and Computer:** Introduction, Types of Software, System Software, Application Software, Software Acquisition	03
6.	**Operating System:** Objectives of operating system, Types of Operating Systems, Functions of OS, Examples of Operating Systems – MS-DOS, Windows family of OS, Linux OS. Windows XP – Introduction, Features, Desktop, Structure, Explorer.	05
7.	**Information Systems:** Data, Information Knowledge, Characteristics of Information, Information Systems, Computer based information systems, Need for efficient IS, Categories of IS – Operations support systems, Management support systems, specialized information systems (ERP). Basics of database.	04
8.	**Computer Programming Fundamentals:** Introduction, Program Development Life Cycle, Algorithm, Control Structures, Flow chart and Pseudo code.	04
	Total	**30**

Text Books:

1. Anita Goel (2010), Computer Fundamentals, *Pearson Publication, First Edition.*

Reference Books:

1. V. Rajaraman (2010), Fundamentals of Computers, *PHI, Fifth Edition.*

Term Work:

1. Minimum ten lab experiments and Minimum 2 Assignments.

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Program: B. Tech. Integrated (All Branches)				Semester: I	
Course: Engineering Drawing-I				Code: BTIAB01006	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorials Hours per week	Credit	Practical (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institution Norms (50 Marks)
2	2	0	3	Scaled to 70 marks	Scaled to 30 marks

*** Practical Examination conducted by school level.**

Objectives:

- To describe scientific facts, principals and technique of drawing in order to visualize and express the ideas.
- To know different curves used in engineering
- To acquire the concepts of projections of an object

Outcomes:

After successful completion of this course students will be able to

- Visualize the role on shop floor, design department and inspection department.
- Draw the different curves used in engineering.
- Draw the projections of points and lines.
- Draw the projections of solids and Orthographic Projection.

Detailed Syllabus

Unit	Description	Duration
1.	**Introduction:** Importance of Engineering Drawing for the study of technical course, Types of lines and dimensioning. **Curves:** Conics-Parabola, Ellipse (Arc's of circle, rectangle and concentric circle method), Hyperbola and Parabola(Eccentricity, rectangular method). Involute of circle and polygon. **Cycloidal Curves:** Cycloid, Epicycloid, Hypocycloid.	08
2.	**Projection of Lines:** Projections of lines inclined to both the reference planes (No traces and both ends of lines in one quadrant only). **Projection of Planes:** Inclined to both the Reference Planes for regular polygons and circles.	08
3.	**Projection of Solids:** Projection of solid likes Prisms, Pyramids, Cylinders, Cones inclined to both the reference Planes. **Section of solids:** Sections of Prism, Pyramid, cylinder and cone.	08

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4.	**Orthographic projections:** Projections of various objects having flat and curved surfaces using 1st angle projection method only.	06
	Total	**30**

Text Books:

1. M. B. Shah and B. C. Rana (2010), "Engineering Drawing", *Pearson Education.*

Reference Books:

1. N. D. Bhat (2013), "Elementary Engineering Drawing", *Charotar Publishing House.*
2. K. Venugopal (2007), "Engineering Drawing and Graphics", *New Age International Publishers.*
3. Giesecke, Mitchell, Spencer and Hill (2008), "Technical Drawing", *Macmillan Publishing Co. Inc. New York.*

Term Work:

1. A2 size drawing sheets having 02- 03 problems on each unit (Minimum five).

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Program: B. Tech. Integrated (All Branches)				Semester: I	
Course: Workshop Practice-I				Code: BTIAB01007	
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	2	0	1	–	Scaled to 50 marks

Objectives:

- To impart hand on safety precaution of different workshop practices on various trades.
- To impart knowledge of basic tools used for different workshop jobs.
- To familiarize students with assembling and troubleshooting of PC.

Outcomes :

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

- Differentiate various tools used in workshop for fitting, welding and carpentry.
- Follow the appropriate safety methods for handling of tools in workshop.
- Assemble all components to build the Personal Computer functional.
- Troubleshoot problems of computer system.
- Maintain Personal Computer system.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction** to various workshop trades, layout. General instructions for safety in various Workshop Trades. Common accidents- causes and preventive measures. First Aid.	02
2.	**Safety Measures for Workshop Trades:** **Fitting Shop**: Introduction to fitting shop tools, common materials used in fitting shop. Description and demonstration of various types of safety precaution while work on benches, holding devices, files and hack-sawing. **Welding Shops:** Introduction to welding and its importance in engineering practice; Welding screens and other welding related equipment, accessories and gloves. Safety precautions during welding. Hazards of welding and its remedies. Precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc. Earthling of welding machine. **Carpentry Shop**: Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed. Marking, sawing, planning and chiseling & their practice.	04

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3.	**Safety Measures for Electric Devices :** Study of electrical safety measures and demonstration about use of protective devices such as fuses, MCBs, ELCBs and relays including earthing.	02
4.	**Assembling and Configuring PC :** Introduction, Components of PC, Caution and safety, Setting up the cabinet, Installing power supply unit, Installing CPU, Installing heat sink and cooling fan, Installing memory module, Mounting motherboard, Installing hard disk, Installing optical drive, Connecting motherboard power supply cables, Connecting to front panel, Connecting mouse, keyboard and monitor, Switching on the computer, Configuring BIOS, Installing operating system, Installing device drivers, Installing ad-on cards.	04
6.	**Troubleshooting and Maintenance:** Safety precautions, Configuring using BIOS parameters, Power on self test, Devices and drivers, Working with windows registry, Performance improving steps, Overclocking the system, Diagnosing general problems, Computer system: common problems and solutions, Preventive maintenance, Replacing CMOS battery, Clearing BIOS password, Flashing BIOS	03
	Total	**15**

Text Books:

1. K. C. John (2010), "Mechanical Workshop Practice", Edition-2, *PHI Learning Pvt. Ltd.*
2. K. L. Jame (2013), "Computer Hardware": Installation, Interfacing, Troubleshooting and Maintenance, *PHI Publication.*

Reference Books:

1. Hajra Choudhary S. K., Bose S. K., Hajra Choudhary A. K., Roy Nirjhar (2013), "Elements of Workshop Technology-I", *Media promoters and Publications.*
2. Anita Goel (2010), "Computer Fundamentals", *Pearson Publication First Edition.*

Term Work:

1. Demonstration and study on safety measures on various workshop trades like fitting, welding and carpentry shop.
2. Demonstration and study on Assembling of components of PC with proper configuration.
3. Report on industry / Safety Training Institute visit conducted in relevance with syllabus.

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Program: B. Tech. Integrated (All Branches)					Semester: II
Course: Mathematics-II					Code: BTIAB02001
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 provide an understanding and use of vectors and integration.
- To develop knowledge of co-ordinate geometry, probability and statistics.

Outcomes:

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

- Define vectors.
- Identify methods of solving an integral.
- Compute probability of an event, mean and variance of a random variable.
- Apply integration to find area under the curve.
- Recognize and write equation of a line and plane.
- Solve problems on permutation and combination.

Detailed Syllabus:

Unit	Description	Duration
1.	**Co-ordinate Geometry** Straight line: Slope and intercept of line, Equations of straight lines, Angle between two straight lines, Perpendicular distance between a point and a straight line, Perpendicular distance between two straight lines. Conic sections: Circle, Parabola, Ellipse and Hyperbola.	10
2.	**Vector Algebra** Definition, scalar product, vector product, algebra of vectors. Application of vectors: work done and moment of force. Equations of lines and planes in three dimension, distance of a point from a plane and line in space, angle between the planes.	08
3.	**Permutation and combination** Fundamental principle of counting, Factorial n, Permutations and combinations formulae, simple applications.	04
4.	**Statistics** Mean, variance, standard deviation of grouped/ungrouped data. Random experiments, events and probability of events, addition theorem on probability, conditional probability, multiplication theorem on probability, Baye's theorem.	15

	Random variable and its probability distribution, probability mass function, mean and variance of a discrete random variable.	
5.	Integration Basic formulae, Integration using LIATE rule, partial fraction method, trigonometric functions, substitution method. Definite Integrals, Properties of definite integrals. Application of definite integration- Area under the curve.	08
	Total	**45**

Note: All theorems without proof.

