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

Program: B Tech (All Program except CSBS, CSDS) / MBA Tech (All Program)/ B Tech Integrated (Computer, Mechanical)				**Semester :** I/V	
Course : Calculus				**Code:** 702BS0C001	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- 100)**
3	0	1	4	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite

Knowledge of vector algebra, functions, limits, differentiation and integration of functions**.**

Course Objective

This course aims at providing adequate exposure to the theory and applications of Calculus. This course will help the students achieve sound understanding of the concepts of calculus, develop problem solving skills and apply the concepts and techniques of calculus to solve problems within Engineering domain. This course will equip the students with intermediate to advanced level concepts and aligned tools to help them tackle advanced mathematics and related applications.

Course Outcomes

After completion of the course, students will be able to-

1. implement appropriate techniques of Differential and Integral Calculus to solve problems
2. analyse functions using the techniques of calculus
3. apply the knowledge of Differential and Integral Calculus to solve real life problems

Detailed Syllabus

Unit	**Description**	**Duration**
1.	**Differential Calculus of functions of one variable** Rolle's theorem, Lagrange's Mean value theorem, Cauchy's Mean value theorem, Convergence of Sequences and series, Taylor's and Maclaurin's Series Expansion, Indeterminate forms, L'Hospital's rule.	9
2.	**Partial Differentiation** Functions of several variables: Limits and continuity, Partial differentiation, Taylor's theorem of function of two variables, Maxima, Minima, Lagrange's Method of Undetermined Multiplier.	9

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3.	**Integral Calculus of functions of one variable** Volume of solid of revolution, Area of the surface of a solid of revolution, Improper Integrals, Special functions: Beta and Gamma functions.	8
4.	**Multiple Integrals** Double Integral, Change of order of Integration, Change of variables, Jacobian, Application of Double Integral to find area, Triple Integral, Change of variable to spherical and cylindrical co-ordinates, Application of Triple Integral to find volume.	10
5.	**Vector Calculus** Gradient, Directional Derivative, Divergence, Curl, Scalar Potential, Harmonic function, Line Integral, Surface Integral, Greens Theorem, Stokes Theorem and Gauss Divergence Theorem.	9
	Total	**45**

Text Books

1. B.V. Ramana, *Higher Engineering Mathematics*,1st Edition, McGraw Hill Education, 2017.
2. B.S. Grewal, *Higher Engineering Mathematics*, 44th Edition, Khanna Publishers, 2017.

Reference Books

1. G. B. Thomas, *Calculus*, 14th Edition, Pearson, 2018.
2. Veerarajan T, *Engineering Mathematics- I*, 1st Edition, McGraw-Hill Education, 2017.
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, 10th Edition, Wiley India, 2017.
4. T. M. Apostol, *Calculus- Volume – I*, 2nd Edition, Wiley Eastern, 2007.
5. H. K. Dass, *Advanced Engineering Mathematics*, 22nd Edition, S. Chand, 2019.

Tutorial Work

8 to 10 Tutorial exercises based on the syllabus.

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Program: B Tech (All Program except CSBS, CSDS) / MBA Tech (All Program)				**Semester:** I/II	
Course : Physics				**Code:** 702BS0C002	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- 100)**
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite Nil

Course Objective

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.

Course Outcomes

After completion of the course, students will be able to-

1. relate and interpret the relationship and interaction between the nature and the matter with a scientific outlook
2. identify and apply different processes of physics that have wide applications in industrial and technological sectors
3. develop creative thinking, problem solving abilities and considerable scientific skills, viz. experimental, observational, manipulative, investigatory and decision making etc.

Detailed Syllabus

Unit	Description	Duration
1.	**Semiconductors Physics** 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.	**Optics** 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.	**LASER and Fiber optics** 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.	**Electricity and Magnetism** Laws and applications of electrostatics and magnetostatics, Maxwell's equations and applications, introduction to waveguides.	6
5.	**Nuclear and Plasma Physics** 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.	**Modern Engineering materials** (Introduction and basic properties of each material) Nanomaterials, Superconductors, Dielectrics, metallic glasses, biomaterials.	5
	Total	**45**

Text Books

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

Reference Books

1. Jearl Walker, David Halliday and Robert Resnick, *Fundamentals of Physics*, 10th edition, Wiley India, 2013.
2. James F.Shackelford and Madanapalli K. Muralidhara, *Materials Science for Engineers,* 7th 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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Program: B Tech (All Program except CSBS, CSDS) / MBA Tech (All Program)/ B Tech Integrated (Computer, Mechanical)				**Semester:** I /II /V/VI	
Course : Elements of Biology				**Code:** 702BS0C049	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- 100)**
3	0	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite Nil

Course Objective

The principal objective of this course is to provide a basic understanding of biological mechanisms of living organisms from the perspective of engineers. To encourage engineering students to think about solving biological problems with engineering tools. To make them aware of the application of engineering principles in biology and engineering robust solutions inspired by biological examples.

