

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

<b>Program:</b> B Tech (All Program except CSBS, CSDS) / MBA Tech (All Program)				<b>Semester:</b> I / II	
<b>Course:</b> Basic Electrical and Electronics Engineering				<b>Code :</b> 702EX0C001	
<b>Teaching Scheme</b>			<b>Evaluation Scheme</b>		
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks-50)</b>	<b>Term End Examinations (TEE) (Marks -100)</b>
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Nil					
<b>Course Objective</b> The main objective of this course is to equip the students with the ability to solve, assemble and test simple AC and DC electrical circuits. Further, the course also enables the student to obtain a basic understanding of the working principle and applications of electronics devices.					
<b>Course Outcomes</b> After completion of the course, students will be able to <ol style="list-style-type: none"> <li>1. interpret DC circuits, theorems and time domain analysis of first order RL circuit</li> <li>2. solve series and parallel AC circuits and compare star/delta configurations</li> <li>3. explain the principles of transformer and electrical machines</li> <li>4. understand the construction, working principle and applications of electronics devices and logic circuits</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>DC Circuits</b> Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff's current law, Kirchoff's voltage laws, Analysis of simple circuits with dc excitation, Superposition Theorem, Thevenin's Theorems, Norton's Theorems. Time-domain analysis of first-order RL circuits.				6
2.	<b>AC Circuits</b> Generation of alternating emf, instantaneous, rms, peak, average values and related other terms, vector representation of AC quantities, Steady state analysis				8



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	of R, L, C series and parallel circuits, resonance. Generation of three-phase emf, star connection, delta connection, relationship between line and phase quantities.	
3.	<b>Transformers and Electrical Machines</b> Construction and working of single-phase transformer Ideal and practical transformer, equivalent circuit, Losses in transformers, Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Single-phase induction motor, construction and working, DC motor construction, working and types.	6
4.	<b>Analog Electronics (no mathematical treatment and design)</b> Half and full wave rectifiers, special purpose diodes -zener regulator, BJT and its applications, amplifier, oscillator, overview of opto-electronics devices, opto-couplers, concepts of transducer, Operational amplifier (IC-741), Inverting and Non-Inverting, Comparator, Timer (IC-555) and multivibrators.	5
5.	<b>Digital Electronics</b> Logic gates, concept of universal logic; implementation of Boolean expressions using logic gates, application of digital circuits: e.g., adder, subtractor, multiplexer, de-multiplexer, Analog to Digital Converter, Digital to Analog Converter.	5
	<b>Total</b>	<b>30</b>

**Text Books**

1. D. C. Kulshreshtha, *Basic Electrical Engineering*, 1<sup>st</sup> Edition, McGraw Hill Education, 2017.
2. E. Hughes, *Electrical and Electronics Technology*, 10<sup>th</sup> Edition, Pearson Education, 2013.
3. Boylstad R.L., Nashelsky L., *Electronic Devices and Circuit Theory*, 12<sup>th</sup> Edition, Pearson, 2012.
4. M. Morris Mano, *Digital Logic and Computer Design*, 10<sup>th</sup> Edition, Prentice Hall India, 2008.

**Reference Books**

1. V. D. Toro, *Electrical Engineering Fundamentals*, 2<sup>nd</sup> Edition, Pearson Education India, 2015.
2. Jacob Millman & Halkias, *Electronic Devices & Circuits*, 2<sup>nd</sup> edition, Tata McGraw Hill, 2013.

**Laboratory Work**

8 to 10 experiments based on the syllabus.




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SVKM's NMIMS Deemed-to-be University  
Mukesh Patel School of Technology Management and Engineering

<b>Program:</b> B Tech Computer Science and Business Systems				<b>Semester:</b> II	
<b>Course:</b> Business Communication & Value Science-II				<b>Code:</b> 702BS0C028	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks - 100)</b>
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Completion of Business communication and Value Science-I					
<b>Course Objective</b> This course aims to train the students in skills like conducting research and planning for designing impactful and credible communication. Also, it aims at sensitizing them towards overcoming bias; embracing diversity and equality leading to fair, creative and productive workplace practices.					
<b>Course Outcomes</b> After completion of the course, the student will be able to- <ol style="list-style-type: none"> <li>1. Demonstrate awareness of the tools of structured written communication essential for communicating on diverse media</li> <li>2. Apply principles of communication towards designing structured and impactful oral and written communication that can be disseminated through diverse and contemporary media</li> <li>3. Analyze personality types, concepts of morality and diversity to create and implement bias free and impactful solutions in societal as well as professional contexts</li> <li>4. Create well- researched and contextualized reports, presentations and other write-ups applying the essential communication tools and principles</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>Tools of Structured Written Communication</b> Principles of Lucid Writing; Vocabulary reinforcement; cloze; Language Usage- Tenses; Modification; Parallelism, Recapitulation practice- Subject verb agreement; pronoun antecedent agreement; Vision Mission Writing; Writing Taglines for Brands; Running Brand Campaigns; e-magazine Creation; Blog writing, Email writing based on organizational contexts and scenarios.				10
2.	<b>Read-Research-Report</b> Eclectic, and paragraph-based reading; Research- Importance of research; Ethical research, copyright, and plagiarism; -Questionnaires as data collection tools; Interviews as data collection tools etc.; Reports-Types, formats, categories, letter and memo reports; Literature review writing; Abstract Writing; Presentation of a Project Report.				12
3.	<b>Leadership Oriented Learning</b> Designing Resumes; cover letters, and Facing Personal Interviews; telephonic and virtual Interviews; Understanding Team/group Dynamics- roles; norms, equity, diversity, pressure to conform, group cohesiveness; group size, social loafing and measures to control social loafing group think and group polarization; Decision				13



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	Making-Rational Decision-Making Model; satisfice, Group decision making techniques-Brainstorming, nominal group technique, Delphi technique, electronic method, Bias in decision making; Big Five personality traits and their implications on learning, behavior and interpersonal communication.	
4.	<b>Understanding and sharing the basic concepts of Morality and Diversity</b> Diversity-Types of Diversity; Social context to Diversity; Organizational Diversity-Types and importance; Impact of diversity on elements like creativity, productivity, decision making etc.; Setting an organizational culture that values and encourages diversity; Moral Value based discussions and mini case examples; case-based examples on Diversity and interpersonal communication settings.	10
	<b>Total</b>	<b>45</b>
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. Steven Mcshane &amp; Mary Ann Von Glinow, <i>Organizational Behavior</i>, 4<sup>th</sup> Edition McGraw Hill-College, 2018.</li> <li>2. Dr Meenakshi Raman and Dr Sangeeta Sharma, <i>Technical Communication-Principles and Practice</i>, 4<sup>th</sup> Edition Oxford University Press, 2022.</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. S Moriarty, N Mitchell, W Wells, <i>Advertising &amp; IMC: Principles and Practice</i>, 6<sup>th</sup> Edition Pearson Education India, 2021.</li> <li>2. Paul V. Anderson, <i>Technical Communication-A Reader Centric Approach</i>, 9<sup>th</sup> Edition, Cengage Publications, 2017.</li> <li>3. Hory Sankar Mukherjee, "Business Communication: Connecting at work", 2<sup>nd</sup> Edition, Oxford University Press, 2016.</li> </ol>		
<b>Laboratory Work</b>		
8 to 10 experiments based on the syllabus.		



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SVKM's NMIMS Deemed-to-be University  
Mukesh Patel School of Technology Management and Engineering

<b>Program:</b> B Tech Mechanical ,Civil and Mechatronics				<b>Semester:</b> II/ IV	
<b>Course:</b> Chemistry				<b>Code:</b> 702BS0C014	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks- 100)</b>
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50
<b>Prerequisite:</b> HSC level Chemistry					
<b>Course Objective</b> The aim is to acquaint students with engineering materials like lubricants, polymers, nanomaterials and composites. Also to familiarize them with the industrial importance of water chemistry, application of fuels and concept of metal corrosion.					
<b>Course Outcomes</b> After completion of the course, the student will be able to- <ol style="list-style-type: none"> <li>1. Rationalize fundamentals of corrosion and materials</li> <li>2. Understand basic concepts in water, combustion of fuels and polymer chemistry</li> <li>3. Solve numerical problems based on water, fuels and combustion, lubricants</li> </ol>					
<b>Detailed Syllabus: (per session plan)</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>Polymers</b> Introduction, basic concepts of degree of polymerization, tacticity, melting and glass transition temperature and its importance. Types of polymerization (Addition, condensation and co-polymerization). Smart polymer materials, conducting polymers, liquid crystals, applications of polymers.				<b>05</b>
2.	<b>Lubricants</b> Definition, Mechanism of lubrication, Properties- viscosity, viscosity index, flash & fire, cloud & pour points, oiliness, saponification & acid value (numericals based on saponification and acid value)				<b>04</b>
3.	<b>Fuels &amp; Combustion</b> Discuss the definition, classification and characteristics. Calculation of Calorific value-Theoretical & Experimental method (Bomb calorimeter). Solid Fuels: Coal, proximate and ultimate analysis, Numerical based on analysis of coal. (Dulong's formula) and bomb calorimetry. Combustion: calculation on air and oxygen requirement.				<b>06</b>

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	Liquid fuels: Mining of Petroleum, Cracking, Reforming, Knocking in IC engines, Octane number, Cetane number & anti-knocking agents (TEL and MTBE) Gaseous fuel: (LPG, CNG) Composition, properties and application.	
4.	<b>Water Chemistry</b> Concept of hardness of water, types of hardness and its determination by EDTA methods, numerical based on water hardness. Water softening processes by: Lime-soda method, ion-exchange process and reverse osmosis process. Role of water as a universal solvent.	05
5.	<b>Chemistry of Corrosion and protection</b> Introduction, types of corrosion, chemical and electrochemical theories of Corrosion and their sub-types (corrosion by oxygen and other gases and liquids), factors affecting corrosion, preventive measures for corrosion-Cathodic and anodic protection methods, use of protective coatings (galvanization, tinning, metal cladding, electroplating, organic coatings like paints and varnishes).	05
6.	<b>Chemistry of Important Engineering Materials and Nanomaterials</b> Introduction to alloys (steels, special steels, Carbon steel, brass, bronze and applications). Introduction to composites; Classification (Polymer, Metal & Ceramic composites, Cement), applications of composites. Introduction to nanomaterials, Structural features and properties of Nanomaterials, recent advances in nanomaterials, application of nano materials in catalysis, medicine, construction chemicals, paints and pigments and heat transfer fluids.	05
	<b>Total</b>	<b>30</b>
<b>Text Books</b>		
1. Palanna. O.G., Engineering Chemistry, Tata McGraw Hill Education. Pvt. Ltd, 1 <sup>st</sup> Edition 2009.		
<b>Reference Books</b>		
1. <i>Advance Organic Chemistry</i> , Jerry March, 7th edition, 2013 2. <i>P. W. Atkins, Physical Chemistry</i> , ELBS/Oxford, 9th Edition, 2010. 3. <i>Textbook of Nanoscience and Nanotechnology</i> , <u>B.S. Murty</u> , <u>P. Shankar</u> , <u>Baldev Raj</u> , <u>B B Rath</u> , James Murday, Springer Science, 2013		
<b>Laboratory Work</b>		
8 to 10 experiments based on the syllabus.		

