

Mohan Lal Sukhadia University Udaipur



B. Tech. Program (Effective from session 2021-2022) (Effective from session 2022-2023)

I and II Semesters
(Common to all branches of Engineering)

Course structure and Syllabus

**Teaching and Examination Scheme
Common for all Engineering branches
Semester I**

SN	Category	Course Code	Course Title	Credit				Contact Hours				Max. Marks		
				Total	L	T	P	Total	L	T	P	IA	ETE	Total
1	BSC	BT1FY01-CT01	Engineering Mathematics-I	4	3	1	0	4	3	1	-	40	160	200
2	BSC	BT1FY02-CT02/	Engineering Physics/	4	3	1	0	4	3	1	-	40	160	200
		BT1FY03-CT03	Engineering Chemistry											
3	HSMC	BT1FY04-CT04/	Communication Skills/	2	2	0	0	2	2	-	-	20	80	100
		BT1FY05-CT05	Human Values											
4	ESC	BT1FY06-CT06/	Programming for Problem Solving/	2	2	0	0	2	2	-	-	20	80	100
		BT1FY07-CT07	Basic Mechanical Engineering											
5	ESC	BT1FY08-CT08/	Basic Electrical Engineering/	2	2	0	0	2	2	-	-	20	80	100
		BT1FY09-CT09	Basic Civil Engineering											
6	BSC	BT1FY10-CP01/	Engineering Physics Lab/	1	0	0	1	2	-	-	2	20	30	50
		BT1FY11-CP02	Engineering Chemistry Lab											
7	HSMC	BT1FY12-CP03/	Language Lab/	1	0	0	1	2	-	-	2	20	30	50
		BT1FY13-CP04	Human Values Activities and Sports											
8	ESC	BT1FY14-CP05/	Computer Programming Lab/	2	0	0	2	4	-	-	4	40	60	100
		BT1FY15-CP06	Manufacturing Practices Workshop											
9	ESC	BT1FY16-CP07/	Basic Electrical Engineering Lab/	1	0	0	1	2	-	-	2	20	30	50
		BT1FY17-CP08	Basic Civil Engineering Lab											
10	ESC	BT1FY18-CP09	Computer Aided Engineering Graphics/	2	0	0	2	4	-	-	4	40	60	100
		BT1FY19-CP10	Computer Aided Machine Drawing											
Total				21	12	2	7	28	12	2	14	280	770	1050

L = Lecture, T = Tutorial, P = Practical, IA=Internal Assessment, ETE=End Term Exam

**Teaching and Examination Scheme
Common for all Engineering branches**

Semester II

SN	Category	Course Code	Course Title	Credit				Contact Hours				Max. Marks		
				Total	L	T	P	Total	L	T	P	IA	ETE	Total
1	BSC	BT2FY01-CT01	Engineering Mathematics-II	4	3	1	0	4	3	1	-	40	160	200
2	BSC	BT2FY03-CT03	Engineering Chemistry/	4	3	1	0	4	3	1	-	40	160	200
		BT2FY02-CT02	Engineering Physics											
3	HSMC	BT2FY05-CT05/	Human Values/	2	2	0	0	2	2	-	-	20	80	100
		BT2FY04-CT04	Communication Skills											
4	ESC	BT2FY07-CT07/	Basic Mechanical Engineering	2	2	0	0	2	2	-	-	20	80	100
		BT2FY06-CT06	Programming for Problem Solving											
5	ESC	BT2FY09-CT09	Basic Civil Engineering	2	2	0	0	2	2	-	-	20	80	100
		BT2FY08-CT08	Basic Electrical Engineering/											
6	BSC	BT2FY11-CP02	Engineering Chemistry Lab	1	0	0	1	2	-	-	2	20	30	50
		BT2FY10-CP01/	Engineering Physics Lab/											
7	HSMC	BT2FY13-CP04	Human Values Activities and Sports	1	0	0	1	2	-	-	2	20	30	50
		BT2FY12-CP03/	Language Lab/											
8	ESC	BT2FY15-CP06	Manufacturing Practices Workshop	2	0	0	2	4	-	-	4	40	60	100
		BT2FY14-CP05/	Computer Programming Lab/											
9	ESC	BT2FY17-CP08	Basic Civil Engineering Lab	1	0	0	1	2	-	-	2	20	30	50
		BT2FY16-CP07/	Basic Electrical Engineering Lab/											
10	ESC	BT2FY19-CP10	Computer Aided Machine Drawing	2	0	0	2	4	-	-	4	40	60	100
		BT2FY18-CP09	Computer Aided Engineering Graphics/											
Total				21	12	2	7	28	12	2	14	280	770	1050