Course Outcomes

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

1. convey that all forms of life have the same building blocks and yet the manifestations are diverse
2. identify and classify microorganisms while understanding molecular basis of DNA as a genetic material for information transfer
3. classify enzymes and distinguish between different mechanisms of enzyme action

Detailed Syllabus

Unit	Description	Duration
1.	**Introduction** Convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries. Examples from - Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor. These examples will highlight the fundamental importance of observations in any scientific inquiry.	3

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2.	**Classification** Convey that classification per se is not what biology is all about. The underlying criterion, such as morphological, biochemical or ecological be highlighted. Hierarchy of life forms at phenomenological level. A common thread weaves this hierarchy Classification.Discuss classification based on (a) cellularity-Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion - aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus	6
3.	**Genetics** Convey that "Genetics is to biology what Newton's laws are to Physical Sciences" Mendel's laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using human genetics.	6
4.	**Biomolecules** Convey that all forms of life has the same building blocks and yet the manifestations are as diverse as one can imagine Molecules of life. In this context discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.	5
5.	**Enzymes** Convey that without catalysis life would not have existed on earth Enzymology: How to monitor enzyme catalyzed reactions. How does an enzyme catalyze reactions. Enzyme classification. Mechanism of enzyme action. Discuss at least two examples. Enzyme kinetics and kinetic- parameters. Why should we know these parameters to understand biology? RNA catalysis.	5

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6.	**Information Transfer** The molecular basis of coding and decoding genetic information is universal Molecular basis of information transfer. DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Define gene in terms of complementation and recombination.	6
7.	**Macromolecular analysis** How to analyses biological processes at the reductionistic level Proteins-structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.	5
8.	**Metabolism** The fundamental principles of energy transactions are the same in physical and biological world. Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergonic reactions. Concept of Keq and its relation to standard free energy. Spontaneity. ATP as an energy currency. This should include the breakdown of glucose to CO2 + H2O (Glycolysis and Krebs cycle) and synthesis of glucose from CO2 and H2O (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy Charge.	5
9.	**Microbiology** Concept of single celled organisms. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics.	4
	Total	**45**

Text Books

1. Arthur T. Johnson, *Biology For Engineers,* 2nd edition, CRC Press Taylor & Francis group, 2018.
2. Prescott, L.M J.P. Harley and C.A. Klein, *Microbiology*, 7th edition, McGraw-Hill Higher Education. 2008.

Reference Books

1. Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B., *Biology: A global approach*, 10th edition, Pearson Education Ltd. 2014.
2. Nelson, D. L.; Lehninger, A. L.; and Cox, M. M., *Principles of Biochemistry*, 8th edition, W.H. Freeman, 2020.

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Program: B Tech / MBA Tech (All Branches except CSBS, CSDS) BTI (IT)	**Semester:** I/II/III
Course: Programming for Problem Solving	Code: 702CO0C001

Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) 50%**	**Term End Examinations (TEE) 50%**
2	4	0	4	Marks Scaled to 50	Marks Scaled to 50

Prerequisite: Nil

Course Objective

Enable students to understand problem statements and solve those using basic programming constructs. Develop skills to analyze real life problem statements and implement using Object Oriented Programming.