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<b>Program:</b> B Tech (All Program except CSE (DS) 311 (VT) / MBA Tech (All Program)/ B Tech Integrated All Program					<b>Semester:</b> I / II/III/IV
<b>Course:</b> Constitution of India					<b>Code :</b> 702BS0C006
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE)</b>
1	0	0	0	Marks Scaled to 50	—
<b>Pre-requisite:-</b>					
<b>Course Objective</b> The course would enable students to get a brief introduction of the Indian Constitution and its principles. The students would have knowledge of concept of 'State' and interdependencies of its institutions vis a vis their relation with fundamental rights.					
<b>Course Outcomes</b> After completion of the course, students will be able to- <ol style="list-style-type: none"> <li>1. Understand the historic evolution of the Indian Constitution, its drafting, nature and to understand the principles mentioned in its Preamble</li> <li>2. Inculcate fundamental rights in its true sense and also the permissible restrictions upon it so as to enjoy these rights within permissible limits while simultaneously performing their duties and to apply these principles into their professional lives</li> <li>3. Ingrain the structure of our polity and role of Judiciary in maintaining the basic structure of the Constitution</li> <li>4. Attain knowledge of the Emergency provisions, when and how it is imposed, to know the additional powers the bestowed upon the Government at times of Emergency and to understand the Amendment procedure</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	Nature, Characteristics and Sources of Indian Constitution				02
2.	Fundamental rights and Fundamental duties - Concept of State, Right to Equality under Articles 14 and 15, Right to certain freedoms under Article 19, Right to Life and liberty under Article 21, Right to religion under Article 25 and 26, Right to remedy under Article 32 and Fundamental duties				06
3.	Indian Judiciary - Concept of Supreme Court and High Courts, Appointment of Judges, Independence of Judiciary, Jurisdictions of Supreme Court and High Courts				03
4.	Emergency Provisions - Concept of National Emergency under Article 352, Financial Emergency under Article 360 and President rule under Article 356 of the Constitution				04

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	<b>Total</b>	<b>15</b>
<b>Text Books</b>		
1. Dr. Durga Das Basu, <i>Introduction to the Constitution of India</i> , 24 <sup>th</sup> Edition, Lexis Nexis, 2019.		
<b>Reference Books</b>		
1. P. M. Bakshi, <i>The Constitution of India</i> , 17 <sup>th</sup> Edition, Universal Law Publishing, 2020.		
2. J. N. Pandey, <i>Constitutional Law of India</i> , 57 <sup>th</sup> Edition, Central Law Agency, 2020.		
3. N. A. Palkhivala, <i>We the people</i> , UBS Publishers Distributors, 1999.		



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**SVKM's Narsee Monjee Institute of Management Studies  
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<b>Program:</b> B Tech (Civil Engineering)				<b>Semester:</b> II	
<b>Course:</b> Construction Technology				<b>Code:</b> 702CI0C015	
<b>Teaching Scheme</b>			<b>Evaluation Scheme</b>		
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks- 100)</b>
2	0	0	2	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Engineering Workshop					
<b>Course Objective</b> This course imparts basic knowledge of construction activities and their sequence, the process of concreting from manufacturing to finishing. It aims to compare various types of flooring and their applications in different scenarios					
<b>Course Outcomes</b> After completion of the course, students will be able to - <ol style="list-style-type: none"> <li>1. Describe various construction activities and their sequence</li> <li>2. Explain the process of concreting from manufacturing to finishing</li> <li>3. Discuss various types of flooring and their applications</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>Excavation</b> Manual and mechanical method of Excavation, disposal of excavated material, dewatering of trenches, shoring and strutting of Trenches, precaution while excavation, fencing – caution signs.				<b>04</b>
2.	<b>Foundation</b> Necessity and Purpose of Foundation, Shallow Foundation, Spread foundation, raft foundation, deep foundation and its types, Precast concrete piles. Modern methods of pile installation.				<b>04</b>
3.	<b>Masonry</b> Terminology, Preparation, construction procedure, post construction precautions, brick masonry stretcher bond and half brick thick masonry, hollow and solid concrete block masonry, fixing of door and window frame in masonry, block masonry. Procedure of constructing un-coursed Rubble and coursed masonry. <b>Pointing &amp; Plastering</b> Necessity and types, methods of providing pointing and plastering.				<b>06</b>
4.	<b>Formwork and Scaffolding</b> Types, basic factors governing selection. Erecting and removal of formwork. Scaffolding types, precautions.				<b>04</b>
5.	<b>Concrete</b> Procedure of mixing concrete, manual and machine mixing, types of mixers, transporting, laying, compacting and curing of concrete, different types of vibrators, underwater concreting.				<b>06</b>

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6.	<b>Floors</b> Solid ground floor, plinth fillings, floor finish with murum, brick-bat concrete, Indian patent stone, cement tiles, China mosaic, floorings for special purposes such as factories, warehouses, stables, garages, railway platforms, upper floors: jack arch construction, mezzanine floors and lofts, false flooring for control rooms.	<b>06</b>
<b>Total</b>		<b>30</b>
<b>Text Books</b> 1. Rangwala S C, <i>Building Construction</i> , 33 <sup>rd</sup> Edition, Charotar Publications, 2016.		
<b>Reference Books</b> 1. Mathur S., <i>Building Construction Handbook</i> , SBS Publishers, 2012. 2. McKay, <i>Building Construction</i> , Pearson India, 2013. 3. Mantri Sandeep, <i>The A to Z of Practical Building Construction and its Management</i> , Mantri Publications, 2017.		



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Signature  
(Head of the Department)

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<b>Program:</b> B Tech All Programs [except CSBS, CSE(DS) 311 (VT)] MBA Tech All Programs B Tech Integrated All Programs				<b>Semester:</b> I / II/V/VI	
<b>Course:</b> Critical Thinking				<b>Code:</b> 702BS0C007	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Internal Continuous Assessment (ICA) (Marks - 100)	Term End Examinations (TEE)
2	0	0	0	Marks Scaled to 50	---
<b>Pre-requisite:</b> Nil					
<b>Course Objective</b> This course examines the basic nature of reasoning and the fallacies which prevent good reasoning and decision making. Both the theory and practice of critical thinking are covered. Emphasis will be on understanding the logical structure of an argument and on recognizing the influence of bias and emotional persuasion on decision making.					
<b>Course Outcomes</b> After completion of the course, students will be able to					
<ol style="list-style-type: none"> <li>1. Solve problems or take decisions by processing information in a clear, logical, reasoned and reflective manner</li> <li>2. Recognise, build and appraise arguments</li> <li>3. Analyse contexts effectively</li> <li>4. Recognise bias and its impact on decision making</li> </ol>					
<b>Detailed Syllabus</b>					
Unit	Description				Duration
1.	<b>Brain and Thinking:</b> Introduction to Thinking, Types of Thinking, Brain and Thinking, Curiosity, Creativity and Different thinking, Critical thinking basics, Meta thinking				10
2.	<b>Social, Psychological Aspects of Thinking:</b> Top barriers to critical thinking, Rationality Bounded Rationality and its model, Fast and Slow Thinking, Objectivity, Subjectivity, Assumptions and Skepticism. Paradigm shift, Perception, prejudice and stereotype, Attribution, Heuristics, Cognitive Biases and Errors, examining critical thinking, Critical Thinking Process, Framework, & Tools, Problems and critical thinking.				10
3.	<b>Deductive and Inductive:</b> Arguments, Principle of Clarity, Truth, Deductive validity, Conditional Propositions, Inductive reasoning, Inductive inferences, Deductive v/s Inductive, Formal fallacies, Informal fallacies.				10
	<b>Total</b>				<b>30</b>
<b>Text Books</b>					
1. Paul Herrick, <i>Think with Socrates: An Introduction to Critical Thinking</i> , 1 <sup>st</sup> edition, 2014.					



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2. Lewis Vaughan, *The Power of Critical Thinking*, 5<sup>th</sup> edition, 2012,

**Reference books:** NA



(Prepared by Corned Faculty/HOD)



<b>Program:</b> B. Tech (Computer Science)				<b>Semester:</b> III	
<b>Course:</b> Digital Circuits and Computer Architecture				Module Code: 702CS0C002	
<b>Teaching Scheme</b>			<b>Evaluation Scheme</b>		
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks- 100 in Question Paper)</b>
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Basic knowledge of Electronics Engineering					
<b>Course Objectives</b> The objectives of offering this course are to provide a brief overview of Boolean Algebra, Combinational Logic, and Sequential Logic; to understanding the fundamental structure and functions of a computer, including the arithmetic and logic units, as well as the implementation of fixed-point and floating-point arithmetic and finally to learn the different ways of communication with I/O devices.					
<b>Course Outcomes:</b> After successful completion of this course, students will be able to-  <ol style="list-style-type: none"> <li>1. Understand number systems and Boolean algebra concepts in Digital Systems.</li> <li>2. Apply concepts of Combinational and Sequential logic for designing Circuits.</li> <li>3. Understand the fundamental structure and functioning of a computer, as well as arithmetic operations, and Central Processing Unit.</li> <li>4. Understand the memory organization and working of I/O</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Boolean Algebra:</b> Binary logic functions, Boolean Laws, Truth tables, Associative and distributive properties, De-Morgan's Theorems.				3
2	<b>Combinational Logic and Circuits:</b> Switching equations, Canonical logic forms, Sum of product & Product of sums, Karnaugh maps, Simplification of expressions, Code conversion Design : Decoder, Encoder, Priority encoder, Multiplexers as function generators, Binary Full Adder, Subtractor, BCD adder				7
3	<b>Sequential Logic and Circuits:</b> Flip Flops: Clocked and edge triggered flip-flops, SR Flip-Flop, D Flip-Flop, JK Flip-Flop, T Flip-Flop. Registers: Serial input -serial output; serial input-parallel output; Parallel In -Parallel Out, Serial In -Serial Out. Design of Asynchronous and Synchronous Counters, Modulo Counters, UP- DOWN counter.				8
4	<b>Basic Structure of a Computer System</b> Functional Units, Basic Operational Concepts, Performance Instructions: Language of the Computer, Operations, Operands Instruction representation, Logical operations, decision making, MIPS Addressing.				3