Text Books:

1. Howard Anton (2011), "Calculus, A new Horizon", *10th edition, John Wiley & Sons.*

Reference Books:

1. B. S. Grewal (2010), Engineering Mathematics, Khanna Publishers, *13th Edition.*

Term Work:

1. Minimum ten tutorials and at-least one assignment to be taken.

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Program: B. Tech. Integrated (All Branches)				Semester: II	
Course: Physics-II				Code: BTIAB02002	
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 Norm (50 Marks)
2	2	0	3	Scaled to 70 marks	Scaled to 30 marks

Objectives

- To enable the students to understand the basic principles of Physics
- 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

- Discuss the concepts of motion of charge in electric and magnetic field, demonstrate its applications and manipulate the displacement of electron.
- Differentiate the magnetic material based on susceptibility and know the uses.
- Classify the solids according to energy bands, explain the theory of pn junction and calculate the conductivity and carrier concentration for semiconductors.
- Explain the mechanism of Laser Beam generation, working principle of optical fibre their applications and calculate different parameters.
- Discuss different cubic lattices, their parameters and defects observed in the crystals.

Unit	Description	Duration
1.	**ELECTRICITY AND MAGNETISM** Coulomb's Law, Ampere's Law, Biot – Savart's Law, Faraday's Law 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.	07
2.	**MAGNETIC MATERIALS AND DIELECTRICS** Dielectric material, dielectric constant, polarization, polarizability & its types; relative permittivity; Piezoelectrics, Ferroelectrics, Applications of dielectric materials - Requirement of good insulating material, some important insulating material. Origin of magnetization using Atomic Theory; classification of magnetic materials based on Susceptibility value; Microstructure of ferromagnetic solids- Domains and Hysteresis loss; Soft & hard magnetic materials and their uses; Magnetic circuits and microscopic Ohm's Law.	06
3.	**SEMICONDUCTOR PHYSICS** Energy band diagram of good conductors, insulators and semiconductors, Concept of Fermi level, Intrinsic semiconductors, Concept of holes, Doping, Extrinsic semiconductors : P type and N	06

	type semiconductors, Formation of PN junction, Hall Effect and Applications	
4.	**LASER AND FIBER OPTICS** Lasers, spontaneous and stimulated emission, population inversion, pumping and active system. The Ruby laser. Gas laser. Semiconductor laser. CO2 laser, design of CO2 laser, mechanism of CO2 laser. Uses of lasers. Fibre optics, principles of fibre, structure and classification of optical fibres, The numerical aperture, fibre optics communication system, Advantages of optical fibre communication, applications and use.	06
5.	**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).	05
	Total	30

Text Books:

1. Dattu R Joshi (2010), "Engineering Physics", *Tata McGraw Hill 1st Edition.*

Reference Books:

1. Arther Beiser (2009), "Concept of Modern Physics", *Tata McGraw Hill, 6th edition.*
2. Halliday and Resnick (2008), Fundamentals of Physics- *Wiley India, 8th edition.*

Term work:

1. Minimum Ten experiments.
2. Minimum two assignment covering the prescribed syllabus.

Experiments:

1. Determination of angle of deviation of He- Ne laser.
2. To measure the numerical aperture of the optical fibre by using 660nm wavelength LED.
3. Study of Crystal Structure.
4. To determine the energy gap of a semiconductor
5. Determination of dielectric constant.
6. Hall effect in semiconductor
7. Determination of e/m
8. Determination of Magnetic susceptibility
9. Faraday Effect
10. Biot – Savart's Law
11. Study of Hysteresis in Magnetic materials.
12. Determination of numerical aperture of fibre optic cable.

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

Program: B. Tech. Integrated (All Branches)				Semester: II	
Course: Chemistry-II				Code: BTIAB02003	
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 (As per Institute Norms) (50 Marks)
2	2	0	3	Scaled to 70 marks	Scaled to 30 marks

Objectives

- To familiarize with the treatment of water for human consumption & industrial applications.
- To learn ore extraction process and understand the importance of alloying and use the knowledge of properties of steel for industrial applications.
- To comprehend the importance of heat capacity and heats of reactions.
- To understand the importance of pollution free environment.
- To get acquainted with the different gas laws.

Outcomes

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

- Understand the various water treatment methods applied in industries.
- Explain the manufacture of cement, concrete and their applications in civil industries.
- Apply the principles of chemical energetics to determine the heat of a reaction.
- Discuss the different effects of environmental pollution.
- Derive relationships between pressure, volume, temperature and number of moles of a gas.

Detailed Syllabus:

Unit	Description	Duration
1.	**Water Technology** **Softening Methods:** Different methods of water hardness removal (lime-soda method, zeolite method, ion-exchange method) and their numerical problems. **Drinking water purification:** Removal of microorganisms- Bleaching powder treatment, UV treatment, chlorination, Ozonization, Desalination by Reverse Osmosis, Ultrafiltration.	05
2.	**Industrial Chemistry** **Cement:** Manufacture of Portland Cement, Chemical Composition and Constitution of Portland Cement, Setting and Hardening of Portland Cement. **Refractories:** Preparation, properties and uses of Silica bricks, Dolomite bricks, Silicon Carbide (SiC).	04

3.	**Chemical Energetics** System and surroundings, reversible and irreversible processes, exothermic and endothermic reactions, Internal energy, first law of thermodynamics, enthalphy, heat of the reaction, Hess's law and numerical problems based on heat of the reaction, heat capacity, relation between Cp and Cv.	06
4.	**Mole Concept** Avogadro's number, molecular and equivalent weight, molar mass, Numerical Problems based on the mole concept, concentration and its units, dilution of solutions and numerical based on it, determining the weight of substance present from the given volume and concentration of the solution containing the substance.	06
5.	**Environmental Chemistry:** Air pollution – Greenhouse effect, acid rain and depletion of ozone layer, smog, photochemical smog – control of air pollution. Water pollution – pollutants from dyeing industries and Tanneries, BOD and COD– waste water treatment (primary and secondary treatment-activated sludge method).	04
6.	**Gases** Ideal and real gases, Gas pressure units, and numericals based on it, Gas laws-Boyle's Charles and Avogadro's law-numericals based on it, Ideal gas equation, determining density and molecular weight of a gas, volume of gases in chemical reactions, Dalton's law of partial pressures and numericals based on it.	05
	Total	**30**

Text Books:

1. Krishnamurthy N, *et al*, Engineering Chemistry (2007), *Prentice Hall of India Pvt.Ltd, New Delhi.*
2. Palanna O.G, Engineering Chemistry (2010), *Tata McGraw Hill Education Pvt. Ltd.*

Reference Books:

1. De. A.K, Environmental Chemistry (2005), *John Wiley & Sons. Inc.*
2. Barrow.G (2007), Physical Chemistry, *Tata McGraw Hill.*

Term work consists of the following:

1. Minimum eight lab experiments based on the units mentioned in the detail syllabus above.

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

Program: B. Tech. Integrated (All Branches)				Semester: II	
Course: Workshop Practice-II				Code: BTIAB02004	
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	2	0	1	--	Scaled to 50 marks

Objectives:

- To impart hand on plumbing operation by handling various plumbing tools.
- To impart knowledge of basic tools used for plumbing 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

- Differentiate various tools used in workshop for plumbing operation in G.I. and PVC pipe.
- Perform plumbing operation in G.I. and PVC.
- Carry out electrical wiring.
- Prepare PCB layout.

Detailed Syllabus:

Unit	Description	Duration
1.	Descriptions and drawing of various plumbing shop tools such as Pipe Dies, Wrenches, Threading dies and Pipe Vices. Safety precautions while handling plumbing tools. Demonstration and practice of Pipe Fittings such as Sockets, Elbow, Tee, Reducer, Nipple, Union coupling, plug, Bend, Float valves and Taps	04
2.	List different sizes of Galvanized Iron (G.I.) and flexible pipe used for fitting. List different adhesive solvent used for fitting. Introduction to various types of threads (internal and external)- single start, multi-start, left hand and right hand threads. Observe the operation threading to G.I. pipe with jointing & jointing of PVC pipe. Practice for actual pipe line by using PVC pipe and accessories without using adhesive. Practice for actual G.I. pipe with socket, plug, and elbow, with operation of cutting, threading and fitting.	10

3.	**PCB Laboratory Exercises:** Layout drawing, positive and negative film making, PCB etching and drilling, tinning and soldering techniques	08
4.	**Wiring:** Study of cables used in Electrical & Electronic transmissions. Study of Electrical Fittings - Switches, Plugs, Holders, Connectors, Earthing. Electrical Wiring for lighting and appliances Series & Parallel Connections.	08
	Total	30

Term Work:

1. Making internal and external threads on a job by tapping and dieing operations (manually)
2. Preparation of job involving thread on GI pipe/ PVC pipe and fixing of different types of elbow, tee, union, socket, stopcock, taps etc.
3. Prepare printed circuit board for small circuits.
4. Classify and summarize different types of cables, connectors and switches.
5. Wiring practice of different types of household wiring.