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

1. Comprehend problem statements, build logic and draw flowchart
2. Develop complex logic using control structures
3. Implement programs using arrays, function and pointers
4. Solve real life problems using Object Oriented paradigm

Detailed Syllabus

Unit	**Description**	**Duration**
1	**Introduction to problem solving skills,** flowcharts, algorithms, basic program structure of C++, I/O statements, data types, variables, operators, expressions, pre-processor directives.	04
2	**Control structures:** Conditional branching, looping, nested looping, recursion.	08
3	**Programming constructs** 1 – D and 2 - D arrays, strings.	04
4	**Modular Programming:** functions, parameter passing, inline function, macro functions.	04

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5	**Programming** using structures and pointers	03
6	**Introduction to Object Oriented programming:** necessity for OOP, data hiding, data abstraction and encapsulation. Classes and Objects.	02
7	**Programming** using constructors, polymorphism and inheritance.	05
	Total	**30**

Textbooks:

1. Bjarne Stroustrup, *The C++ Programming Language*, 4th Edition, Addison Wesley, 2013.

Reference Books:

1. Bjarne Stroustrup, *Programming – Principles and Practice Using C++*, 2nd Edition, Addison Wesley, 2014.
2. KR Venugopal, Rajkumar Buyya, *Mastering C++*, 2nd Edition, Tata McGraw-Hill, Paperback 2013.

Laboratory Work:

8 to 10 experiments based on the syllabus.

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Program B Tech (All Program except CSBS, CSDS) / MBA Tech (All Program)/				**Semester:** I / II	
Course: Engineering Graphics and Design				**Code**: 702ME0C001	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks-50)**	**Term End Examinations (TEE) (Marks-100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Nil

Course Objectives

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.

Course Outcomes

After completion of the course, students will be able to-

1. interpret and communicate drawings effectively using different types of curves, lines, planes,
2. analyze the concepts of projections and section of right regular solids with their development,
3. apply the techniques, skills, and modern tools to create projections of machine components with the help of software.

Detailed Syllabus

Unit	**Description**	**Duration**
1.	**Introduction to Engineering Drawing** 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.	4

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2.	**Projections of Lines and Planes** Introduction to projections of points, conventions; points locating in all quadrants. **Projections of lines**: Introduction, lines inclined to one plane and parallel to other plane, lines inclined to both planes. **Projections of planes**: Introduction, types of planes, plane surface inclined to both reference planes, projection of auxiliary planes	5
3.	**Projections of Regular Solids** 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	5
4.	**Section and Development of Regular Solids** 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.	4
5.	**Orthographic Projections** 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.	4
6.	**Sectional Orthographic Projections** 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.	4
7.	**Isometric Projections** 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	4
	Total	**30**

Text Books

1. N. D. Bhatt, V. M. Panchal and P. R. Ingle, *Engineering Drawing*, 53rd edition, *Charotar Publishing House*, 2014.

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Reference books

1. M. B. Shah and B. C. Rana, *Engineering Drawing*, 2nd edition, Pearson Education, 2014.
2. K. Venugopal and V. Prabhu Raja, *Engineering Drawing + AutoCAD*, 6th edition, New Age International (P) Ltd. Publishers, 2011.

Laboratory Work

8 to 10 experiments based on the syllabus.

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Program: B Tech (All Program except CSBS, CSDS) / MBA Tech (All Program)/ B Tech Integrated (Computer, Mechanical)	**Semester:** I / II/V/VI
Course: Professional Ethics	**Code:** 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) (Marks -100 in Question Paper)**
1	0	0	1	Scaled to Marks 50	---

Pre-requisite: Nil

Course Objective

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.

Course Outcomes

After completion of the course, students would be able to

1. understand the engineering code of ethics and be able to apply them as necessary,
2. understand moral complexities in many engineering activities and decision-making processes,
3. understand some of the contemporary issues in the engineering professions,
4. effectively communicate their knowledge and understanding of engineering ethics.

Detailed Syllabus

Unit	**Description**	**Duration**
1.	**Introduction to Ethics-** • Concept of morals and ethics, • Study of engineering ethics; • Laws and ethics; • Personal and professional ethics.	2
2.	**Professional Practice in Engineering-** • Common morality ASME code of ethics, • Technical codes and standards, • Accepted standards of Engineering practice and the standard of care.	2
3.	**Ethics as design-doing justice to moral Problem-**	2

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	• Discuss about ethics as a design to solve moral problems • Comparison between moral problems and engineering design problems; • Moral lessons from design problems; • Implications of the dynamic character of problem situations.	
4.	**Rights and Responsibilities of Engineers-** • Moral responsibilities; • Conflicts of interests; • Confidentiality, • Engineers, organizations and ethics, • Engineer-manager relationships; • loyalty; • The concept of whistleblowing.	4
5.	**Responsibility for the Environment-** • Rapid Technological growth and depletion of resources, • Reports of the Club of Rome. • Limits of growth: sustainable development • Energy Crisis: Renewable Energy Resources • Environmental degradation and pollution. • Eco-friendly Technologies. • Environmental Regulations, • Environmental Ethics • Appropriate Technology, • Movement of Schumacher; later developments of Technology and developing notions. • Problems of Technology transfer, • Technology assessment impact analysis. • Problems of man, machine, interaction, • Impact of assembly line and automation. • Human centered Technology	5
	Total	**15**