5	<b>Arithmetic for Computers</b> Addition and Subtraction, Multiplication Division, Booth Multiplication, Floating Point Representation, Floating Point Operations	3
6	<b>Central Processing Unit</b> Major Components of CPU, Instruction Formats, Addressing Modes, Data Transfer and manipulation, Program Control, Subroutine Call and Return, RISC vs CISC, Pros and Cons of RISC and CISC.	6
7	<b>Memory Organization:</b> Internal Memory - Memory characteristics and memory hierarchy, Cache memory: Elements of cache design, Address mapping and translation-Direct mapping, Address mapping and translation-Associative mapping, Address mapping and translation -Set associative mapping, Performance characteristics of two level memory, Semiconductor main memory- Types of RAM, DRAM and SRAM. Semiconductor main memory- Advanced DRAM organizations, Chip logic, Memory module organization. High speed memories- Associative memory, High speed memories- Interleaved memory.	10
8	<b>Input and Output Unit:</b> Input and output- External Devices, Keyboard, Monitor, Disk drive and device driver. I/O modules- Programmed I/O, I/O modules-Interrupt Driven I/O, DMA. I/O modules- I/O channels and I/O processors, Serial transmission and synchronization.	5
	<b>Total</b>	45
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. M. Morris Mano, "Digital Design with an Introduction to Verilog HDL", PHI, 5<sup>th</sup> Edition 2013.</li> <li>2. William Stallings, "Computer Organization and Architecture: Designing for Performance", Pearson Education, 10th Edition 2019.</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. R P Jain, "Modern Digital Electronics", McGraw Hill Education, 4<sup>th</sup> Edition, 2013.</li> <li>2. B. Holdsworth," Digital Logic Design" Elsevier Science ,2<sup>nd</sup> Edition 2014.</li> <li>3. Andrew Tannenbaum, Todd Austin, "Structured Computer Organization", 6th Edition, Prentice-Hall,2013.</li> <li>4. David Harris Sarah Harris, "Digital Design and Computer Architecture", Second Edition, Elsevier Science, 2012.</li> <li>5. V. Carl Hamacher and Zaky, "Computer Organization",5th Edition, Tata Mc-Graw Hill, 2011.</li> </ol>		

*Seena Shal*

Signature

(Head of the Department)

<b>Program:</b> B.Tech. and MBA Tech. (All branches [except CSBS, CSE(DS) 311 (VT)] and Civil )				<b>Semester:</b> I/II	
<b>Course:</b> Digital Manufacturing Laboratory				<b>Code:</b> 702MEOC016	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks-50)</b>	<b>Term End Examinations (TEE) (Marks -100)</b>
0	2	0	1	Marks Scaled to 50	-
<b>Pre-requisite:</b> Nil					
<b>Course Objective</b> The course aims to introduce digital fabrication tools and methods. It familiarizes the students with various principles of 3D printing along with solid modeling, part slicing and fabrication using Fused deposition modelling (FDM) process.					
<b>Course Outcomes</b> After completion of the course, students will be able to - <ol style="list-style-type: none"> <li>1. Describe FDM Technology</li> <li>2. Prepare given model for 3D printing</li> <li>3. Create products of complex geometries using 3D printer</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Introduction to Digital Manufacturing and Technical Design</b> Overview of 3D printing laboratory equipment, pre-fabricating requirements - printer bed size, hardware and materials required.				<b>02</b>
2	<b>3D Printing Process steps</b> 3D printing concepts for converting CAD model into real parts, process steps involved in 3DP, creation of solid model, conversion to STL file, slicing the file or select a STL model from online resources, machine set up, build.				<b>06</b>
3	<b>3D Printing with Fused Deposition Modeling (FDM)</b> Operating principle and workflow of a Fused Deposition Modeling (FDM) 3D Printing machine, effect of layer thickness, infill density, part orientation and overhang angles on FDM printed parts, study of lithophane.				<b>10</b>
4	<b>Project Involving Ideation, Design and 3D Printing</b> Briefing of idea, designing of product, solid model creation, final fabrication using 3D printer.				<b>12</b>
	<b>Total</b>				<b>30</b>
<b>Text Books</b>					



(Prepared by Corned Faculty/HOD)



1. Noorani, Rafiq, "3D Printing: Technology, Applications, and Selection", CRC Press, 1<sup>st</sup> edition, 2017.
2. Filemon Schöffner, Ben Redwood, Brian Garret, *The 3D Printing Handbook: Technologies, design and applications*, 3D Hubs, 2017

**Reference Books**

1. Chua, C. L., Lim, K., "Rapid Prototyping: Principles and Applications", World Scientific Publishing Co. Pte. Ltd., 3<sup>rd</sup> edition, 2010

**Laboratory Work**

6 to 8 laboratory exercises (and a mini project) based on the syllabus.

**List of Experiments**

- 1) To design an object using an open source software (Tinkercad).
- 2) To understand the working of slicing software (Repetier Host)
- 3) To examine the effect of layer thickness, infill density and orientation on build time and material consumption.
- 4) To generate code for designed object using Repetier host software for 3D printing.
- 5) To study the components of a Fused Deposition Modeling (FDM) 3D Printing machine.
- 6) To prepare FDM machine for printing the given object.
- 7) To print object using FDM machine.
- 8) To carry out post processing on the printed object.
- 9) To evaluate the effect of overhang angles on build quality of polylactic acid (PLA) and Acrylonitrile butadiene styrene (ABS) parts made using FDM.
- 10) To build parts of same geometry in PLA and ABS and compare the bending strength.
- 11) To create an object using lithophane technique.
- 12) Mini project.



(Prepared by Corned Faculty/HOD)



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

<b>Program: B Tech (All Program except Civil, CSBS, CSE(DS)311(VT) / MBA Tech (All Program)</b>				<b>Semester: I / II</b>	
<b>Course: Electrical and Electronics Workshop</b>				<b>Code: 702EX0C021</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks ---)</b>
0	2	0	1	Marks Scaled to 50	--
<b>Pre-requisite - Nil</b>					
<b>Course Objective</b> This course gives the basic working knowledge required for the production of various engineering products. It is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the engineer working in the various engineering industries and workshops.					
<b>Course Outcomes</b> After completion of the course, students will be able to - <ol style="list-style-type: none"> <li>1. Identify correct testing instruments and tools for various tasks</li> <li>2. Build PCB circuits using through hole and SMD components for small applications</li> <li>3. Make use of required electrical components for building domestic wiring circuits</li> <li>4. Assemble PC hardware and configure network topology</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>Familiarization and application of testing instruments and commonly used measuring instruments and tools</b> Multimeter, Function generator, Power supply, Digital Storage Oscilloscope (DSO) etc. Soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Tweezers, Crimping tool, Hot air soldering and de-soldering.				4
2.	<b>Printed circuit boards (PCB)</b> Types, Single sided, Double sided, PTH, Processing methods, schematics design using open source software and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling. <b>Soldering and Joining Processes -</b> Introduction, Techniques and circuit assembly. Assembling of electronic circuits using SMT (Surface Mount Technology) components/stations.				8
3.	<b>Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses and connectors</b> Wiring of fan, tube light, two-way control (staircase wiring), Earthing- Need, objectives and types - Plate, Pipe, Rod and maintenance free earthing. Understanding of electric shock, understand rating and working of Miniature Circuit Breakers (MCB), Electric Leakage Circuit Breaker (ELCB), Residual Current Circuit Breaker (RCCB) and Fuse.				8

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

4.	<b>Introduction to PC Hardware -</b> Assembly of I/O peripherals, memories and storage devices, Central Processing Unit (CPU), Graphic Processing Unit (GPU), and SMPS. LAN configuration using device (MAC) address, Switch/Hub configuration (4/8 port), router configuration using GSM. Study of ARDUINO boards (uno/mega), sensors - Temperature, Humidity, LDR, Smoke, Ultrasonic etc., Shields - Motor driver, wi-fi, IO, DC gear motors, Stepper motor.	10
	<b>Total</b>	<b>30</b>

**Text Books**

1. R.S. Khandpur, *Printed Circuit Boards: Design, Fabrication, assembly and testing*, 3<sup>rd</sup> Edition, Tata McGraw Hill, 2017.
2. Dan Gookin, *Troubleshooting and maintaining your PC*, 3<sup>rd</sup> Edition, Wiley, 2017.
3. R.P. Singh, *Electrical Workshop: Safety, Commissioning, maintenance and testing of electrical equipment*, 3<sup>rd</sup> Edition, IK International Publishing, 2012.

**Reference Books**

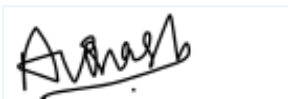
1. John H. Watt, Terrell Croft, *American Electricians' Handbook: A Reference Book for the Practical Electrical Man*, 9<sup>th</sup> Edition, McGraw-Hill, 2018.

**Laboratory Work**

6 to 8 laboratory exercises (and a practicum) based on the syllabus.

List of experiments:

1. To identify electronic components with specification (Functionality, type, size, color coding, package, symbol, cost etc). (wires, Cables, Connectors, Fuses, Switches, Relays, Heat sink etc.)
2. To understand and use measuring and testing instruments (Mutimeter, Function generator, Power supply, Digital Storage Oscilloscope)
3. To design PCB schematics using suitable software.
4. To fabricate single sided PCB for a simple electronic circuit.
5. To assemble and test an electronic circuit.
6. To study functioning of circuit breakers.
7. Experiment based on house hold wiring of appliances such as fan, tube light etc.
8. Dis-assemble and assemble of PC.
9. To configure LAN, switch and router for network topology.
10. To simulate and implement simple applications using ARDUINO.
11. Practicum



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(Head of the Department)





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

<b>Program:</b> B Tech All Program (except B Tech CSBS, CSE (DS) 311 (VT)), MBA Tech (All Program), B Tech Integrated Mechanical, Information Technology, Data Science and Computer				<b>Semester:</b> I / II / III / V / VI	
<b>Course:</b> Elements of Biology				<b>Code:</b>	
<b>Teaching Scheme</b>			<b>Evaluation Scheme</b>		
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks - 100)</b>
3	0	0	3	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Fundamental knowledge of physics, chemistry, and mathematics.					
<b>Course Objective:</b> To introduce students to modern biology with an emphasis on evolution of biology as a multi-disciplinary field, to make them aware of application of engineering principles in biology. This will encourage engineering students to think about solving biological problems with engineering tools. They will also be exposed to the application of engineering principles in biology and engineering robust solutions, inspired by biological examples.					
<b>Course Outcomes:</b> After completion of the course, students will be able to –					
<ol style="list-style-type: none"> <li>1. Identify key principles of biomimicry and develop engineering solutions for different fields</li> <li>2. Classify microorganisms and their molecular properties and analyze the role of DNA as genetic material in transferring information among living organisms</li> <li>3. Describe the fundamental building blocks of life, including carbohydrates, amino acids, proteins, and lipids, and illustrate their functions in cellular processes and metabolism</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>Introduction to Biomimicry</b> Applications of biology in engineering, Biology as an independent scientific discipline, Importance of studying biology, Exploring biological discoveries of the 19 <sup>th</sup> century: Brownian motion and beyond. Applications of biology: Biotechnology, Bioremediation, Bioinformatics, etc., Biologically inspired engineering. Biomimicry in engineering using designs, processes, and ecosystems. Sustainable engineering. Case study: The Kingfisher's beak inspired high-speed Bullet trains.				<b>09</b>
2.	<b>The fundamental building blocks of life</b> Unity in diversity of life, Molecules of life. Structure and functions of carbohydrates, amino acids, proteins, and lipids. Hierarchy in protein structure. Primary secondary, tertiary, and quaternary structure. Proteins as enzymes, transporters, receptors, and structural elements. Nucleotides and DNA/RNA.				<b>06</b>
3.	<b>Genetics and Information Transfer</b> Genetics as the foundation of biology, Mendel's laws, Segregation and independent assortment, Gene mapping, Single gene disorders, Molecular basis of genetic information transfer, DNA as genetic material, Genetic code, Universality of genetic				<b>09</b>