L = Lecture, T = Tutorial, P = Practical, IA=Internal Assessment, ETE=End Term Exam

SYLLABUS
Semester I
Common for all Engineering branches

BT1FY01-CT01: Engineering Mathematics-I

Credit: 4
3L+1T+0P

Max. Marks: 200 (IA:40, ETE:160)
End Term Exam: 3 Hours

SN	CONTENTS	Hours
1	Calculus: Improper integrals (Beta and Gamma functions) and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.	8
2	Sequences and Series: Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.	8
3	Fourier Series: Periodic functions, Fourier series, Euler's formula, Change of intervals, Half range sine and cosine series, Parseval's theorem.	8
4	Multivariable Calculus (Differentiation): Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.	8
5	Multivariable Calculus (Integration): Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Centre of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.	8
TOTAL		40

Suggested Readings:

1. Thomas' Calculus, George B. Thomas, Jr., Maurice D. Weir, Joel R. Hass, Pearson Educations.
2. Calculus with Early Transcendental Functions, James Stewart, Cengage Learning Publication.
3. Engineering Mathematics, C.B. Gupta, S.R. Singh and Mukesh Kumar, McGraw Hill Education.
4. Engineering Mathematics, S. Pal and S.C. Bhunia, Oxford University Press.
5. Higher Engineering Mathematics, B.V. Ramana, McGraw Hill Education.
6. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley.

Semester I & II
Common for all Engineering branches

BT1FY02-CT02/ BT2FY02-CT02: Engineering Physics

Credit: 4
3L+1T+0P

Max. Marks: 200 (IA:40, ETE:160)
End Term Exam: 3 Hours

SN	CONTENTS	Hours
1	Wave Optics: Newton's Rings, Michelson's Interferometer, Fraunhofer Diffraction from a Single Slit. Diffraction grating: Construction, theory and spectrum, Resolving power and Rayleigh criterion for limit of resolution, Resolving power of diffraction grating, X-Ray diffraction and Bragg's Law.	8
2	Quantum Mechanics: Introduction to quantum Mechanics, Wave-particle duality, Matter waves, Wave function and basic postulates, Time dependent and time independent Schrodinger's Wave Equation, Physical interpretation of wave function and its properties, Applications of the Schrodinger's Equation: Particle in one dimensional and three dimensional boxes. Coherence and Optical Fibers: Spatial and temporal coherence: Coherence length; Coherence time and „Q“ factor for light, Visibility as a measure of Coherence and spectral purity, Optical fiber as optical wave guide, Numerical aperture; Maximum angle of acceptance and applications of optical fiber.	8
3	Laser: Einstein's Theory of laser action; Einstein's coefficients; Properties of Laser beam, Amplification of light by population inversion, Components of laser, Construction and working of He-Ne and semiconductor lasers, Applications of Lasers in Science, engineering and medicine.	8
4	Material Science & Semiconductor Physics: Bonding in solids: covalent and metallic bonding, Energy bands in solids: Classification of solids as Insulators, Semiconductors and Conductors, Intrinsic and extrinsic semiconductors, Fermi dirac distribution function and Fermi energy, Conductivity in semiconductors, Hall Effect: Theory, Hall Coefficient and applications.	8
5	Introduction to Electromagnetism: Divergence and curl of electrostatic field, Laplace's and Poisson's equations for electrostatic potential, Bio-Savart law, Divergence and curl of static magnetic field, Faraday's law, Displacement current and magnetic field arising from time dependent electric field, Maxwell's equations, Flow of energy and Poynting vector.	8
TOTAL		40