Text Books

1. M.W. Martin and R. Schinzinger, Ethics in Engineering, 2nd Edition, McGraw-Hill, 2005.
2. Charles B. Fleddermann, Engineering Ethics, 3rd Edition, Pearson, 2007.
3. P.A. Vesilind and A. S Gunn, Engineering Ethics and Environment, 1st Edition , Cambridge University Press, 1998.

Reference Books

1. Caroline Whitbeck, Ethics in Engineering – Practice and Research, 2nd Edition, Cambridge University Press, 2011.

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Program: B Tech (All Program except CSBS, CSDS) / MBA Tech (All Program)/BTI(comp)				**Semester:** I / II/III	
Course: Constitution of India				**Code :** 702BS0C006	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- 100)**
1	0	0	0	Marks Scaled to 50	__

Pre-requisite: Nil

Course Objective

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.

Course Outcomes

After completion of the course, students will be able to

1. understand the historic evolution of the Indian Constitution, its drafting, nature and to understand the principles mentioned in its Preamble,
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,
3. ingrain the structure of our polity and role of Judiciary in maintaining the basic structure of the Constitution,
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.

Detailed Syllabus

Unit	Description	Duration
1.	Nature, Characteristics and Sources of Indian Constitution	2
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	6

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3.	Indian Judiciary – Concept of Supreme Court and High Courts, Appointment of Judges, Independence of Judiciary, Jurisdictions of Supreme Court and High Courts	3
4.	Emergency Provisions – Concept of National Emergency under Article 352, Financial Emergency under Article 360 and President rule under Article 356 of the Constitution	4
	Total	**15**

Text Books

1. Dr. Durga Das Basu, Introduction to the Constitution of India, 24th Edition, Lexis Nexis, 2019.

Reference Books

1. P. M. Bakshi, *The Constitution of India*, 17th Edition, Universal Law Publishing, 2020.
2. J. N. Pandey, *Constitutional Law of India*, 57th Edition ,Central Law Agency, 2020.
3. N. A. Palkhivala, *We the people*, UBS Publishers Distributors, 1999.

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Program: B Tech (All Program except CSBS, CSDS) / MBA Tech (All Program)/ B Tech Integrated (Computer/Mechanical)				**Semester:** I / II/V/VI	
Course: Critical Thinking				**Code:** 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) (Marks -100)**
2	0	0	0	Marks Scaled to 50	---

Pre-requisite: Nil

Course Objective

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.

Course Outcomes

After completion of the course, students will be able to

1. solve problems or take decisions by processing information in a clear, logical, reasoned and reflective manner
2. recognise, build and appraise arguments
3. analyse contexts effectively
4. recognise bias and its impact on decision making

Detailed Syllabus

Unit	Description	Duration
1.	**Brain and Thinking:** Introduction to Thinking, Types of Thinking, Brain and Thinking, Curiosity, Creativity and Different thinking, Critical thinking basics, Meta thinking	10
2.	**Social, Psychological Aspects of Thinking:** Top barriers to critical thinking, Rationality Bounded Rationality and its model, Fast and Slow Thinking, Objectivity, Subjectivity, Assumptions and Skepticism. Paradigm shift,	10

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	Perception, prejudice and stereotype, Attribution, Heuristics, Cognitive Biases and Errors, examining critical thinking, Critical Thinking Process, Framework, & Tools, Problems and critical thinking.	
3.	**Deductive and Inductive:** Arguments, Principle of Clarity, Truth, Deductive validity, Conditional Propositions, Inductive reasoning, Inductive inferences, Deductive v/s Inductive, Formal fallacies, Informal fallacies.	10
	Total	**30**

Text Books

1. Paul Herrick, *Think with Socrates: An Introduction to Critical Thinking*, 1st edition, 2014.
2. Lewis Vaughan, *The Power of Critical Thinking*, 5th edition, 2012,

Reference books: NA

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Program: B Tech (All Program except CSBS, CSDS) / MBA Tech (All Program)				**Semester:** I / II	
Course: Basic Electrical and Electronics Engineering				**Code :** 702EX0C001	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks-50)**	**Term End Examinations (TEE) (Marks -100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Nil

Course Objective

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.