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	code, DNA replication, Protein synthesis, Central dogma of life: transcription and translation. Case study: Breaking the storage barrier by storing massive amounts of data on DNA.	
4.	<b>Enzymes</b> Catalysis as a crucial element for life, Enzymology, Enzyme-catalyzed reactions, Enzyme-substrate complex, Mechanism of action, Enzyme classification, Enzyme kinetics, Enzyme inhibition, Industrial applications of enzymes.	06
5.	<b>Metabolism</b> Metabolism: catabolism and anabolism, Principles of energy transactions, ATP as energy currency, ATP cycle, Cellular respiration, Anaerobic respiration, Aerobic respiration, Metabolic regulation, Bioenergetics.	06
6.	<b>Microbiology and Drug Discovery</b> Introduction to biological classification: criteria of organization and hierarchy of life. Ecological aspects of single-celled organisms, Identification, and classification of microorganisms, Microbial growth kinetics, Microbial biotechnology. Drug discovery, Model organisms for biological studies <i>E. coli</i> , <i>S. cerevisiae</i> , <i>D. melanogaster</i> , <i>C. elegans</i> , <i>A. thaliana</i> , <i>M. musculus</i> . Vaccines, Targeted drug delivery Case study: Development of a nanoparticle-based vaccine delivery system for cancer immunotherapy.	09
	<b>Total</b>	<b>45</b>
<b>Textbooks:</b>		
<ol style="list-style-type: none"> <li>1. Arthur T. Johnson, <i>Biology for Engineers</i>, 2<sup>nd</sup> Edition, CRC Press Taylor &amp; Francis group, 2018.</li> <li>2. Prescott, L.M J.P. Harley and C.A. Klein, <i>Microbiology</i>, 12<sup>th</sup> edition, McGraw-Hill Higher Education, 2022.</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B., <i>Biology: A global approach</i>, 12<sup>th</sup> edition, Pearson Education Ltd., 2020.</li> <li>2. Nelson, D. L.; Lehninger, A. L.; and Cox, M. M., <i>Principles of Biochemistry</i>, 8<sup>th</sup> edition, W.H. Freeman, 2020.</li> </ol>		
<b>Laboratory/Tutorial details</b>		
<ul style="list-style-type: none"> <li>• Not applicable.</li> </ul>		

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**(Prepared by Concerned Faculty/HOD)**

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

<b>Program:</b> B Tech (All Programs except CSBS and CSE(DS)311(VT)) /MBA Tech (All Programs)				<b>Semester:</b> I / II	
<b>Course:</b> Engineering Graphics and Design				<b>Code:</b> 702ME0C001	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks-50)</b>	<b>Term End Examinations (TEE) (Marks-100)</b>
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite: -</b>					
<b>Course Objectives</b> This course is aimed at providing basic understanding of the fundamentals of Engineering Graphics; mainly visualization, graphics theory, standards & conventions of drawing, the tools of drawing and the use of drawings in engineering applications. The course has been structured to include sufficient simulations which would aid the student in visualization of three-dimensional objects and developing the drawing.					
<b>Course Outcomes</b> After completion of the course, students will be able to- <ol style="list-style-type: none"> <li>1. Interpret and communicate drawings effectively using different types of curves, lines, planes</li> <li>2. Analyze the concepts of projections and section of right regular solids with their development</li> <li>3. Apply the techniques, skills, and modern tools to create projections of machine components with the help of software</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>Introduction to Engineering Drawing</b> Principles of engineering graphics and their significance, usage of drawing instruments, lettering, numbering; Conic sections (ellipse, parabola, hyperbola - general method only) including the rectangular hyperbola; cycloid, epi-cycloid, hypo-cycloid and involutes.				04
2.	<b>Projections of Lines and Planes</b> Introduction to projections of points, conventions; points locating in all quadrants. <b>Projections of Lines</b> Introduction, lines inclined to one plane and parallel to other plane, lines inclined to both planes. <b>Projections of Planes</b> Introduction, types of planes, plane surface inclined to both reference planes, projection of auxiliary planes				05
3.	<b>Projections of Regular Solids</b> Introduction to projection of regular solids, types of solids; Projections of regular solids (prisms, pyramids, cylinders, cones) covering those inclined to both the reference planes				05

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4.	<b>Section and Development of Regular Solids</b> Introduction to section and development of regular solids; Section of regular prisms, pyramids, cylinders, cones; Development of surfaces of right regular solids namely prisms, pyramids, cylinders and cones.	04
5.	<b>Orthographic Projections</b> Principles of orthographic projections, conventions used in quadrant formation, conversion of isometric models to orthographic views and vice-versa, orthographic views of geometrical solids and objects from industry.	04
6.	<b>Sectional Orthographic Projections</b> Principles of sectional orthographic projection, need of sectional views, types of sections, hatching of sectioned part and principles, sectional orthographic views of geometrical solids and objects from industry.	04
7.	<b>Isometric Projections</b> Principles of isometric projection-isometric scale, isometric views, conventions; isometric views of lines, planes, simple and compound solids; conversion of orthographic views to isometric models to and vice-versa; isometrics projections of given views.	04
	<b>Total</b>	<b>30</b>
<b>Text Books</b>		
1. N. D. Bhatt, V. M. Panchal and P. R. Ingle, <i>Engineering Drawing</i> , 53 <sup>rd</sup> Edition, Charotar Publishing House, 2014.		
<b>Reference Books</b>		
1. M. B. Shah and B. C. Rana, <i>Engineering Drawing</i> , 2 <sup>nd</sup> Edition, Pearson Education, 2014. 2. K. Venugopal and V. Prabhu Raja, <i>Engineering Drawing + AutoCAD</i> , 6 <sup>th</sup> edition, New Age International (P) Ltd. Publishers, 2011.		
<b>Laboratory Work</b>		
8 to 10 experiments based on the syllabus.		



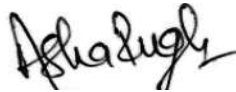
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SVKM's Narsee Monjee Institute of Management Studies  
Mukesh Patel School of Technology Management & Engineering

<b>Program:</b> B Tech /MBA Tech (Mechanical Engineering) B Tech (Civil Engineering and Mechatronics Engineering)				<b>Semester:</b> III II & III	
<b>Course :</b> Engineering Mechanics				<b>Code:</b> 702ME0C013	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks-50)</b>	<b>Term End Examinations (TEE) (Marks -100)</b>
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Nil					
<b>Course Objective</b> In this course students will get acquainted with the various systems of forces. It is designed for the students to understand the concept of static equilibrium and apply the equations of motion to rigid bodies.					
<b>Course Outcomes</b> After completion of the course, the student will be able to - <ol style="list-style-type: none"> <li>1. Determine the resultant of various systems of forces</li> <li>2. Analyse the system of forces in equilibrium</li> <li>3. Evaluate the displacement, velocity and acceleration of a moving bodies</li> <li>4. Determine the forces developed on rigid bodies subjected to displacements and rotations</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>System of Forces</b> Rectangular components of forces in space, moment, couple, Varignon's theorem, resolution of forces, resultant of force system (coplanar, non-coplanar), concept of virtual work, principle of virtual work.				<b>05</b>
2.	<b>Application of System of Forces and Equilibrium</b> Conditions of equilibrium, types of support, loads and beams, free body diagrams, support reactions. <b>Friction</b> Laws of friction, angle of friction, angle of repose, cone of friction, equilibrium of bodies on rough horizontal and inclined plane, application to inclined planes, wedges, ladder & screw jack. <b>Analysis of Pin Jointed Plane Trusses</b> Perfect truss, analysis using method of joints and method of sections.				<b>08</b>
3.	<b>Centroid and Moment of Inertia</b> Centroid, moment of inertia, polar moment of inertia, and product of inertia, parallel and perpendicular axis theorem.				<b>03</b>
4.	<b>Kinematics of Particle</b> Velocity and acceleration in terms of rectangular coordinate system, rectilinear motion, curvilinear motion, projectile motion, tangential and normal component of acceleration, acceleration - time, velocity- time graphs and their uses, relative velocity				<b>07</b>

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	<b>Kinematics of Rigid Bodies</b> Translation, pure rotation and plane motion of rigid bodies, instantaneous centre of rotation for the velocity for bodies in plane motion, link mechanisms (up to two links).	
5.	<b>Kinetics of Particles</b> Newton's laws of motion, D'Alembert's principle, equation of dynamic equilibrium, linear motion, curvilinear motion. <b>Kinetics of Rigid Bodies</b> D'Alembert's principle for bodies under translational motion, rotational motion about a fixed axis and plane motion.	07
	<b>Total</b>	<b>30</b>
<b>Text Books</b> 1. Beer & Johnston, <i>Engineering Mechanics</i> , 12 <sup>th</sup> Edition, Tata McGraw Hill, 2020. 2. R. C. Hibler, <i>Engineering Mechanics</i> , 14 <sup>th</sup> Edition, Pearson Education, 2017.		
<b>Reference Books</b> 1. F. L. Singer, <i>Engineering Mechanics</i> , Harper & Raw Publication, 1954. (Classic Book) 2. D. S. Kumar, <i>Engineering Mechanics</i> , 12 <sup>th</sup> Edition, Tata McGraw Hill, 2013.		
<b>Laboratory Work</b> 8 to 10 experiments based on the syllabus.		