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

Program:	B. Tech. Integrated (All Branches)	**Semester:**	II
Course:	Computer Programming-I	**Code:**	BTIAB02005

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 70 marks	Scaled to 30 marks

Pre-requisite: Knowledge of Basic Computer Systems

Objectives:

- The course will enable the students to understand the basic concepts of procedural and object oriented programming.

Outcomes:

After Successful completion of this course, students will be able to

- Illustrate flowchart and algorithm for a given problem.
- Develop and Execute C programs using basic programming constructs.
- Implement C programs using various data types and functions.
- Solve problems using Pointers.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Algorithm & Flowchart**	02
2.	**C Programming Language:** Brief History of 'C', Program Development Life Cycle, Compiling and Executing a C Program	01
3.	**The Components of a C Program:** Program's Components, Variables, Numeric Data Types, Constants, Statements, Expressions and Operators.	03
4.	**Basic Program Control:** Arrays, Controlling Program Execution: For, While, Do While, Nested Loops	04
5.	**Fundamentals of I/O:** Formatted Input and Formatted Output	02
6.	**Arrays:** One Dimensional Array, Declaration and Initialization, Multi dimensional Array, Dynamic Arrays	03
7.	**Functions: The Basic Control:** Function Defined, how a Function works, Functions & Structured Programming, Writing a Function, Passing Arguments to a Function, Calling Functions, Recursion	04

8.	**Understanding Pointers:** What is a Pointer?, Pointers and Simple Variables, Pointers and arrays, Passing Arrays to Functions, Passing Pointers to Functions	03
9.	**Characters & Strings:** Using character Variables, Using Strings, Strings and Pointers, String without Arrays, Displaying and Reading Strings	02
10.	**Structures:** Simple Structures, Complex Structures : containing arrays, structures, Arrays of Structures, Structures & Pointers, Unions	04
11.	**File handling Concepts:** defining and opening a file, closing a file, I/O operating on files	02
	Total	30

Text Book:

1. E. Balaguruswamy (2011), "Programming in ANSI C", *Tata McGraw Hill Education.*

Reference Books:

1. Ashok N. Kamthane (2011), "Programming in C", *Pearson Education, 2nd Edition.*

Term Work:

1. At least fifteen programs based each unit and minimum two assignments.

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

Program: B. Tech. Integrated (All Branches)	Semester: II
Course: Engineering Drawing–II	Code: BTIAB02006

Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorials Hours per week	Credit	Practical (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institution Norms (50 Marks)
2	2	0	3	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To get acquainted with the use of drafting software in engineering drawing.
- To acquire the concepts of Sectional orthographic projections.
- To know the concepts of isometric and Section of solid projections.

Outcomes:

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

- Generate drawings with the help of computer software.
- Draft the orthographic projections of a machine element.
- Generate drawings on the isometric and section of solid projections of machine elements.

Detailed Syllabus

Unit	Description	Duration
1.	Sectional views of Orthographic Projections: Conversion of pictorial view with sectional orthographic projection (Full Section Only)	08
2.	Isometric Projections: Isometric view and projection of linear and curvilinear features.	08
3.	Section of solid: prism, pyramid, cone and cylinder. With its true shape of section. Development of Solid.	08
4.	Introduction to Machine Parts: Types of nuts, bolts, screws, studs and riveted joints	06
	Total	30

Text Books:

1. N. D. Bhatt (2013), "Elementary Engineering Drawing", *Charotar Publishing House.*
2. M. B. Shah and B. C. Rana (2010), "Engineering Drawing", *Pearson Education.*

Reference Books:

1. K. Venugopal (2007), "Engineering Drawing and Graphics", *New Age International Publishers.*

2. Giesecke, Mitchell, Spencer and Hill (2008), "Technical Drawing", *Macmillan Publishing Co. Inc. New York.*

Term Work:

1. A2 size drawing sheet and Class assignments having 2-3 problems on each unit.

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

Program: B. Tech. Integrated (All Branches)				Semester: II	
Course: Fundamentals of Engineering Mechanics				Code: BTIAB02007	
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)
2	2	0	3	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To develop thorough understanding of centroids of area
- To get acquainted with the various systems of forces
- To understand the concept of friction
- To get acquainted with velocity and acceleration of moving particles
- To inculcate the ability to conduct experiments for better understanding of various principles of mechanics

Outcomes:

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

- Determine centroid of irregular shape areas
- Determine the resultant / equilibrant of various coplanar force systems.
- Analyse the system of forces in equilibrium with and without friction.
- Determine velocity and acceleration of moving particles at any instance
- Conduct experiments for better understanding of various principles.

Detailed Syllabus:

Unit	Description	Duration
1.	**Centroid of plane areas and wires:** Application to simple geometrical shapes and wires bent into circular arcs.	06
2.	**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.	06
3.	**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.	06
4.	**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 blocks, wedges and ladder.	06

5.	**Kinematics of Particle: Velocity** and acceleration in terms of rectangular coordinate system, rectilinear motion, acceleration - time, velocity- time graphs and their uses, relative velocity, projectile motion.	06
	Total	30

Text Book:

1. N. H N. H. Dubey (2014), "Engineering Mechanics", *Tata McGraw Hill*
2. R. C. Hibbler (2004), "Engineering Mechanics", *McMillan Publishers*

Reference Books:

1. F F. L. Singer (1954), "Engineering Mechanics", *Harper & Raw Publication*
2. Beer & Johnson (2011), "Engineering Mechanics", *Tata McGraw Hill*
3. D. S. Kumar (2009), "Engineering Mechanics", *Tata McGraw Hill*
4. Macklin & Nelson (2012), "Engineering Mechanics", *Tata McGraw Hill*
5. A. K. Tayal (2008), "Engineering Mechanics", *Umesh Publication*
6. E. W. Nelson, Charles L. Best, W.G. Mclean, Merle Potter (2010), "Schaum's outlines on Engineering Mechanics -Statics", *Tata McGraw Hill*
7. E. W. Nelson, Charles L. Best, W.G. Mclean, Merle Potter (2010), "Schaum's outlines on Engineering Mechanics -Dynamics", *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. 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:	B. Tech. Integrated (All Branches)	Semester: II
Course:	Elements of Electrical Engineering	Code: BTIAB02008

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 70 marks	Scaled to 30 marks

Objectives:

- Understand the concept of Electro Motive Force (EMF), potential difference, current, ohm's law, resistivity, power dissipation in resistance, effect of temperature on resistance.
- Understand the concepts of magnetic field, Faraday's laws of electromagnetic induction and magnetic circuits.
- Analyze and solve simple ac and dc electrical and magnetic circuits using different theorems and laws.
- To impart hands-on experience in assembling and testing circuits.

Outcomes:

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

- Analyze dc and ac circuits using network theorems & ac fundamentals.
- Determine the resonant frequency of any given series or parallel RLC circuit.
- Compare electric and magnetic circuits.
- Analyze simple and composite magnetic circuits.

Detailed Syllabus:

Unit	Description	Duration
1.	**Resistance and DC Network** The idea of Electrical Potential, Resistance, Unit of Resistance, Law of Resistance, Units of Resistivity, Conductance and Conductivity, Effect of Temperature on Resistance, Ohm's Law, Resistance in Series, Voltage Divider Rule, Resistance in Parallel, Types of Resistors, Nonlinear Resistors, Division of Current Parallel Circuits, Equivalent Resistance, Electric Circuits, Kirchhoff's Law, Independent Sources, Maxwell's Loop Current Method, Nodal Analysis, Source Conversion.	10
2.	**Capacitance** Capacitor, Capacitance, Parallel-plate Capacitor, Special Cases of Parallel-plate Capacitor, Multiple and Variable Capacitors, Capacitors in Series, Capacitors in Parallel, Energy Stored in Capacitor, Current-Voltage Relationships in a Capacitor, Charging of a Capacitor, Time Constant, Discharging of a Capacitor.	04

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.	06
4.	**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.	10
	Total	30

Text Books:

1. B. L. Theraja (2004), Fundamentals of Electrical Engineering and Electronics, *S. Chand & Co., 2nd Edition.*

Reference Books:

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

Term Work:

1. At least ten laboratory experiments based on above mentioned units.
2. Minimum 3 assignments based on the prescribed syllabus.