Course Outcomes

After completion of the course, students will be able to

1. interpret DC circuits, theorems and time domain analysis of first order RL circuit
2. solve series and parallel AC circuits and compare star/delta configurations
3. explain the principles of transformer and electrical machines
4. understand the construction, working principle and applications of electronics devices and logic circuits

Detailed Syllabus

Unit	Description	Duration
1.	**DC Circuits** Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current law, Kirchhoff'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.	**AC Circuits** 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.	**Transformers and Electrical Machines** 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.	**Analog Electronics (**no mathematical treatment and design) 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.	**Digital Electronics** 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
	Total	**30**

Text Books

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

Reference Books

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

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

Program: B Tech /MBA Tech all branches (except B Tech CSBS and B Tech CSE (DS))				**Semester**: I /II	
Course: English Communication				**Code:** 702BSOCO59	
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)**
-	**2**	**-**	**1**	**Marks Scaled to 50**	**-**

Pre-requisite: Nil

Course Objective

The objective of the course is to develop students' competency in the English language in relation to listening, speaking and reading.

Course Outcomes

After completion of the course, the student will be able to –

1. Use their knowledge of vocabulary and grammar to articulate their ideas effectively
2. Demonstrate effective listening and speaking skills in oral communication situations such as speeches, conversations, power-presentations, etc
3. Apply different reading techniques as needed to read passages effectively

Detailed Syllabus

Unit	**Description**	**Duration**
1.	**Vocabulary Building through Literature** Introduction to root and affixes, Synonyms and antonyms, Idioms and phrasal verbs, Commonly confused words, Words: denotation, connotations and usage	**06**
2.	**Useful Practices of Grammar** 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.	**Oral Communication** Listening skills, Public speaking, impromptu speaking, Situational dialogues	**06**

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4.	**Comprehension through Short Fiction** Fast Reading, Skimming, Scanning, Active Reading, Cloze Reading, SQ3R Technique	**06**
5.	**Presentations** Planning – occasion, audience, purpose, Outlining – introduction, main body, conclusion, Visual slide design, Verbal, non-verbal communication	**06**
	Total	**30**

Text Books

1. Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practice*, 3rd ed. Oxford University Press, 2015
2. Mark Lester and Larry Beason, *The McGraw-Hill Education Handbook of English Grammar and Usage*, 3rd ed. McGraw Hill, 2019

Reference Books

1. Bovee Courtland and John Thill, *Business Communication Today*, Pearson Education, 14th Ed. 2017
2. John Seely, *Oxford Guide to Effective Writing and Speaking*, Oxford University Press, 3rd Ed. 2013
3. Michael Swan, *Practical English Usage*, Oxford University Press, 4th Ed. 1995
4. F.T Wood, *Remedial English Grammar*. Macmillan. 2007

Laboratory/ Tutorial Work

- 8 to 10 Practical activities based on the syllabus

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Program: B Tech (All Program except CSBS, CSDS) / MBA Tech (All Program)/B Tech Integrated (Mechanical/Computer)				**Semester:** I / II/V/VI	
Course: Design Thinking				**Code:** 702BS0C011	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks -50)**	**Term End Examinations (TEE) (Marks -100)**
2	0	0	0	Marks Scaled to 50	---

Pre-requisite: Nil

Course Objective

The objective of this course is to understand the concept of Design thinking through engaging the students in projects/ assignments that illustrate the various pillars of Design thinking. Imbibe the higher order skill of Design thinking which they will be able to apply in various projects during their course, to create new products & services.

Course Outcomes

After completion of the course, students will be able to-

1. develop a human-centric approach towards problem solving
2. apply design thinking principles to come up with innovative solutions to problems and challenges

Detailed Syllabus

Unit	Descriptions	Duration
1.	Introduction to Design Thinking -Design Thinking as 'Experience Innovation' - Concepts of Customer Desirability, Technological Feasibility, Business Viability and their significance	2
2.	Case Study: Discussion on HBR article Design Thinking by Tim Brown (Pre-Read based analysis of all four case studies covered in article)	2
3.	Mindset Creation - Growth Mindset vs. Fixed Mindset - Essential elements of Design Thinking Mindset - Case Study: Jeff Bezos-Amazon's approach of being Customer Obsessed	2
4.	- Pillars of Design Thinking	2