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SVKM's NMIMS Deemed-to-be University  
Mukesh Patel School of Technology Management and Engineering

<b>Program:</b> B Tech All Program [except CSBS, CSE(DS) 311 (VT), MBA Tech All Program, B Tech Integrated Mechanical, Information Technology, Computer, Data Science				<b>Semester:</b> I /II / V / VI	
<b>Course:</b> English Communication				<b>Code:</b> 702BS0C059	
<b>Teaching Scheme</b>			<b>Evaluation Scheme</b>		
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE)</b>
0	2	0	1	Marks Scaled to 50	-
<b>Pre-requisite:</b> -					
<b>Course Objective</b> The objective of the course is to develop students' competency in the English language in relation to listening, speaking and reading.					
<b>Course Outcomes</b> After completion of the course, the students will be able to - <ol style="list-style-type: none"> <li>1. Use their knowledge of vocabulary and grammar to articulate their ideas effectively</li> <li>2. Demonstrate effective listening and speaking skills in oral communication situations such as speeches, conversations, power-presentations, etc</li> <li>3. Apply different reading techniques as needed to read passages effectively</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>Vocabulary Building through Literature</b> Introduction to root and affixes, Synonyms and antonyms, Idioms and phrasal verbs, Commonly confused words, Words: denotation, connotations and usage				06
2.	<b>Useful Practices of Grammar</b> Articles and Prepositions, Subject-verb agreement, noun-pronoun agreement, Personal Pronouns (First Person, Second Person, Third Person), Modifiers – Errors in Modifiers (Misplaced, Dangling, Squinting), Redundancies and clichés, Tenses, Parallelism, Punctuation, Sentences, clauses and phrases, Active and passive voice, direct and indirect speech				06
3.	<b>Oral Communication</b> Listening skills, Public speaking, impromptu speaking, Situational dialogues				06
4.	<b>Comprehension through Short Fiction</b> Fast Reading, Skimming, Scanning, Active Reading, Cloze Reading, SQ3R Technique				06



(Prepared by Cornead Faculty/HOD)





SVKM's NMIMS Deemed-to-be University  
Mukesh Patel School of Technology Management and Engineering

5.	<b>Presentations</b> Planning – occasion, audience, purpose, Outlining – introduction, main body, conclusion, Visual slide design, Verbal, non-verbal communication	<b>06</b>
	<b>Total</b>	<b>30</b>
<b>Text Books</b> <ol style="list-style-type: none"><li>1. Meenakshi Raman and Sangeeta Sharma, <i>Technical Communication: Principles and Practice</i>, 3<sup>rd</sup> ed. Oxford University Press, 2015</li><li>2. Mark Lester and Larry Beason, <i>The McGraw-Hill Education Handbook of English Grammar and Usage</i>, 3<sup>rd</sup> ed. McGraw Hill, 2019</li></ol>		
<b>Reference Books</b> <ol style="list-style-type: none"><li>1. Bovee Courtland and John Thill, <i>Business Communication Today</i>, Pearson Education, 14<sup>th</sup> Ed. 2017</li><li>2. John Seely, <i>Oxford Guide to Effective Writing and Speaking</i>, Oxford University Press, 3<sup>rd</sup> Ed. 2013</li><li>3. Michael Swan, <i>Practical English Usage</i>, Oxford University Press, 4<sup>th</sup> Ed. 1995</li><li>4. F.T Wood, <i>Remedial English Grammar</i>. Macmillan. 2007</li></ol>		
<b>Laboratory Work</b> 8 to 10 experiments based on the syllabus.		



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

<b>Program:</b> B Tech/ MBA Tech / B Tech Integrated				<b>Semester :</b> I/ II/ IV/ V/VI/ VII/ VIII	
<b>Course:</b> Environmental Science				<b>Code:</b> 702CI0C014	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks- ---)</b>
1	0	1	2	Marks Scaled to 50	--
<b>Pre-requisite:</b> Fundamental Knowledge of physics, chemistry and mathematics					
<b>Course Objective</b> This course aims to understand the multidisciplinary nature of environmental sciences, greenhouse effect and climate change. It also aims to discuss the basics of natural resources, biodiversity, environmental pollution.					
<b>Course Outcomes</b> After completion of the course, the student will be able to - <ol style="list-style-type: none"> <li>1. Explain the concept of natural resources, ecosystem and biodiversity</li> <li>2. Relate the various aspects of environmental pollutions with its cause and effect</li> <li>3. Explain the greenhouse effect and climate change</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Multidisciplinary nature of environmental science</b> Definition, scope and importance of environmental sciences.				01
2	<b>Natural Resources</b> Natural resources: Forest resources, Water resources, Mineral resources, Food resources. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.				02
3	<b>Ecosystems</b> Concept of an ecosystem. Structure and function of an ecosystem. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features of the following ecosystem:- a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems.				02
4	<b>Biodiversity</b> Definition: genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.				02
5	<b>Environmental Pollution</b> Definition, Cause and effects for Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards and Solid waste pollution.				04
6	<b>The Science of Climate Change</b> Greenhouse effect, Global warming, Global environmental changes, Acid rain Ozone layer depletion, Carbon footprint				04
<b>Total</b>					<b>15</b>

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

**Text Books**

1. Erach Bharucha, *Textbook of Environmental Studies*, 2<sup>nd</sup> Edition, University Press, 2019.

**Reference Books**

1. MP Poonia & SC Sharma, *Environmental Studies*, 1<sup>st</sup> Edition, Khanna Publishing House, 2017.
2. Rajagopalan, *Environmental Studies*, 3<sup>rd</sup> Edition, Oxford University Press, 2015.

**Tutorial Work**

8 to 10 Tutorial exercises based on the syllabus.



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Signature  
(Head of the Department)

<b>Program:</b> B. Tech. Computer Science and Business Systems				<b>Semester :</b> II	
<b>Course:</b> Fundamentals of Economics				<b>Code :</b> 702TG0C004	
<b>Teaching Scheme</b>			<b>Evaluation Scheme</b>		
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks- 100 in Question Paper)</b>
2	0	0	2	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Nil					
<b>Course Objective:</b>					
1. Understand fundamental financial concepts of Microeconomics and Macroeconomics.					
<b>Course Outcomes:</b>					
After completion of the course students would be able to:					
1. Describe how microeconomic models can be used to consider fundamental economic choices of households and firms					
2. Explain how macroeconomic models can be used to analyse the economy as a whole					
3. Elucidate how government policy influences microeconomic choices and macroeconomic outcomes					
<b>Detailed Syllabus:</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>Microeconomics:</b> <i>Principles of Demand and Supply</i> – Supply Curves of Firms – Elasticity of Supply; <i>Demand Curves of Households</i> – Elasticity of Demand; Equilibrium and Comparative Statics (Shift of a Curve and Movement along the Curve); <i>Welfare Analysis</i> – Consumers’ and Producers’ Surplus – Price Ceilings and Price Floors; <i>Consumer Behaviour</i> – Axioms of Choice – Budget Constraints and Indifference Curves; <i>Consumer’s Equilibrium</i> – Effects of a Price Change, Income and Substitution Effects – Derivation of a Demand Curve; <i>Applications</i> – Tax and Subsidies – Intertemporal Consumption – Suppliers’ Income Effect; <i>Theory of Production</i> – Production Function and Iso-quants – Cost Minimization; <i>Cost Curves</i> – Total, Average and Marginal Costs – Long Run and Short Run Costs; <i>Equilibrium of a Firm Under Perfect Competition; Monopoly and Monopolistic Competition</i>				15



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2.	<p><b>Macroeconomics:</b> <i>National Income and its Components – GNP, NNP, GDP, NDP; Consumption Function; Investment; Simple Keynesian Model of Income Determination and the Keynesian Multiplier; Government Sector – Taxes and Subsidies; External Sector – Exports and Imports; Money – Definitions; Demand for Money – Transactionary and Speculative Demand; Supply of Money – Bank’s Credit Creation Multiplier; Integrating Money and Commodity Markets – IS, LM Model; Business Cycles and Stabilization – Monetary and Fiscal Policy – Central Bank and the Government; The Classical Paradigm – Price and Wage Rigidities – Voluntary and Involuntary Unemployment</i></p>	15
	<b>Total</b>	<b>30</b>
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. Pindyck, Robert S., and Daniel L. Rubinfeld, <i>Microeconomics</i></li> <li>2. Dornbusch, Fischer and Startz, <i>Macroeconomics</i></li> <li>3. Paul Anthony Samuelson, William D. Nordhaus, <i>Economics</i></li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Hal R, Varian, <i>Intermediate Microeconomics: A Modern Approach.</i></li> <li>2. N. Gregory Mankiw, <i>Principles of Macroeconomics.</i></li> </ol>		

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(Prepared by Corned Faculty/HOD)

<b>Program:</b> B Tech All Program [except CSBS, CSE(DS) 311 (VT)] MBA Tech All Program B Tech Integrated Mechanical ,Computer, Data Science				<b>Semester :</b> I/ II/VI	
<b>Course:</b> Linear Algebra and Differential Equations				<b>Code:</b> 702BS0C051	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks- 100)</b>
3	0	1	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Knowledge of fundamental concepts in Algebra, Differential and Integral Calculus.					
<b>Course Objective</b> This course aims to instil in prospective engineers knowledge of concepts and techniques in Linear Algebra and Differential Equations. It also prepares the students to deal with advanced level of Mathematics and applications that would be essential for their disciplines.					
<b>Course Outcomes</b> After completion of the course, students will be able to- <ol style="list-style-type: none"> <li>1. demonstrate understanding of the fundamental concepts of Linear Algebra and carry out related computational skills</li> <li>2. use effective mathematical methods for solving Differential Equations</li> <li>3. analyse functions, matrices and equations</li> <li>4. apply Calculus techniques and Algebraic skills to solve real life problems</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>Linear Equations and Vector Spaces</b> Rank of Matrix, System of linear equations, Vector space, Subspace of vector space, Linear span, Linear independence and dependence, Basis, Dimension.				10
2.	<b>Linear Transformation and Eigenvalues</b> Linear transformation, Matrix associated with linear transformation, Composition of linear maps, Kernel and Range of a linear map, Rank-Nullity Theorem, Inverse of a linear transformation, Cayley- Hamilton Theorem, Eigenvalues, Eigenvectors, Eigenvalues of symmetric, skew-symmetric, Hermitian and Skew-Hermitian matrices, Diagonalization, Orthogonal Diagonalization of a real symmetric matrix.				12
3.	<b>First order Ordinary Differential Equations</b> Exact equations, Equations reducible to exact equations using integrating factors, Linear equations, Bernoulli equation, Orthogonal trajectories.				05