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

Program : B. Tech. Integrated (All Branches)				Semester : III	
Course : Engineering Mathematics - I				Code : BTIAB03001	
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 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:

- Understand the concepts of complex numbers, hyperbolic functions, Mean value theorems and vector products to solve Engineering problems.
- Express functions in series using Taylor's and Maclaurin's expansions, and evaluate limits of indeterminate forms using L' Höspital's Rule.
- Find partial derivatives of functions and carry out the knowledge to error and approximations, maxima and minima.
- Apply the concepts such as gradient, directional derivative, curl and divergence to solve real life problems.

Detailed Syllabus:

Unit	Description	Duration (Hrs)
1.	**Complex Numbers:** Introduction to complex numbers, modulus and amplitude of a complex number, Argand's diagram, cartesian, polar and exponential forms of a complex number. **Algebra of complex numbers:** equality, addition, subtraction, multiplication and division. De-Moivre's theorem, Roots of complex numbers, Euler's form of circular functions, Hyperbolic functions, relation between circular and hyperbolic functions.	12
2.	**Mean value theorems, Series expansion and Indeterminate forms:** Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean	10

	value theorem. Taylor's formula, Maclaurin's series. **Indeterminate forms:** $\frac{0}{0},\frac{\infty}{\infty},0\times\infty,\infty-\infty,0^0,\infty^0,1^\infty$ by L'Höspital's rule.	
3.	**Partial Derivatives and its applications:** Partial Derivatives of two and three variable functions, Partial derivative of composite function, Homogeneous functions in two or three variables, Euler's theorem, error and approximations, Maxima and Minima in 2 variables by second derivative test.	13
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, Irrotational and Solenoidal Fields.	10
	Total	**45**

Text Book:

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

Reference Books:

1. Andreescu Titu, Andrica Dorin (2014), Complex Numbers from A to ... Z, *Birkhäuser 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, 3rd edition.*

Term Work:

As per institute norms.

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

Program: B. Tech Integrated (All Branches)				Semester: III	
Course: Engineering Chemistry				Code: BTIAB03002	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours per week	Practical Hours per week	Tutorials Hours per week	Credit	Theory (3Hrs, 70 Marks)	Internal Continuous Assessment As per Institute Norms (50 Marks)
2	2	-	3	Scaled to 70 marks	Scaled to 30 marks

Objectives

- To introduce basic principles of chemistry such as nomenclature, properties of solutions, and reaction stoichiometry.
- To familiarize the concepts and applications of fuels, polymers, battery technology, and e-waste management.

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

1. Identify different functional groups and write the correct trivial and IUPAC names of compounds; distinguish the various formula applied to different types of solutions; interpret reaction stoichiometry and solve numerical problems.
2. Demonstrate the constructions of primary and secondary batteries and respective uses; visualize the importance of various classes of polymers and applications in daily life.
3. Classify different types of fuels based on their properties and applications; recognize the importance of e-waste management with respect to environment and health hazards and solve numerical problems based on fuels.

Detailed Syllabus:

Unit	Description	Duration (Hrs)
1	**Basic Principles of Organic Chemistry:** Tetravalence of carbon, hybridization (sp^3, sp^2, sp hybridization with one example each), functional groups: those containing halogens, oxygen, and nitrogen (-COOH, $-NH_2$, -CHO, -C=O); homologous series, isomerism. General introduction to naming organic compounds-trivial names and IUPAC nomenclature (aliphatic C_1-C_4, aromatic C_6- mono & disubstituted).	05
2	**Solutions and Stoichiometry:** Types of solutions and its characteristics, properties of aqueous solutions, different units for expressing concentration of solutions (ppm, ppb, normality, molarity, molality, mole fraction of solute, mass fraction of solute and solvent), empirical and molecular formula from elemental composition, numericals based on empirical formula, molarity and mole fraction.	05

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3	**Fuels & Combustion:** Definition, Classification, characteristics. Calorific value-Theoretical & Experimental (Bomb calorimeter). **Solid Fuels**: Coal, proximate and ultimate analysis, Numericals 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 fuels**: (LPG, CNG) Composition, properties and applications.	08
4	**Battery Technology:** Classification of voltaic cells: Primary and Secondary cells; construction, working and applications of: Daniell cell, lead-acid battery, Ni-Cd cell, Li-ion battery, hydrogen-oxygen fuel cell, solar cells.	05
5	**Polymers:** Introduction and definition of important terms – monomer, polymer, polymerization, degree of polymerization, tacticity, and melting-glass transition temperature. Some commercially important polymers (PVC, teflon, polystyrene, nylon-6 and 6,6, terylene and bakelite). **Plastics**: Thermosetting & Thermoplastics, Compounding of plastics, Preparation, properties and applications of commercial plastics (PF, PMMA)	05
6	**E-waste:** Definition, classification and management of e-waste.	02
	Total	30

Text Books:

1. Abhijit Mallick; Chemistry for Engineers, Viva books, 1st Edition 2012.
2. Palanna.O.G., Engineering Chemistry, Tata McGraw Hill Education. Pvt. Ltd, 1st Edition 2009.
3. Samir Sarkar; Fuels & Combustion, Orient Longman Pvt. Ltd. 2nd Edition 2003.

Reference Books:

1) R.T. Morrison & R. N. Boyd, Organic Chemistry, Prentice Hall, 6th Edition 1992.
2) Johrie. R.; E-waste, TERI Press, 2008.
3) Paul C. Hiemenz & Timothy P. Lodge; Polymer Chemistry, CRC Press, 2nd Edition 2007.

20/7/16

4) Thomas Reddy; Linden's Handbook of Batteries, Tata McGraw Professional, 4th Edition 2009.
Term work consists of the following: 1. Two class tests. 2. Minimum eight lab experiments. 3. Three tutorials.

SVKM'S NMIMS

Mukesh Patel School of Technology Management and Engineering

Program: B. Tech. Integrated (All Branches)				**Semester :** III	
Course : Constitution of India				**Code :** BTIAB03003	
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)**
2	0	0	2	--	Scaled to 50 marks

Objective:

- 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:

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

- Learn basic aspects of constitution of India.
- Apply Constitutional provision on Business and their Professionals.

Detailed Syllabus

Unit	Description	Duration (Hrs)
1.	The Constitution, its evolution and Preamble to the Constitution.	04
2.	Fundamental rights and duties, exceptions with examples, individual responsibilities and duties, application to business.	10
3.	Directive principles of State Policy, its emphasis and its impact as related to business.	04
4.	Indian Judiciary and LokAdalats.	06
5.	Emergency Provisions under Article 352 – 360.	04
6.	Voting behaviour in India and present political scene. Responsibility of Business in relation to the Constitution.	02
	Total	**30**

Text Books:

1. Durga Das Basu (2009), "Indian Constitution", *20th Edition.*

Reference Books:

1. N. A. Palkhiwala (2009), "We the People".
2. Justice Hidayatullah (2009), "Indian Constitution".

Term work consists of the following:

1. Assignments / Case studies.
2. Two class tests.

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

Program: B.Tech.-Integrated (Civil & Mechanical)					Semester : III
Course : Engineering Mechanics					Code : BTIMC03001
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 develop thorough understanding of moment of inertia
- To know the concept of pin jointed frames
- To get acquainted with 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 moment of inertia for plane areas
- Analyse pin jointed frames
- Evaluate the velocity, acceleration and displacement of a moving body
- Analyse the forces developed on the moving body

Detailed Syllabus:

Unit	Description	Duration (Hrs)
1.	**Moment of inertia of plane areas:** Moment of inertia of plane areas, parallel axis theorem. Introduction to polar moment of inertia, product of inertia and mass moment of inertia.	04
2.	**Analysis of pin jointed plane frames:** Perfect truss, method of joints, and method of section.	06
3.	**Forces in space:** Rectangular components of forces in space, resultant of concurrent forces, moment of a forces about a point and a given axis, resultant of general force system, Equilibrium of a particle in space.	07
4.	**Principle of virtual work:** Application to determine the reactions of determinate beams with/ without internal hinges	04

5.	**Kinematics of particle:** Motion along plane curved path, tangential and normal component of acceleration, simple harmonic motion. **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).	10
6.	**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.	08
7.	**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 conservation of momentum, impact of solid bodies, elastic impact, semi-elastic impact and plastic impact.	06
	Total	**45**

Text Book:

1. N. H. Dubey (2014), "Engineering Mechanics", *Tata McGraw Hill*
2. R. C. Hibbler (2004), "Engineering Mechanics", *McMillan Publishers*

Reference Books:

1. F. L. Singer (1954), "Engineering Mechanics", *Harper & Raw Publication* (Classic book)
2. Beer & Johnson (2011), "Engineering Mechanics", *Tata McGraw Hill*
3. D. S. Kumar (2009), "Engineering Mechanics", *Tata McGraw Hill*
4. Macklin & Nelson (2012), "Engineering Mechanics", *Tata McGraw Hill*
5. A. K. Tayal (2008), "Engineering Mechanics", *Umesh Publication*
6. E. W. Nelson, Charles L. Best, W.G. Mclean, Merle Potter (2010), "Schaum's outlines on Engineering Mechanics -Statics", *Tata McGraw Hill*

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:	B. Tech. Integrated (Civil Engineering)				Semester : III
Course :	Construction Materials				Code : BTICI03001
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 various building materials
- To know the manufacturing processes of various building materials
- To impart knowledge about application of building materials in construction

Outcomes:

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

1. Differentiate various building materials in terms of their types, properties, defects, processes and uses
2. Describe various manufacturing processes of various building materials.
3. Justify the applications of different building materials in construction

Detailed Syllabus:

Unit	Description	Duration (Hrs)
1.	**Requirements of Building Materials and Products:** Functional, Aesthetical And Economical. **Study of Properties of Materials:** Physical, Mechanical, Chemical, Biological and other Engineering Properties.	05
2.	**Materials for masonry work:** **Stones** - Types, Properties, Testing, Qualities of Good Stones, Quarrying, Surface Finishing, Preservative Treatments. **Brick and concrete blocks** - manufacturing process, qualities, properties, Testing and uses. **Miscellaneous materials** - Siporex blocks, fly ash blocks, (manufacturing process, properties and civil engineering uses) etc.	07
3.	**Binder Material:** Lime, Cement – types, properties, manufacturing process, testing and Manufacturing Process, Mortar and concrete - Ingredients, Types and Uses, Grouts.	07

4.	**Steel:** Types - mild steel, cast iron, wrought iron, stainless steel, TOR steel, galvanised iron, etc. Different forms of steel used in construction - bars, flats, structural steel sections, hot rolled, cold formed, etc.	05
5.	**Timber:** General, classification, structure, qualities of good timber, defects in timber, strength of timber, decay of timber, preservative treatment and wood composites	08
6.	**Flooring and Roofing Materials:** Types of floor finishes, suitability, Types of Roofing materials, suitability.	02
7.	**Paints and Varnishes :** Types, constituents, methods, defects and uses	02
8.	**Construction Chemicals:** Water proofing and termite proofing materials, Chemicals for concrete Repairs, Concrete Admixtures, Sealants	04
9.	**Miscellaneous Materials:** Glass: types and uses, plastic, fibre-reinforced concrete, asphalt, bitumen, micro silica, PVC, Plaster of Paris, non-ferrous metals	05
	Total	**45**

Text Book:

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

Reference Books:

1. P.C. Varghese , "Building Materials", *PHI Leaning Pvt. Ltd.*,2005.
2. S.C. Rangawala, "Engineering Materials", *Charotar Publishing House Pvt. Ltd.,2012.*

Term Work:

Term work should consists of the following

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

List of Experiments :

1. Physical tests on cement (Fineness, consistency, setting time, compressive strength, soundness test)
2. Tests on bricks (Compressive strength test and water absorption test)
3. Tests on siporex block (Compressive strength test and water absorption test)
4. Tests on concrete block (Compressive strength test and water absorption test)
5. Tests on timber (Compressive strength test parallel to grains and perpendicular to grain, moisture content test, flexural strength test)
6. Tests on tile (Flexural strength test, water absorption test)
7. Tests on fine aggregates (Bulking, silt content, water absorption, specific gravity)
8. Tests on course aggregates (Water absorption, specific gravity)

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

Program:	B. Tech. Integrated (Civil Engineering)			Semester :	III
Course :	Construction Engineering			Code :	BTICI03002
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	3	Scaled to 70 marks	Scaled to 30 marks

Objectives:

- To impart the knowledge of various construction processes
- To know the manufacturing processes of various building materials
- To impart knowledge about application of building materials in construction

Outcomes:

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

1. Differentiate various building materials in terms of their types, properties, defects, processes and uses
2. Describe various manufacturing processes of various building materials.
3. Justify the applications of different building materials in construction

Detailed Syllabus:

Unit	Description	Duration (Hrs)
1.	**Types of Structures:** Load bearing & Framed structures, their suitability and economic aspects, introduction to building components	04
2.	**Foundations:** Functions, Requirements, Types – strip footings, columns footings, isolated and combined, raft foundations, pile foundations, well foundation and cessions.	08
3.	**Masonry Constructions:** Stone Masonry - Types, Joints, Lifting appliances, Permissible loads, Supervision during construction, Maintenance Brick Masonry - Terminology, Art of brick laying, tools for brick works, Bonds, Junctions, Typical structural members in brickworks, columns/piers, footings, thresholds, jambs, window sills, corbels, Defects in brick masonry, Supervision of brick masonry works, Comparison of brick masonry and stone masonry Composite Masonry- Stone composite masonry, Brick-Stone composite masonry.	12

	Reinforced brick masonry and Concrete block masonry Masonry Finishes - Plastering, Pointing, Painting and Other Decorative finishes	
4.	**Reinforced Cement Concrete:** Grades of Concrete and steel, ingredients, mixing, types of mixers, transportation and placement, compaction, types of vibrators, curing, various methods for curing. Formwork – materials used, requirements and design considerations, centering and scaffolding, types and material used.	07
5.	**Floors and Roofs:** Floors - Construction of ground floor and Upper floors, floor finishing – types and methods. Roofs - Features of good roofs, Classification of roofs, wooden and steel trusses, Roof covering, Drainage	04
6.	**Doors and Windows:** Terminology, types, suitability, approximate sizes, fixtures and fittings.	04
7.	**Staircases:** Types, terminology, types, requirements, geometric design, Ramps, Escalators, Lifts	04
8.	**Shotcrete and grouting:** Process, equipment used	02
	Total	**45**

Text Book:

1. P.C. Varghese, "Building Construction", *PHI Leaning Pvt. Ltd., 2007.*

Reference Books:

1. Don Arthur Watson, "Construction Materials and Processes", *Tata McGraw Hill* , 2007.
2. S.C. Rangawala, "Building Construction", *Charotar Publishing House Pvt. Ltd., 2009.*

Term Work:

Term work should consists of the following

1. Minimum five assignments covering the prescribed syllabus.
2. Minimum eight A3 size drawing sheets indicating details of various building components

SVKM'S NMIMS
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Program : B. Tech. Integrated (All Branches)				Semester : IV	
Course : Engineering Mathematics - II				Code : BTIAB04001	
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 provide an understanding of Matrices and differential equations in technical subjects.
- To impart knowledge of Beta & Gamma functions and double integrals, its applications to solve engineering problems.

Outcomes:

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

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

Detailed Syllabus:

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

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

Text Books:

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

Reference Books:

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

Term Work:

As per institute norms.

SVKM'S NMIMS
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Program : B. Tech. Integrated (All Branches)				Semester : IV	
Course : Engineering Physics				Code : BTIAB04002	
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
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 Norm (50 Marks)
2	2	0	3	Scaled to 70 marks	Scaled to 30 marks

Objectives

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

Outcomes

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

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

Detailed Syllabus:

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

3.	**Energy technology :** Need for clean energy, different methods for obtaining clean energy viz. nuclear energy (including basics of nuclear physics like fission and fusion etc.) solar cells (including conventional and Nano material based solar cells), hydrogen fuels and wind mills. Advantages and limitations of each method.	06
4.	**Introduction to Nanotechnology:** Definition of nanotechnology, quantum confinement effect [how the material properties differ as the size is reduced: Coloumb Blockade, Surface plasmon resonance, some basic Nano materials like carbon nanotubes, graphene, quantum dots, applications of nanotechnology (scratch resistance coatings, clothing, antimicrobial applications, drug delivery, IC technology), Nano-toxicity (basic idea). Scanning and Transmission electron microscopes, Scanning Tunneling Microscope, Atomic Force Microscope.	08
	Total	**30**

Text Books:

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

Reference Books:

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

Term work:

As per Institute norms.

SVKM'S NMIMS
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Program : B. Tech. Integrated (All Branches)				Semester : IV	
Course : Numerical Techniques				Code : BTIAB04003	
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 bring awareness of various numerical techniques to solve Engineering problems.

Outcomes:

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

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

Detailed Syllabus:

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

6.	**Numerical differentiation & Integration:** Derivatives using Forward and Backward difference formula, Trapezoidal Rule for Numerical Integration, Simpson's 1/3 Rule, Simpson's 3/8 Rule. Application to estimate the distance covered in given time and volume of a solid.	09
7.	**Solution to Ordinary differential equations:** Picard's method, Taylor series method, Euler's method, Fourth-Order Runge-Kutta method.	08
	Total	**45**

Text Books:

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

Reference Books:

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

Term Work:

As per institute norms.