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	- Introduction to Stages of Design Thinking based on Stanford d. School	
5.	Case Study for Application of Design Thinking IDEO Shopping Cart (Case Video followed by debrief/class discussion)	2
6.	Empathy [A] -Introduction to empathy -Decoding Customer Behaviour using DT (using case study method)	2
7.	Empathy [B] -Tools:Understanding Consumer's Unmet Needs & Pain Points: (Observation, Focused Interviews, Shadowing, Journey Mapping) - Rules and tips for each specific tool (Class activity based learning for each tool)	4
8.	Empathy [C] Debrief of Class Activity for Journey Mapping Empathy Case Study: 'Embrace- Infant Incubator'	2
9.	Define -Analysis of data gathered from Empathy stage through tools like Clustering & Affinity Diagrams -Building Problem Statements & understanding POV -Tools: Framing problems as 'How Might We?' questions	2
10.	Ideate -Concept of Semi-structured approach to Ideation in DT -Rules of Ideation -Tools: Brainstorming, Brainwriting, Dot Voting	2
11.	Ideate -Class Activity to demonstrate Brainstorming & Dot Voting - Case Study for Out of the Box Idea Generation: Steelcase	2
12.	Prototype -Introduction to concept of prototyping & basic techniques of rapid prototyping -Introduction to Low fidelity vs. High fidelity prototypes and their significance in the Design Thinking process -General information on user testing & MVPs - Case Study for Prototyping & User Testing: Nordstorm Innovation Lab	2
13.	Term End Group Project	4

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	Analysis of Design Thinking success stories from across various domains – Students are expected to build a presentation based on the design thinking led success story of their chosen company/organization	
	Total	**30**

Textbook and Reference Books

1. Idris Mootee , *Design Thinking for Strategic Innovation*, Wily, 2014.

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Program: MBA Tech B Tech (All Program except CSBS, CSDS and Civil)				**Semester:** I/II	
Course: Digital Manufacturing Laboratory				**Code:** 702MEOC016	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks-50)**	**Term End Examinations (TEE) (Marks -100)**
0	2	0	1	Marks Scaled to 50	-

Pre-requisite: Nil

Course Objective

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.

Course Outcomes

After completion of the course, students will be able to -

1. Describe FDM Technology
2. Prepare given model for 3D printing
3. Create products of complex geometries using 3D printer

Detailed Syllabus

Unit	Description	Duration
1	**Introduction to Digital Manufacturing and Technical Design** Overview of 3D printing laboratory equipment, pre-fabricating requirements – printer bed size, hardware and materials required.	**02**
2	**3D Printing Process steps** 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.	**06**
3	**3D Printing with Fused Deposition Modeling (FDM)** 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.	**10**
4	**Project Involving Ideation, Design and 3D Printing** Briefing of idea, designing of product, solid model creation, final fabrication using 3D printer.	**12**
	Total	**30**

Text Books

1. Noorani, Rafiq, *3D Printing: Technology, Applications, and Selection*, 1st edition, CRC Press, 2017.

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2. Filemon Schöffer, 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*, 3rd edition, World Scientific Publishing Co. Pte. Ltd., 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.

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Program B Tech (All Program except CSBS, CSDS and Civil) and MBA Tech				**Semester:** I / II	
Course: Electrical and Electronics Workshop				**Code:**702EX0C021	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks ---)**
0	2	0	1	Marks Scaled to 50	--

Pre-requisite – Nil

Course Objective

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.

Course Outcomes

After completion of the course, the student will be able to -

1. Identify correct testing instruments and tools for various tasks
2. Build PCB circuits using through hole and SMD components for small applications
3. Make use of required electrical components for building domestic wiring circuits
4. Assemble PC hardware and configure network topology

Detailed Syllabus

Unit	Description	Duration
1.	**Familiarization and application of testing instruments and commonly used measuring instruments and tools** 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.	**Printed circuit boards (PCB)** 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. **Soldering and Joining Processes –** Introduction, Techniques and circuit assembly. Assembling of electronic circuits using SMT (Surface Mount Technology) components/stations.	8

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3.	**Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses and connectors** 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
4.	**Introduction to PC Hardware –** 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
	Total	**30**

Text Books

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

Reference Books

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

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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

Signature (Head of the Department)	Signature (Dean)

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

Program: B Tech (All Program except CSBS, CSDS) /MBA Tech (All Program)				**Semester : II/I**	
Course: Environmental Science				**Code:** 702CI0C014	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- ---)**
1	0	1	2	Marks Scaled to 50	--

Pre-requisite: Fundamental Knowledge of physics, chemistry and mathematics

Course Objective

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.