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4.	<b>Higher order Ordinary Differential Equations</b> Higher order linear differential equations with constant coefficients, operator method, undetermined coefficients, Wronskian, variation of parameters method, Euler-Cauchy equation, power series solution: Example - Legendre and Bessel Differential Equations.	12
5.	<b>Partial Differential Equations</b> Introduction, Formation of Partial Differential Equations, Classification of second order Partial Differential Equations, Integrals of Partial Differential Equations, Solutions of Partial Differential Equations by the Method of Direct Integration, separation of variables method to simple problems in Cartesian coordinates, Initial & boundary value problems and solutions by separation of variables.	06
<b>Total</b>		<b>45</b>
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. B.V. Ramana, <i>Higher Engineering Mathematics</i>, 1<sup>st</sup> Edition , McGraw Hill Education, 2017.</li> <li>2. B.S. Grewal, <i>Higher Engineering Mathematics</i>, 44<sup>th</sup> Edition, Khanna Publishers, 2017.</li> <li>3. D. Poole, <i>Linear Algebra: A Modern Introduction</i>, 3<sup>rd</sup> Edition , Brooks/Cole, 2010.</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. G. B. Thomas, <i>Calculus</i>, Pearson, 13<sup>th</sup> Edition 2014.</li> <li>2. Veerarajan T, <i>Engineering Mathematics- I</i>, 1st Edition, McGraw-Hill Education, 2016.</li> <li>3. Erwin Kreyszig, <i>Advanced Engineering Mathematics</i>, 10<sup>th</sup> Edition ,Wiley India, 2017.</li> <li>4. G. Strang, <i>Introduction to linear algebra</i>, 5<sup>th</sup> Edition, Wellesley Cambridge Press, 2016.</li> <li>5. G. F. Simmons, <i>Differential equations with applications and historical notes</i>, 2<sup>nd</sup> Edition McGraw-Hill Education, 2017.</li> <li>6. W. E. Boyce and R. C. DiPrima, <i>Elementary Differential Equations and Boundary Value Problems</i>, 9<sup>th</sup> Edition, ,Wiley India, 2015.</li> <li>7. S.L. Ross, <i>Differential Equations</i>, 3<sup>rd</sup> Edition,Wiley India, 2016</li> <li>8. H. K. Dass, <i>Advanced Engineering Mathematics</i>, 22<sup>nd</sup> Edition ,S. Chand, 2019.</li> </ol>		
<b>Tutorial Work</b>		
8 to 10 Tutorial exercises based on the syllabus.		



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Mukesh Patel School of Technology Management and Engineering

<b>Program:</b> B. Tech. Computer Science and Business Systems				<b>Semester :</b> II	
<b>Course:</b> Linear Algebra				<b>Code:</b> 702BS0C026	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks- 100)</b>
3	0	1	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Knowledge of Basic Concepts in Algebra.					
<b>Course Objective</b> This course aims at providing adequate exposure to the theory and applications of Linear Algebra. It develops in students the computational competency in the subject and an ability to apply the theoretical constructs and computational techniques to solve problems within Engineering domain					
<b>Course Outcomes</b> After completion of the course, students will be able to- <ol style="list-style-type: none"> <li>1. Demonstrate understanding of fundamental concepts of linear algebra</li> <li>2. Make use of computational techniques of linear algebra to solve related problems</li> <li>3. Analyse linear transformations, systems of linear equations and matrices</li> <li>4. Demonstrate understanding of applications of linear algebra</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>Matrices and Determinants</b> Introduction to Matrices and Determinants; Solution of Linear Equations; Cramer's rule; Inverse of a Matrix.				07
2.	<b>Rank of Matrix</b> Vectors and linear combinations; Rank of a matrix; Gaussian elimination; LU Decomposition; Solving Systems of Linear Equations using the tools of Matrices.				08
3.	<b>Vector Space</b> Vector space; Basis; Dimension; Orthogonality; Projections; Gram-Schmidt orthogonalization and QR decomposition.				12
4.	<b>Linear transformation, Eigenvalues and vectors</b> Eigenvalues and Eigenvectors; Cayley Hamilton Theorem, Diagonalisation; Positive definite matrices; Linear transformations; Hermitian and unitary matrices.				11
5.	<b>Introduction to applications</b> Singular value decomposition and Principal component analysis; Introduction to their applications in Image Processing and Machine Learning.				07



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Total	45
<b>Text Books</b> <ol style="list-style-type: none"><li>1. David Poole, <i>Linear Algebra: A Modern Introduction</i>, Brooks/Cole, Cengage Learning, 4th Edition 2014.</li><li>2. B. S. Grewal, <i>Higher Engineering Mathematics</i>, Khanna Publication, 44<sup>th</sup> Edition 2017.</li></ol>	
<b>Reference Books</b> <ol style="list-style-type: none"><li>1. David C. Lay, Steven R Lay, Judi J McDonald, <i>Linear Algebra and its applications</i>, Pearson, 5th Edition 2015.</li><li>2. Gilbert Strang, <i>Introduction to linear algebra</i>, Wellesley- Cambridge Press, 5th Edition 2016.</li><li>3. R C Gonzalez and R E Woods, <i>Digital Image Processing</i>, Pearson, 4th Edition 2018.</li></ol>	
<b>Web Reference</b> <ol style="list-style-type: none"><li>1. <a href="https://machinelearningmastery.com/introduction-matrices-machine-learning/">https://machinelearningmastery.com/introduction-matrices-machine-learning/</a></li></ol>	
<b>Tutorial Work</b> 8 to 10 Tutorial exercises based on the syllabus.	



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Mukesh Patel School of Technology Management & Engineering**

<b>Program:</b> B Tech/ MBA Tech/BTI				<b>Semester:</b> II/III/IV/V/VI/VII	
<b>Course :</b> Management Accounting for Engineers				<b>Code:</b> 702TF0C001	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA)  (Marks - 50)</b>	<b>Term End Examinations (TEE)  (Marks - 100)</b>
2	---	---	2	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> NIL					
<b>Course Objective</b> The course provides a conceptual understanding of various aspects of cost accounting - cost ascertainment, cost analysis, and use information for managerial decision making					
<b>Course Outcomes</b> After completion of the course, the student will be able to -					
<ol style="list-style-type: none"> <li>1. Explain the concepts of Financial and Cost Accounting</li> <li>2. Build a cost sheet of a product</li> <li>3. Plan a flexible budget</li> <li>4. Analyse the various costs and variances in costs</li> <li>5. Recommend a suitable decision</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	Conceptual framework of Financial Accounting				4
2	Introduction to Cost and Management Accounting				2
3	<b>Cost</b> Concepts and Classification				2
4	Material Control				4
5	Single or Output costing				2
6	Marginal Costing and CVP analysis				4
7	Standard Costing and Variance Analysis				4
8	Budgeting				4
9	Activity Based Costing				4
	<b>Total</b>				<b>30</b>
<b>Text Book</b>					
<ol style="list-style-type: none"> <li>1. Lal. J., &amp; Srivastava, S, <i>Cost accounting</i>, Tata McGraw Hill , 5/e, New Delhi, 2013</li> <li>2. Ramanathan, S., <i>Accounting for Management</i> , latest reprint Oxford University Press, New Delhi, 2014</li> </ol>					

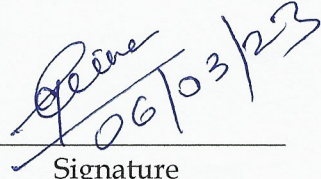
Approved in Academic Council dated 14.02.2020 for Academic year 2023-24



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

**Reference Books**

1. Horngren, C., Datar, S. & Rajan, M , *Cost accounting: A managerial emphasis*, Pearson Publication, 15/e ,New Delhi , 2014
2. Khan, M.Y., & Jain, P.K., *Management Accounting*, Tata Mc- Graw Hill , 7/e ,New Delhi , 2007

  
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(Head of the Department)

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

<b>Program:</b> B Tech (All Program [except CSBS, CSE(DS) 311 (VT)] / MBA Tech (All Program))				<b>Semester:</b> I/II	
<b>Course :</b> Physics				<b>Code:</b> 702BS0C002	
<b>Teaching Scheme</b>			<b>Evaluation Scheme</b>		
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks- 100)</b>
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite Nil</b>					
<b>Course Objective</b> The knowledge of Physics relevant to engineering is critical for converting ideas into technology. An understanding of Physics also helps engineers understand the working and the limitations of existing devices and techniques, which eventually leads to new innovations and improvements. This course aims to make students understand the basic concepts of Physics thoroughly with a view to lay foundations for the various engineering courses.					
<b>Course Outcomes</b> After completion of the course, students will be able to- <ol style="list-style-type: none"> <li>1. relate and interpret the relationship and interaction between the nature and the matter with a scientific outlook</li> <li>2. identify and apply different processes of physics that have wide applications in industrial and technological sectors</li> <li>3. develop creative thinking, problem solving abilities and considerable scientific skills, viz. experimental, observational, manipulative, investigatory and decision making etc.</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>Semiconductors Physics</b> Formation of energy bands and classification of solids into conductors, semiconductors and insulators, direct and indirect band gap semiconductors, fermi levels in semiconductor, energy gap and its temperature dependence, physics of semiconductor junction, hall effect and application.				8
2.	<b>Optics</b> Interference: Thin film interference, wedge shaped film and Newton's rings and their applications.				9



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	Diffraction: Fraunhofer and Fresnel diffraction, Fraunhofer diffraction at single slit, double slit, and multiple slits, Characteristics of diffraction grating and its applications.	
3.	<b>LASER and Fiber optics</b> Introduction to interaction of radiation with matter, Population inversion, pumping, various modes, threshold, population inversion, Solid state LASER, Semiconductor LASER, Gas LASER, applications of lasers. Introduction, optical fiber as a dielectric wave guide, total internal reflection, numerical aperture and various fiber parameters, losses associated with optical fibers, step and graded index fibers, application of optical fibers.	9
4.	<b>Electricity and Magnetism</b> Laws and applications of electrostatics and magnetostatics, Maxwell's equations and applications, introduction to waveguides.	6
5.	<b>Nuclear and Plasma Physics</b> Introduction to nuclear physics, types of nuclear reactions, nuclear fission as a source of energy, Particle accelerators: Cyclotron, Synchrotron, Nuclear radiation counters: Geiger Muller Counter, scintillation counter. Basic concepts of Plasma physics: Plasma as a state of matter, Debye length, plasma frequency, collisions, dc conductivity, ac conductivity Applications of plasma physics.	8
6.	<b>Modern Engineering materials</b> (Introduction and basic properties of each material) Nanomaterials, Superconductors, Dielectrics, metallic glasses, biomaterials.	5
	<b>Total</b>	<b>45</b>

**Text Books**

1. H.K Malik and A.K. Singh, *Engineering Physics*, 2<sup>nd</sup> Edition, Tata McGraw Hill, 2017.

**Reference Books**

1. Jearl Walker, David Halliday and Robert Resnick, *Fundamentals of Physics*, 10<sup>th</sup> edition, Wiley India, 2013.
2. James F.Shackelford and Madanapalli K. Muralidhara, *Materials Science for Engineers*, 7<sup>th</sup> edition, Pearson Education, 2006.
3. Francis F. Chen, *Introduction to Plasma Physics*, Springer, 2012.

**Laboratory Work**

8 to 10 experiments based on the syllabus.