SVKM'S NMIMS
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Program: B. Tech. Integrated (Civil Engineering)					Semester : IV
Course : Strength of Materials					Code : BTICI04001
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

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

Detailed Syllabus:

Unit	Description	Duration (Hrs)
1.	**Tension, Compression and Shear:** Mechanical properties of materials such as elasticity, plasticity and creep, Linear Elasticity, Hooke's Law and Poisson's ratio, normal stress and strain, shear stress and strain, Allowable stresses and allowable loads, factor of safety, material constants.	04
2.	**Axially Loaded Members:** Changes in the length of members having uniform and non-uniform cross-section, statically indeterminate members, thermal effects, misfits and pre-strain, tri-axial state of stress.	08
3.	**Torsion:** Torsional deformation of a circular bar of linearly elastic materials, non-uniform torsion, transmission of power by circular shaft, statically indeterminate torsional members.	06

4.	**Shear Force and Bending Moments in beams:** Types of beams, loads and reactions, shear force and bending moments, relationships between loads, shear force and bending moments, shear force and bending moment diagrams for beams with and without internal hinges.	10
5.	**Stresses in beams:** Pure bending and non-uniform bending, curvature and longitudinal strains in beams, normal stresses in beams having linearly elastic materials, composite beams, shear stresses in beams, shear stress variation across the section for rectangular, circular, triangular, flanged sections having at least one axis of symmetry, design of beams for bending and shear.	10
6.	**Analysis of stresses:** Plane stress, stresses on inclined sections, principal stresses and maximum shear stresses, Mohr's circle for plane stress	07
	Total	**45**

Text Book:

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

Reference Books:

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

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

Form 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 cast iron specimen.
6. Torsion test on mild steel / cast iron specimen.
7. Brinell hardness test on metal specimens.
8. Rockwell hardness test on metal specimens.
9. Charpy impact test on metal specimens.
10. Izod impact test on metal specimens.

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Program: B. Tech. Integrated (Civil Engineering)					Semester : IV
Course : Surveying - I					Code : BTICI04002
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

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

Detailed Syllabus:

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

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

Text Book:

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

Reference Books:

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

Term Work:

1. Minimum five assignments covering the prescribed syllabus
2. Report of minimum six experiments performed in the laboratory

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 surveying
9. Use of planimeter for measuring area of irregular figures

SVKM'S NMIMS
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Program: B. Tech. Integrated (Civil Engineering)					Semester : IV
Course : Engineering Geology					Code : BTICI04003
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 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

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

Detailed Syllabus:

Unit	Description	Duration (Hrs)
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	08

	Elements - Folds, Faults, Joints, Unconformity, Dip, Strike, Outcrop Patterns, Outliers and Inliers, Importance of Structural Elements in Civil Engineering operations.	
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. **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	08
	Total	**45**

Text Book:

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

Reference Books:

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

Term Work:

1. Minimum five assignments covering the prescribed syllabus
2. Report of experiments performed in the laboratory

List of Experiments:

1. Study of physical properties of the minerals.
   a. Megascopic identification of rock forming minerals – crystalline, crypto-crystalline and amorphous silica and their varieties, Orthoclase, Microcline, Plagioclase, Muscovite, Biotite, Hornblende, Asbestos, Augite, Olivine, Tourmaline, Garnet, Natrolite, Actinolite, Calcite, Dolomite, Gypsum, Corundum, Talc, Fluorite, Kyanite, etc.
   b. Megascopic identification of ore forming minerals - Bauxite, Graphite, Galena, Pyrite, Hematite, Magnetite, Chalcopyrite, Chromite, coal
2. Identification of rocks –
   a. Megascopic identification of Igneous rocks : Granite and its varities, Synite, Dionite, Gabbro, Pegmatite, Porphyry, Dolerite, Rhyolite, Pumice, Trachyte, Basalt and its varieties, Volcanic Breccia, Volcanic Tuffs.
   b. Megascopic identification of Sedimentary rocks : Conglomerate, Breccia, Sandstone and its varieties, Shales, Limestone, Melliolite, Laterite,
   c. Megascopic identification of Metamorphic rocks: Slate, Phyllite, Mica, Schists, Hornblende schists, Granite gneiss and its varieties, Augen gneiss, Marbles and quartzite.
3. Study of Structural geological maps

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

Program:	B. Tech. Integrated (All Branches)				Semester: V
Course:	Engineering Mathematics - III				Code: BTIAB05001
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 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:

- Apply Matrices, Laplace transforms, Fourier series to Engineering problems.
- Use the concepts of Matrices, Laplace transforms and Fourier series for solving problems.

Detailed Syllabus:

Unit	Description	Duration (Hrs)
1.	**Matrices:** Characteristic equation, Eigen values and Eigen vectors of a square matrix, Cayley-Hamilton Theorem, Similar Matrices, Diagonalization, Functions of a Square Matrix, Quadratic Forms, Reduction of a quadratic form to canonical form using orthogonal transformation.	12
2.	**Laplace transform:** Definition, Laplace transform of $1, e^{at}, \sin at, \cos at, \sinh at, \cosh at, t^n$, Change of scale property, First shifting property, $L\{t^n f(t)\}, L\left\{\frac{f(t)}{t}\right\}, L\left\{\int_0^t f(u)du\right\}, L\{f^n(t)\}$, Inverse Laplace transform, Properties of Inverse Laplace transform, Inverse Laplace using partial fraction and Convolution Theorem. Laplace transforms of Periodic functions, Dirac delta functions, Unit step functions, Second shifting property. Application to solve initial and boundary value problems involving ordinary differential equations.	20
3.	**Fourier Series:** Orthogonality and orthonormality, Definition of 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 $[\alpha, \alpha+2c]$, Even and Odd functions, Half range sine and cosine expansions, Parseval's identities.	13
	Total	**45**

Text Books:

1. Glyn James (2010), "Advance Modern Engineering Mathematics", *Pearson Education, 4th edition.*

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Reference Books:

1. Erwin Kreyszig (2006), "Advanced Engineering Mathematics", *Wiley Eastern Ltd, 8th edition.*
2. Murray Spiegel (2005), "Schaum's Outline: Advanced Mathematics for Engineers and Scientists", *Tata McGraw Hill.*
3. B.V. Ramana (2010), "Higher Engineering Mathematics", *Tata McGraw Hill, 1st edition.*

Term Work:

As per institute norms.

Program: B. Tech. Integrated (Civil Engineering)					Semester : V
Course : Surveying-II					Code : BTICI05001
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 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 Book:

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
Mukesh Patel School of Technology Management and Engineering

Program:	B. Tech. Integrated (Civil Engineering)				Semester : V
Course :	Fluid Mechanics - I				Code : BTICI05002
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)
2	2	0	3	Scaled to 60 marks	Scaled to 40 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

Outcomes:

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

- illustrate the different properties of fluids
- differentiate the concepts of fluid statics, kinematics and dynamics
- calculate the flow using different flow measuring devices

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.	05
3.	**Buoyancy and Floatation** Archimedes principle, metacentre, metacentric height, equilibrium of floating and submerged bodies.	03
4.	**Fluid Kinematics and Dynamics** Description of fluid flow: Lagrangian method, Eulerian method, streamlines, pathlines, streaklines, and classification of fluid flows, continuity equation, rotational flow, rotation and vorticity, velocity and stream function, circulation, flow net, Euler's equation, Bernoulli's theorem and its application to real fluid.	07

5.	**Flow Measurement - I** Venturimeter, nozzle meter, pitot tube, rotameter. Orifices: hydraulic coefficients, small and large orifices, time of emptying of tank through orifices.	05
6.	**Flow Measurement - II** Mouthpieces: external, convergent, Borda's mouthpiece. Notches and weirs: rectangular, triangular, Cipolleti weirs, velocity of approach, end contraction.	05
	Total	**30**

Text Book:

1. Modi P.M. and Seth S.M. (2015), "Hydraulics and Fluid Mechanics", *Standard Book House*

Reference Books:

1. Victor Lyle Streeter, E. Benjamin Wylie (1985), "Fluid Mechanics", McGraw-Hill. (Classic Book)
2. Bansal R.K. (2015), "Hydraulics and Fluid Mechanics", *Laxmi Publications.*
3. Subramanaya K., (2010), "Theory and Applications of Fluid Mechanics", *Tata McGraw Hill.*

Term Work:

Term work should consist of the following

- Minimum five assignments covering the prescribed syllabus
- Report of minimum six experiments performed in the laboratory from the list given below.