Course Outcomes

After completion of the course, the student will be able to -

1. Explain the concept of natural resources, ecosystem and biodiversity
2. Relate the various aspects of environmental pollutions with its cause and effect
3. Explain the greenhouse effect and climate change

Detailed Syllabus

Unit	Description	Duration
1	**Multidisciplinary nature of environmental science** Definition, scope and importance of environmental sciences.	**01**
2	**Natural Resources** 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	**Ecosystems** 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	**Biodiversity** 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	**Environmental Pollution**	**04**

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	Definition, Cause and effects for Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards and Solid waste pollution.	
6	**The Science of Climate Change** Greenhouse effect, Global warming, Global environmental changes, Acid rain Ozone layer depletion, Carbon footprint	**04**
	Total	**15**

Text Books

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

Reference Books

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

Tutorial Work

8 to 10 Tutorial exercises based on the syllabus.

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Program: B Tech (Civil Engineering)				**Semester:** I	
Course: Engineering Workshop				**Code:** 702CI0C001	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks-50)**	**Term End Examinations (TEE) (Marks---)**
0	4	0	2	Marks Scaled to 50	---

Pre-requisite: Nil

Course Objective

The course aims to introduce properties of building materials, methods of construction and building services used in practice. It also aims to introduce minor instruments used for surveying and digital fabrication tools & methods.

Course Outcomes

After completion of the course, students will be able to -

1. Illustrate the properties of building materials and methods of construction
2. Describe various building services
3. Demonstrate the use of minor surveying instruments
4. Create products of complex geometries using 3D printer

Detailed Syllabus

Unit	Description	Duration
1	**Building Materials** Study of properties and applications of various building materials like stones, bricks, tiles, cement, cement mortar, concrete, structural steel and reinforcement, timber, glass, gypsum, etc.	**12**
2	**Components of Building** Study of various types of buildings as per NBC, different types of structures like load bearing, framed etc., various components of building like foundations, columns, beams, slabs, floors, roofs, doors, windows, staircases and their suitability.	**10**
3	**Building Services** Different types of pipes, joints, taps, fixtures and accessories used in plumbing, components (pipes, bends, chambers etc.) used in sanitary/sewerage lines, scheme/plan for water supply and sanitary system for a simple residential building, building electrical systems, lifts and escalators.	**08**
4	**Surveying Instruments** Use of minor equipment for surveying, study of chains, tapes, cross-staffs, ranging rods, magnetic compass	**08**

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5	**Introduction to Digital Manufacturing and Technical Design** Overview of 3D printing laboratory equipment, pre-fabricating requirements – printer bed size, hardware and materials required. **3D Printing Process steps** Process steps involved in 3D printing, select a STL model from online resources, slicing the file, machine set up, build and post processing.	**05**
6	**3D Printing with Fused Deposition Modeling (FDM)** Operating principle and workflow of a Fused Deposition Modeling (FDM) 3D Printing machine, effect of layer thickness and infill density on FDM printed parts, study of lithophane. **Project Involving Ideation, Design and 3D Printing** Briefing of idea, designing of product, solid model creation, final fabrication using 3D printer.	**09**
7	**Site Visits** Study of different construction activities at site.	**08**
	Total	**60**

Text Books

1. S. K. Duggal, *Building Materials*, 4th Edition, New Age International Pvt. Ltd, 2012.
2. Noorani, Rafiq, *3D Printing: Technology, Applications, and Selection*, 1st Edition, CRC Press, 2017.
3. Filemon Schöffer, Ben Redwood, Brian Garret, *The 3D Printing Handbook: Technologies, design and applications*, 3D Hubs, 2017.

Reference Books

1. S.C. Rangawala, *Engineering Materials*, 43rd Edition, Charotar Publishing House Pvt. Ltd, 2017.
2. S.C. Rangawala, *Building Construction*, 33rd Edition, Charotar Publishing House Pvt. Ltd, 2016.
3. Chua, C. L., Lim, K., *Rapid Prototyping: Principles and Applications*, 3rd Edition, World Scientific Publishing Co. Pte. Ltd., 2010.

Laboratory Work

8 to 10 experiments based on the syllabus.

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