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

<b>Program : B Tech /MBA Tech /BTI</b>				<b>Semester:II/III/IV/V/VI/VII</b>	
<b>Course : Principles of Economics and Management</b>				<b>Code: 702TG0C001</b>	
<b>Teaching Scheme</b>			<b>Evaluation Scheme</b>		
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks - 100)</b>
3	---	---	3	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite: NIL</b>					
<b>Course Objective</b> This course provides basic orientation towards economic (micro and macroeconomics) principles and help them understand the functions of management. This course also aims to understand issues dealing with small-scale economic phenomena and concepts such as prices and output of firms, industries and resource owners along with examining market impact of technological change with regards to understand broader aspects of the economy and its environment.					
<b>Course Outcomes</b> After completion of the course, the student will be able to - <ol style="list-style-type: none"> <li>1. Illustrate basic concepts of economics (demand, supply, elasticity, scarcity) and explain behaviour on individual, households and firm and Handle economic data and write economic report,</li> <li>2. Analyse and evaluate the impact of Economic Policies and its implication on the Business Environment,</li> <li>3. Demonstrate and determine the students towards basic management principles and act as foundation for higher levels of learning and to be able to handle basic functions of management (planning, organizing, coordination, and control).</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Introduction</b> Definition of Economics, Types of Economic Systems, Problem of Scarcity of Economic Resources. <b>Demand and Supply</b> Demand Curve and Supply Curve, Equilibrium of Demand and Supply, Shift in Demand and Supply. <b>Application of Demand and Supply</b> Price Elasticity of Demand, Price Elasticity of Supply, Factors which influence Elasticity, Elasticity and Revenue.				6



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2	<p><b>Market Structure /Industry Analysis Types of Competition</b> Monopoly, Oligopoly, Monopolistic Competition, Perfect and Imperfect Competition, Government Policies towards Industries. Circular Flow of Economy, Structures, Role of Government, Business Cycles.</p> <p><b>Macroeconomics</b> National Income - Gross Domestic Product (GDP), Gross National Product (GNP), Inflation - Cost Push and Demand Pull Inflation, Unemployment, Philips Curve.</p>	6
3	<p><b>Functions of Central Bank, Money supply, RBI &amp; Monetary Policy. (Current Credit Policy to be critiqued) Stabilization Policy</b> Role of Fiscal Policy. Demand and Consumer Behavior: Utility and Marginal Utility. New Economic Policy: Liberalization, Privatization and Globalization</p>	6
4	<p><b>Theory of Production</b> Law of Diminishing Returns, Returns to Scale, Productivity. Analysis of Costs: Types of Costs - Total Cost, Fixed Cost, Variable Cost, Marginal Cost, Impact of Marginal Cost on Average Cost.</p>	6
5	<p><b>Introduction to Management</b> Management &amp; Organizations, Management History. Understanding Management Thought, Contribution of F.W. Taylor, Henry Fayol, Elton - Mayo Contexts- Constraints &amp; Challenges. Planning: Managers as Decision Makers, Foundations of Planning, Strategic Management.</p>	9
6	<p><b>Organizing</b> Line and Staff Relationships, Centralization and Decentralization, Role of Delegation, Managing Human Resources, Managing Teams. Leading and Motivation: Basic Concepts and Practices -Maslow's, Herzberg, McClelland 's Theory of Achievement.</p>	6
7	<p><b>Controlling</b> Introduction to Controlling Inventory, Quality Control. Orientation towards Finance, Marketing, Human Resources and Operation Departments.</p>	6
	<b>Total</b>	<b>45</b>

**Text Books**

1. Samuelson and Nordhaus, *Economics Special Indian Edition*, 20th edition Tata McGraw Hill Publication, 2020
2. Mishra and Puri, *Indian Economy*, 36<sup>th</sup> Revised Updated Edition, Himalaya Publishing House, 2018

Approved in Academic Council dated 14.02.2020 for Academic year 2023-24

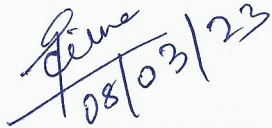


**SVKM's Narsee Monjee Institute of Management Studies  
Mukesh Patel School of Technology Management & Engineering**

3. Koontz. H. and Weihrich H., *Essentials of Management: An International, Innovation and Leadership Perspective*, 10th reprint Edition, McGraw Hill Education (India), 2018
4. Deviga V. and Karunagaran M., *Principles of Economics*, 3<sup>rd</sup> Edition, Oxford University Press, 2013

**Reference Books**

1. Mankiw Gregory, *Economics: Principles and applications*, Cengage Learning, 2011
2. Robbins et al., *Management*, 14<sup>th</sup> Edition, Pearson India, 2019

  
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Signature  
(Head of the Department)

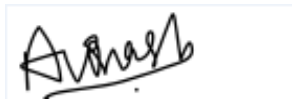
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SVKM's NMIMS  
Mukesh Patel School of Technology Management & Engineering

<b>Program: B Tech Computer Science and Business Systems</b>				<b>Semester: II</b>	
<b>Course: Principles of Electronics Engineering</b>				<b>Code: 702EX0C004</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100)</b>
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Theory of semiconductor materials, their atomic structures and properties DC circuit analysis and AC fundamentals.					
<b>Course Objective</b> The aim of the course is that the student should understand working principle, characteristics and simple applications of basic electronic devices. The course also helps students to understand the application of these devices in advanced circuits such as amplifiers. It also intends to impart hands on experience in assembling and testing simple circuits					
<b>Course Outcomes</b> After completion of the course, students will be able to - <ol style="list-style-type: none"> <li>1. Examine the working of P - N junction diode and its applications</li> <li>2. Differentiate various configurations and biasing circuits of Bi-polar Junction Transistor</li> <li>3. Recognize various types of Field Effect Transistors and its configurations</li> <li>4. Describe various basic digital electronic circuits</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Diodes and Diode Circuits</b> Formation of P-N junction, energy band diagram, built-in-potential, forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Junction capacitance and Varactor diode. Simple diode circuits, load line, linear piecewise model; Rectifier circuits: half wave, full wave, PIV, DC voltage and current, ripple factor, efficiency, idea of regulation.				08
2	<b>Bipolar Junction Transistors</b> Formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode, transistor action, injection efficiency, base transport factor and current amplification factors for CB and CE modes. Biasing and Bias stability: calculation of stability factor.				08
3	<b>Field Effect Transistors</b> Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles				08
4	<b>Digital Electronics Fundamentals</b> Difference between analog and digital signals, Logic ICs, half and full adder/subtractor, multiplexers, demultiplexers, flip-flops, shift registers, counters				06

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Total	30
<b>Text Books</b> <ol style="list-style-type: none"><li>1. Robert L. Boylestad, &amp; Louis Nashelsky, <i>Electronic Devices and Circuit Theory</i>, 11<sup>th</sup> Edition, Pearson, 2017.</li><li>2. M. Morris Mano, <i>Digital Logic &amp; Computer Design</i>, 4<sup>th</sup> Edition, Pearson Education India, 2016.</li><li>3. David A. Bell, <i>Electronic Devices and Circuits</i>, 5<sup>th</sup> Edition, Oxford University Press, 2010.</li></ol>	
<b>Reference Books</b> <ol style="list-style-type: none"><li>1. J. Millman and A. Grabel, <i>Microelectronics</i>, 3<sup>rd</sup> Edition, McGraw Hill, 2017.</li><li>2. A. Paul Malvino, <i>Electronic Principles</i>, 8<sup>th</sup> Edition, McGraw Hill, 2016.</li><li>3. B. Streetman and S. Banerjee, <i>Solid State Electronic Devices</i>, 7<sup>th</sup> Edition, Pearson, 2014.</li></ol>	
<b>Laboratory Work</b> <p>8 to 10 practical exercises (and a practicum) based on the syllabus.</p>	



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Signature  
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<b>Program:</b> B Tech (Artificial Intelligence, Artificial Intelligence and Machine Learning, Artificial Intelligence and Data Science) / MBA Tech (Artificial Intelligence)				<b>Semester :</b> II	
<b>Course:</b> Probability and Random Variables				<b>Code:</b> 702BS0C021	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks- 100 in Question Paper)</b>
2	0	1	3	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Knowledge of Permutation, Combination and Pre-Calculus.					
<b>Course Objective</b> To equip the students with intermediate to advanced level concepts and tools in probability and statistics that help them tackle relevant problems within engineering domain.					
<b>Course Outcomes</b> After completion of the course, students will be able to- <ol style="list-style-type: none"> <li>1. Know the concept of probability and random variables</li> <li>2. Solve problems involving conditional probability and moments</li> <li>3. Demonstrate understanding of the applications of various probability distributions, measures of central tendency to solve real life problems</li> <li>4. Analyse the different probability density functions and their applications</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1.	<b>Probability</b> Concept of experiments, sample space, event. Definition of Combinatorial Probability. Conditional Probability, Mutually exclusive events, Joint probability of related and independent events, Statistical independence, Total Probability theorem, Bayes theorem.				06
2.	<b>Random Variables</b> Random Variables, Cumulative Distribution function, Probability Density Function, Mathematical expectation and its properties, Moments (including variance) and their properties, interpretation, Moment generating function.				08
3.	<b>Two dimensional Random Variables</b>				08




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	Joint PDF's and CDF's, Conditional PMF and PDF, Marginal PDF, Conditional Mean & Variance, Rule for Independence, Covariance and correlation of random variables	
4.	<b>Probability distributions</b> Discrete probability distributions: Binomial, Poisson and Geometric distributions, Uniform distribution. Continuous probability distributions: Exponential, Normal distribution, Chi-square, t, F distributions.	08
	<b>Total</b>	<b>30</b>
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. T. Veerarajan, <i>Probability, Statistics and Random Processes</i>, 3rd edition, Tata McGraw-Hill 2003, 2008.</li> <li>2. S. M. Ross, <i>Introduction of Probability Models</i>, Academic Press, N.Y.</li> <li>3. A. Goon, M. Gupta and B. Dasgupta, <i>Fundamentals of Statistics</i>, vol. I &amp; II, World Press.</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. S. M. Ross, <i>A first course in Probability</i>, 10<sup>th</sup> Edition, Prentice Hall, 2018.</li> <li>2. I. R. Miller, J.E. Freund and R. Johnson, <i>Probability and Statistics for Engineers</i>, 4<sup>th</sup> Edition, PHI.</li> <li>3. A. M. Mood, F.A. Graybill and D.C. Boes, <i>Introduction to the Theory of Statistics</i>, McGraw Hill Education.</li> <li>4. Athanasios Papoulis, S. Unnikrishna Pillai, <i>Probability, Random Variables and Stochastic Processes</i>, 4th edition, Tata McGraw-Hill 2002, 2008.</li> </ol>		
<b>Tutorial Work</b>		
8 to 10 Tutorial exercises based on the syllabus.		