List of Experiments:

1. Verification of Archimedes 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

Program: B. Tech. Integrated (Civil Engineering)					Semester : V
Course : Concrete Technology					Code : BTICI05003
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 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

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

Program: B. Tech. Integrated (Civil Engineering)					Semester : V
Course : Building Design and Drawing - I					Code: BTICI05004
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (4 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
1	4	0	3	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart knowledge of 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
- illustrate principles of planning of residential buildings
- design residential buildings following various bye-laws

Detailed Syllabus:

Unit	Description	Duration
1.	**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.	02
2.	**Details of Building Drawing** Drawing of details: site plan, line plan, layout plan, detailed plan, services plan, elevation, section, structural plan, importance and purpose of preparing above drawings.	02
3.	**Principles of Planning** For residential buildings: principles of planning such as aspect, prospect, orientation, roominess, grouping, privacy, ventilation, access, circulation, economy, drainage etc.	03
4.	**Building Bye-laws** Building bye-laws for residential buildings, Following important bye-laws for plot area and built-up area, size of rooms, margins, F.S.I., F.A.R., heights, passages, ventilation, circulation, open space, water supply and sanitary, electrification, fire safety,	03

	general safety, lifts, environment approval procedure with respect to bye-laws	
5.	**Planning Residential Buildings** Given situations & plot area; prepare detailed drawing of a double storied residential building (Load Bearing & RCC) i.e line plan, detailed plan, elevation and section, site plan, layout plan of the building Detailing of RCC members: foundation details, plinth level plan, floor level plan, terrace level plan	05
	Total	**15**

Text Book:

1. Shah M. G., Kale C. M., Patki S. Y. (2011), "Building Drawing", *Tata McGraw Hill*

Reference Books:

1. Dr. N Kumara Swamy and A. Kameswara Rao (2015), "Building Planning and Drawing", *Charotar Publishing House Pvt. Ltd.*
2. Bureau of Indian Standards (2005), "National Building Code of India", *BIS Publications*

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 five A1 size drawing sheets - Working Drawing, drawn independently for the two structures designed as mentioned above, showing floor plans and sections and structural details.

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

Program: B. Tech. Integrated (Civil Engineering)					Semester : V
Course : Fundamentals of Structural Analysis					Code : BTICI05005
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)
2	0	2	3	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart knowledge of internal forces developed in various structures
- To study concepts of deflections and strain energy in structures

Outcomes:

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

- draw SFD, BMD for rigid jointed frames
- determine stresses developed in various structures
- evaluate the strain energy stored and deflections of structures

Detailed Syllabus:

Unit	Description	Duration
1	**Axial Force, Shear Force and Bending Moment Diagrams for frames** AFD, SFD and BMD for statically determinate rigid jointed frames with and without internal hinges.	08
2.	**Deflections of Beams** Moment curvature relationship, deflection of cantilever, simply supported and overhanging beams for different types of loadings using double integration method and Macaulay's method.	08
3.	**Strain Energy** Strain energy in axially loaded members, members under bending, shear, circular members in torsion, stresses due to axial load & impact load, complementary energy, application to beams, rigid jointed frames and pin jointed frames.	04
4.	**Analysis of Structures Subjected to Axial Loads and Bending** Core of a section, determination of resultant stresses developed due to combined axial and bending, application to columns subjected to eccentric loads, chimneys, retaining walls, dams, etc.	06

5.	**Analysis of Thin Pressure Vessels** Stresses and strains in thin cylindrical and spherical shells subjected to internal pressure, cylindrical shells with hemispherical ends.	04
	Total	**30**

Text Book:

1. Andrew Pytel, Jaan Kiusalaas (2012), "Mechanics of Materials – Second Edition", *Cengage Learning*
2. C. S. Reddy (2010), "Basic Structural Analysis", *McGraw Hill*

Reference Books:

1. Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf (2013), "Mechanics of Materials – Third Edition", *Tata McGraw Hill*
2. 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 seven assignments covering the prescribed syllabus

Program: B. Tech. Integrated (Civil Engineering)					Semester : V
Course : Presentation and Communication Techniques					Code : BTICI05006
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)
2	0	2	0	-----	Scaled to 50 marks

Objectives:

- To understand communications in business organisation and advanced technical writing.
- To have knowledge of presentation tools and skills.
- To acquaint with career skills, interpersonal skills, technical writing and group discussion.

Outcomes:

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

- Effectively communicate in a business organization.
- Implement efficient presentation tools and skills.
- Have ability for better career skills, interpersonal skills, technical writing and group discussion.

Detailed Syllabus:

Unit	Description	Duration
1.	Communication in a Business Organization: Internal and external communication, Types of meetings, strategies for conducting successful business meetings, documentation (notice, agenda, minutes, resolution) of meetings.	06
2.	Advanced technical writing: Report writing Definition and importance of reports, qualities of reports, language and style in reports, types of reports, formats (letter, memo, project-reports). Methods of compiling data for preparing report. A computer-aided presentation of a technical project report based on survey-based or reference based topic. The topics are to be assigned to a group of 8-10 students. The written report should not exceed 20 printed pages.	06

3.	Presentation Skills: Elements of an effective presentation, Structure of a presentation, Presentation tools, Audience analysis. Language: Articulation, Good pronunciation, Voice quality, Modulation, Accent and Intonation	03
4.	Interpersonal Skills: Team - Building, Decision - Making, Time-Management, Leadership, Introduction to Emotional Intelligence.	06
5.	Technical Paper Writing and presentation.	02
6.	Career Skills: Preparing resumes and cover letters. Types of Resumes. Interview techniques: Preparing for job interviews, facing an interview, verbal and non-verbal communication during interviews, observation sessions and role-play techniques to be used to demonstrate interview strategies (mock interviews)	04
7.	Group Discussion: Group discussion as part of selection process. Structure of a group discussion, Dynamics of group behaviour, techniques for effective participation, Team work and use of body language.	03
	Total	30

Text Book:

1. Lesikar & Petit (1998), "Report writing for business", *Tata McGraw Hill*
2. R. C. Sharma & Krishna Mohan (2002), " Business Correspondence & Report writing", *Tata McGraw Hill Publications*

Reference Books:

1. Huckin & Olsen (1991), "Technical writing & Professional communication", *McGraw Hill*
2. Dr. Meenakshi Raman & Dr. Sangeeta Sharma (2004), "Technical Communication: Principles and Practice", *Oxford University Press*

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 and Engineering

Program:	B. Tech. Integrated (All Branches)			Semester: VI	
Course:	Engineering Mathematics - IV			Code: BTIAB06001	
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 Norm (50 Marks)
3	0	2	4	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To provide the understanding and use of Complex variables.
- Acquire knowledge of statistical methods and linear programming problems.

Outcomes:

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

- Solve problems involving functions of complex variables, random variables, probability distribution, Testing of Hypothesis and operations research.
- Identify the suitable methods of complex variables, random variables, probability distribution, Testing of Hypothesis and operations research to solve real life problems.
- Apply knowledge of complex variables, random variables, probability distribution, Testing of Hypothesis and operations research to Engineering problems.

Detailed Syllabus

Unit	Description	Duration (Hrs)
1.	**Complex Variables :** Functions of Complex Variables Analytic Function, Cauchy-Riemann Conditions for Analytic Functions, Harmonic Functions, Milne-Thompson method to determine analytic function when it's real or imaginary or its combination is given. Conformal transformation: Standard transformations such as translation, rotation and magnification, inversion and reflection. Bilinear transformation, cross ratio, fixed points.	12
2.	**Random Variables:** Discrete and continuous random variables, probability density function, cumulative distribution function, mean, variance, moments and moment generating functions. Relation between raw moments and central moments.	8
3.	**Probability Distribution:** Discrete Probability Distribution: Binomial Distribution, Poisson Distribution, Continuous Probability Distribution: Normal Distribution, Mean and Variance of the above distributions.	8

4.	**Testing of Hypothesis:** Large Sample Tests: tests for mean. Small sample tests: Student's t-test, F- test.	8
5.	**Introduction to Operations Research:** Linear Programming Problems: Problem Formulation, Graphical method, Simplex method, Big-M method.	9
	Total	**45**

Text Books:

1. H. K. Dass (2008) "Advanced Engineering Mathematics", *S. Chand & Co., 18th edition.*
2. J. K. Sharma (2010), "Operations Research Theory and Applications", *Macmillan, 4th Edition.*

Reference Books:

1. Glyn James (2010), "Advance Modern Engineering Mathematics", *Pearson Education, 4th edition.*
2. S. P. Gupta (2007), "Statistical Methods", *Sultan Chand & Sons, 35th Edition.*
3. Erwin Kreyszig (2010), "Advanced Engineering Mathematics", *Wiley Eastern Ltd, 10th Edition.*
4. T. Veerarajan (2008), "Probability, Statistics and Random Processes", *Tata McGraw Hill, 2nd Edition.*
5. V. K. Kapoor (2007), "Operations Research", *Sultan Chand & Sons, 4th Edition.*

Term Work:

As per institute norms.