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<b>Program:</b> B Tech All Program [except CSBS, CSE(DS) 311 (VT)] MBA Tech All Program B Tech Integrated All Program				<b>Semester:</b> I / II / VI	
<b>Course:</b> Professional Ethics				<b>Code:</b> 702BS0C005	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks-50)	Term End Examinations (TEE)
1	0	0	1	Scaled to Marks 50	---
<b>Pre-requisite:</b> Nil					
<b>Course Objective</b> This course is designed to encourage students to inculcate human values, that will enable them to grow as a responsible human being. The course also helps students to understand how to maintain ethical conduct in discharging professional duties, which will be beneficial for them in their professional lives.					
<b>Course Outcomes</b> After completion of the course, students will be able to - <ol style="list-style-type: none"> <li>1. Understand the engineering code of ethics and be able to apply them as necessary,</li> <li>2. Understand moral complexities in many engineering activities and decision-making processes,</li> <li>3. Understand some of the contemporary issues in the engineering professions,</li> <li>4. Effectively communicate their knowledge and understanding of engineering ethics.</li> </ol>					
<b>Detailed Syllabus</b>					
Unit	Description				Duration
1.	<b>Introduction to Ethics-</b> <ul style="list-style-type: none"> <li>• Concept of morals and ethics,</li> <li>• Study of engineering ethics;</li> <li>• Laws and ethics;</li> <li>• Personal and professional ethics.</li> </ul>				02
2.	<b>Professional Practice in Engineering-</b> <ul style="list-style-type: none"> <li>• Common morality ASME code of ethics,</li> <li>• Technical codes and standards,</li> <li>• Accepted standards of Engineering practice and the standard of care.</li> </ul>				02
3.	<b>Ethics as design-doing justice to moral Problem-</b> <ul style="list-style-type: none"> <li>• Discuss about ethics as a design to solve moral problems</li> <li>• Comparison between moral problems and engineering design problems;</li> <li>• Moral lessons from design problems;</li> <li>• Implications of the dynamic character of problem situations.</li> </ul>				02
4.	<b>Rights and Responsibilities of Engineers-</b> <ul style="list-style-type: none"> <li>• Moral responsibilities;</li> </ul>				04



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	<ul style="list-style-type: none"> <li>• Conflicts of interests;</li> <li>• Confidentiality,</li> <li>• Engineers, organizations and ethics,</li> <li>• Engineer-manager relationships;</li> <li>• loyalty;</li> <li>• The concept of whistleblowing.</li> </ul>	
5.	<p><b>Responsibility for the Environment-</b></p> <ul style="list-style-type: none"> <li>• Rapid Technological growth and depletion of resources,</li> <li>• Reports of the Club of Rome.</li> <li>• Limits of growth: sustainable development</li> <li>• Energy Crisis: Renewable Energy Resources</li> <li>• Environmental degradation and pollution.</li> <li>• Eco-friendly Technologies.</li> <li>• Environmental Regulations,</li> <li>• Environmental Ethics</li> <li>• Appropriate Technology,</li> <li>• Movement of Schumacher; later developments of Technology and developing notions.</li> <li>• Problems of Technology transfer,</li> <li>• Technology assessment impact analysis.</li> <li>• Problems of man, machine, interaction,</li> <li>• Impact of assembly line and automation.</li> <li>• Human centered Technology</li> </ul>	05
	<b>Total</b>	<b>15</b>
<p><b>Text Books</b></p> <ol style="list-style-type: none"> <li>1. M.W. Martin and R. Schinzinger, Ethics in Engineering, 2<sup>nd</sup> Edition, McGraw-Hill, 2005.</li> <li>2. Charles B. Fleddermann, Engineering Ethics, 3<sup>rd</sup> Edition, Pearson, 2007.</li> <li>3. P.A. Vesilind and A. S Gunn, Engineering Ethics and Environment, 1<sup>st</sup> Edition , Cambridge University Press, 1998.</li> </ol>		
<p><b>Reference Books</b></p> <ol style="list-style-type: none"> <li>1. Caroline Whitbeck, Ethics in Engineering – Practice and Research, 2<sup>nd</sup> Edition, Cambridge University Press, 2011.</li> </ol>		

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<b>Program:</b> B Tech/ MBA Tech Data Science, B Tech (CSE) DS (Chandigarh & Hyderabad Campus)				<b>Semester:</b> II	
<b>Course:</b> Python for Data Analysis				<b>Code:</b> 702DB0C011	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks - 100)</b>
1	2	0	2	Scaled to 50 marks	Scaled to 50 Marks
<b>Pre-requisite:</b> Programming for problem solving					
<b>Course Objective</b> The aim of the course is to provide students with the knowledge of Creating Data Science Pipeline, Preparing the data, performing exploratory data analysis and apply visualization techniques. It will also educate students on preprocessing various types of information from different sources within the integrated development environment.					
<b>Course Outcomes</b> After completion of the course, the student will be able to - <ol style="list-style-type: none"> <li>1. Explain the role of python in data science</li> <li>2. Apply the python libraries to execute, visualize and analyse data in python ecosystem</li> <li>3. Analyze raw data and perform wrangling to improve data usability</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Overview of Python</b> Basics of Python and its role in data science, data types, variables, expressions, objects and functions.				01
2	<b>Working with Real Data</b> Accessing Data in Structured Flat-File Form ,Reading from a text file Reading CSV delimited format, Reading Excel.				02
3	<b>NumPy Basics</b> Arrays and Vectorized Computation Multidimensional Array Object, Operations between Arrays and Scalars, Basic Indexing and Slicing.				02
4	<b>Introduction to Pandas</b> Essential functionality, arithmetic and data alignment, function application and mapping, Handling Missing Data, Filtering Out Missing Data, Filling in Missing Data, Other pandas Topics				04



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5	<b>Data Loading, Storage, and File Formats</b> Reading and Writing Data in Text Format, reading Text Files in Pieces, Writing Data Out to Text Format, JSON data, interacting with HTML	02
6	<b>Data Visualization</b> Introduction to Matplotlib, Plotting Functions in pandas, Plotting Maps, Python Visualization Tool Ecosystem	02
7	<b>Data Merging</b> Combining and merging data set, Group wise operation and data Transformation, Sting Manipulation	02
	<b>Total</b>	<b>15</b>
<b>Text Books</b> <ol style="list-style-type: none"><li>1. Daniel Y. Chen, <i>Pandas for Everyone: Python Data Analysis</i>, 1<sup>st</sup> edition, Pearson Education, 2018</li><li>2. Wes Mckinney, <i>Python for Data Analysis</i>, 2<sup>nd</sup> edition, O'Reilly, 2017</li></ol>		
<b>Reference Books</b> <ol style="list-style-type: none"><li>1. John Paul Mueller, <i>Python for Data Science for Dummies</i>, 1<sup>st</sup> edition, Wiley, 2015</li><li>2. Alex Galea, <i>Applied Data Science with Python and Jupyter</i>, 1<sup>st</sup> edition, Packt, 2018</li></ol>		
<b>Laboratory Work</b> 8 to 10 programming exercises (and a practicum) based on the syllabus		



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<b>Program:</b> B Tech (Artificial Intelligence, Computer Engineering, Information Technology, Electronics & Telecommunication Engineering, Mechatronics Engineering, CSE (Cyber), AI and ML, AI and DS, CSBS, Computer Science) MBA Tech (Artificial Intelligence, Computer Engineering, Information Technology)				<b>Semester:</b> II	
<b>Course:</b> Python Programming				<b>Code:</b> 702AI0C004	
<b>Teaching Scheme</b>			<b>Evaluation Scheme</b>		
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks - 100)</b>
0	2	0	1	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Nil					
<b>Course Objective</b> The course is designed to provide basic knowledge of Python programming and how to design and program Python applications.					
<b>Course Outcomes</b> After completion of the course, the student will be able to - <ol style="list-style-type: none"> <li>1. Recognize various data structures and apply them in solving computational problems.</li> <li>2. Understand and apply different file handling operations</li> <li>3. Apply core python and object-oriented python concepts to build real world applications.</li> <li>4. Implement database connectivity in python</li> </ol>					
<b>Detailed Syllabus</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
<b>1</b>	<b>Introduction to Python</b> Installation, Features, Python Interpreter and its working, Syntax and Semantics, comments, imports, indentation, variables, data types, math arithmetic, operators (comparison, logical, bitwise), expressions, print, formatting print, generating random numbers				3
<b>2</b>	<b>Python Data Structures &amp; Flow Control</b> Strings, Lists, Dictionaries, Tuples, Sets; Slicing; properties, operations and methods of these data structures Conditional blocks using if, else and elif, Simple For loop, For loop using Ranges, While loops, Loop manipulation using Pass, Continue, Break List and dictionary comprehension, NumPy to create one-dimensional and two-dimensional arrays, Pandas using dataframes.				9



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<b>3</b>	<b>Python Functions</b> Defining and calling functions, return, scope, function arguments (args and kwargs), recursive functions; Built-in functions: Lambda, Map, Filter, Reduce, Zip, Enumerate	<b>6</b>
<b>4</b>	<b>File and Exceptional Handling</b> File I/O read/write operations, open, close, with, seek, tell; manipulating files and directories Exception, Types of errors, handling an exception, try, expect, else, try-finally clause, Argument of an Exception, Raising an Exception	<b>4</b>
<b>5</b>	<b>Classes and Objects</b> Class definition, object creation, class variables and methods, accessing class attributes, meaning of self, __init__, inheritance, overriding super class	<b>5</b>
<b>6</b>	<b>Regular Expression and database connectivity using Python</b> Regular Expressions, Match function, Search function, Matching vs Searching, Wildcard, Database connectivity using SQLite3	<b>3</b>
	<b>Total</b>	<b>30</b>
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. Dr. R. Nageswara Rao, <i>Core Python Programming</i>, 2<sup>nd</sup> Edition, Dreamtech Pres, Wiley Publication, 2018.</li> <li>2. Paul Barry, <i>Head first Python: A Brain Friendly guide</i>, 2<sup>nd</sup> Edition, O'Reilly publication, 2016.</li> <li>3. Martin C. Brown, <i>Python: The Complete Reference</i>, 4<sup>th</sup> Edition, McGrawHill Education, 2018.</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Bill Lubanovic, <i>Introducing Python Modern computing in simple packages</i>, 3<sup>rd</sup> Edition, O'Reilly publication, 2019.</li> <li>2. Wes McKinney, <i>Python for Data Analysis</i>, 2<sup>nd</sup> Edition, O'Reilly publication, 2017.</li> <li>3. Jeeva Jose, P. Sojan Lal, <i>Introduction to Computing and Problem Solving with Python</i>, 1<sup>st</sup> Edition, Khanna Publication, 2019.</li> </ol>		
<b>Laboratory/ Tutorial Work</b>		
8 to 10 experiments / Programming exercises (and a practicum where applicable) based on the syllabus		



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