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

Program:	B. Tech. Integrated (Civil Engineering)				Semester : VI
Course :	Geotechnical Engineering -I				Code : BTICI06001
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 (Hrs)
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

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

Program: B. Tech. Integrated (Civil Engineering)					Semester : VI
Course : Fluid Mechanics - II					Code :BTICI6002
Teaching Scheme				Evaluation Scheme	
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)
2	0	2	3	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart knowledge of liquids subjected to acceleration
- To get acquainted the concepts of laminar flow
- To impart knowledge of dimensional analysis and ideal fluid flow

Outcomes:

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

- analyse the behaviour of liquids in acceleration
- analyse laminar flow
- explain the concepts of dimensional analysis and ideal flow

Detailed Syllabus:

Unit	Description	Duration (Hrs)
1.	**Liquids in Relative Equilibrium** Uniform linear acceleration, liquid container subjected to constant horizontal and vertical acceleration, constant rotation with vertical axis.	06
2.	**Laminar Flow - I** Reynold's experiment, critical velocity, steady laminar flow through circular pipes, annulus.	05
3.	**Laminar Flow - II** Parallel plates: stationary and moving, kinetic correction factor, momentum correction factor, Dash pot.	04
4.	**Dimensional Analysis** Dimensional homogeneity, Buckingham's π theorem, Rayleigh's method, dimensionless groups.	05
5.	**Similitude and Model Studies** Similitude, model studies, distorted & undistorted models.	04
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.	06
	Total	**30**

Text Book: 1. Modi P.M. and Seth S.M. (2015), "Hydraulics and Fluid Mechanics", *Standard Book House*
Reference Books: 1. Victor Lyle Streeter, E. Benjamin Wylie (1985), "Fluid Mechanics", McGraw-Hill. (Classic Book) 2. Bansal R.K. (2015), "Hydraulics and Fluid Mechanics", *Laxmi Publications.* 3. Subramanaya K., (2010), "Theory and Applications of Fluid Mechanics", *Tata McGraw Hill.*
Term Work: Term work should consists of the following 1. Minimum seven assignments covering the prescribed syllabus

Program: B. Tech. Integrated Civil Engineering					Semester : VI
Course : Construction Equipment and Techniques					Code : BTICI06003
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 (Hrs)
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:	B. Tech. Integrated (Civil Engineering)				Semester : VI
Course :	Building Design and Drawing - II				Code : BTICI06004
Teaching Scheme				Evaluation Scheme (Marks & Weightage)	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Theory (4 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
1	4	0	3	Scaled to 60 marks	Scaled to 40 marks

Objectives:

- To impart knowledge of planning and drawings of public buildings
- To introduce concepts of development of master plan of an area using the principles of town planning

Outcomes:

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

- plan and develop the drawings of public buildings
- explain the concept of town planning

Detailed Syllabus:

Unit	Description	Duration (Hrs)
1.	**Introduction** Planning & design of public buildings such as • Buildings for education: schools, colleges, institutions, libraries • Buildings for health and hospitality: hospitals, health centres, 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.	04
3.	**Town Planning** Objectives and principles, master plan, road systems, zoning, green belt, slums development, introduction to green buildings DC rules for local authorities.	03
	Total	**15**

Text Books:

1. Shah M. G., Kale C. M., Patki S. Y. (2011), "Building Drawing", *Tata McGraw Hill*
2. Rangwala (2015), "Town Planning", Charotar *Publishing House Pvt. Ltd.*

Reference Books:

1. Dr. N Kumara Swamy and A. Kameswara Rao (2015), "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 (2012)

Term Work:

- Term work shall consist of minimum five A1 size drawing sheets using details of minimum two different types of public buildings.
- 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 and Engineering

Program: B. Tech. Integrated (Civil Engineering)					Semester : VI
Course : Structural Analysis - I					Code : BTICI06005
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 internal forces developed in various structures
- To study concepts of deflections in structures
- To impart concepts of ILD and rolling loads

Outcomes:

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

- determine internal forces developed in arches, cables and columns
- evaluate the deflections of beams and frames
- draw ILD for beams

Detailed Syllabus:

Unit	Description	Duration (Hrs)
1	**General Theorems** Theorems relating to elastic structures, principle of virtual work. Castigliano's theorem, Betti's and Maxwell's reciprocal theorems, principle of superposition.	03
2.	**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, deflection due to temperature changes, application to beams, pin jointed frames and rigid jointed frames.	16
3.	**Three Hinged Arch** Determination of normal thrust, radial shear force and bending moment for three hinged parabolic and circular arches.	06

4.	**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
5.	**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, struts with eccentric loads, lateral loads, struts with initial curvature.	08
6.	**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.	06
	Total	**45**

Text Book:

1. C. S. Reddy (2010), "Basic Structural Analysis", *McGraw Hill*

Reference Books:

1. G. S. Pandit, S. P. Gupta (2008), "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 (2015), "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

Program:	B. Tech. Integrated (Civil Engineering)				Semester : VI
Course :	Entrepreneurship and Management				Code : BTICI06006
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)
2	0	0	0	-----	Scaled to 50 marks

Objectives:

- To introduce entrepreneurship and management and its concepts and characteristics.
- To familiarize with entrepreneur skills, functions and accounting.
- To acquaint with current Indian entrepreneurship scenario.

Outcomes:

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

- Describe the entrepreneurship and management with its concepts and characteristics.
- Understand entrepreneur talent, work culture and finances.
- Get to know of current Indian entrepreneurship scenario.

Detailed Syllabus:

Unit	Description	Duration (Hrs)
1.	Definitions of entrepreneurship, concept and characteristics of entrepreneur and entrepreneurship, an ideal entrepreneur, qualities of an entrepreneur, aspects of entrepreneurship, environment for entrepreneurship	04
2.	The entrepreneurial culture : elements of culture, business culture and culture of society, entrepreneurial culture, cultural change, socio-economic origins of entrepreneurship, barriers to entrepreneurship, factors affecting entrepreneurship	04
3.	Classification depending on type of business, technology, motivation, growth, stages of development. Entrepreneurial traits and motivation: initiative, entrepreneurial skills, entrepreneurship: sources of supply & motivation, Growth of entrepreneurs, entrepreneurial functions	04
4.	Project development :Project: stages of project, project development cycle, life cycle of project, ISO certification & its importance, search for an idea, preliminary screening, project identification, project Formulation, SWOT analysis, project report, Project appraisal:market,technical,financial and economical	05

	social, ecological, organizational. Tools of analysis: time value of money, compounding & discounting, break-even analysis, payback period, net present value, social cost-benefit analysis Sources & types of finance	
5.	Present scenario of Indian industry and entrepreneurs, government policies promoting entrepreneurship, institutions in aid of entrepreneurs, finance for entrepreneurs, sources and types of finance, small scale industries related to civil engineering, steps for starting a small scale industry, safety rules & regulations for construction industries, selection of type of own organization, ownership types: sole proprietorship, partnership, private company, public limited company	04
6.	Project accounting: generally accepted accounting principles, book keeping, double entry system and ledger, preparation of income statement and balance sheet	04
7.	Management: concept of management, objectives, basic functions of management, emergence of management thought, brief description of contributions by Fredrick Taylor, Henry Fayol, Elton Mayo and Gilbreth, Principles of organization, forms of organization: line, line & staff, functional and matrix	05
	Total	**30**

Text Book:

1. R. Hisrich & M. P. Peters (2008), "Entrepreneurship", *Tata Mc Graw Hill*
2. Colombo plan Staff College for Technical Education (2012), "Entrepreneurship Development", *Tata Mc Graw Hill*

Reference Books:

1. Vasant Desai (2002), "Dynamics of Entrepreneurial Development & Management", *Himalaya Publishing House*
2. Prasanna Chandra (2001), "Finance Sense", *Tata Mc Graw Hill*

Term Work:

Term work should consists of the following

1. Minimum seven assignments covering the prescribed syllabus