Suggested Readings:

1. Engineering Physics: Malik and Singh (Tata McGraw Hill)
2. Engineering Physics: Naidu (Pearson)
3. Optics : Ajay Ghatak (Tata McGraw Hill)
4. Concept of Modern Physics: A. Baiser (Tata McGraw Hill)
5. Fundamental of Optics : Jetkins and White (Tata McGraw Hill)
6. Material Science: Smith (McGraw Hill)

Semester I & II
Common for all Engineering branches

BT1FY03-CT03/ BT2FY03-CT03: Engineering Chemistry

Credit: 4
3L+1T+0P

Max. Marks: 200 (IA:40, ETE:160)
End Term Exam: 3 Hours

SN	CONTENTS	Hours
1	<p>Water: Common impurities, hardness, determination of hardness by complexometric (EDTA method), Degree of hardness, Units of hardness Municipal water supply: Requisite of drinking water, Purification of water; sedimentation, filtration, disinfection, breakpoint chlorination. Boiler troubles: Scale and Sludge formation, Internal treatment methods, Priming and Foaming, Boiler corrosion and Caustic embrittlement Water softening; Lime-Soda process, Zeolite (Permutit) process, Demineralization process. Numerical problems based on Hardness, EDTA, Lime-Soda and Zeolite process.</p>	8
2	<p>Organic Fuels: Solid fuels: Coal, Classification of Coal, Proximate and Ultimate analyses of coal and its significance, Gross and Net Calorific value, Determination of Calorific value of coal by Bomb Calorimeter. Metallurgical coke, Carbonization processes; Otto-Hoffmann by-product oven method. Liquid fuels : Advantages of liquid fuels, Mining, Refining and Composition of petroleum, Cracking, Synthetic petrol, Reforming, Knocking, Octane number, Anti-knocking agents, Cetane number Gaseous fuels; Advantages, manufacturing, composition and Calorific value of coal gas and oil gas, Determination of calorific value of gaseous fuels by Junker's calorimeter Numerical problems based on determination of calorific value (bomb calorimeter/Junker's calorimeter/Dulong's formula, proximate analysis & ultimate and combustion of fuel.</p>	8
3	<p>Corrosion and its control: Definition and significance of corrosion, Mechanism of chemical (dry) and electrochemical (wet) corrosion, galvanic corrosion, concentration corrosion and pitting corrosion. Protection from corrosion; protective coatings-galvanization and tinning, cathodic protection, sacrificial anode and modifications in design.</p>	8
4	<p>Engineering Materials: Portland Cement; Definition, Manufacturing by Rotary kiln. Chemistry of setting and hardening of cement. Role of Gypsum. Glass: Definition, Manufacturing by tank furnace, significance of</p>	8

	annealing, Types and properties of soft glass, hard glass, borosilicate glass, glass wool, safety glass Lubricants: Classification, Mechanism, Properties; Viscosity and viscosity index, flash and fire point, cloud and pour point. Emulsification and steam emulsion number.	
5	Organic reaction mechanism and introduction of drugs: Organic reaction mechanism: Substitution; SN1, SN2, Electrophilic aromatic substitution in benzene, free radical halogenations of alkanes, Elimination; elimination in alkyl halides, dehydration of alcohols, Addition: electrophilic and free radical addition in alkenes, nucleophilic addition in aldehyde and ketones, Rearrangement; Carbocation and free radical rearrangements Drugs : Introduction, Synthesis, properties and uses of Aspirin, Paracetamol	8
TOTAL		40

Suggested Readings:

1. Engineering Chemistry by Monica Jain and P C Jain, Dhanpat Rai Publishing Company (P) Ltd, New Delhi.
2. Engineering Chemistry Wiley, India.
3. The Chemistry and Technology of Coal, by J G Speigh, CRC Press.
4. The Chemistry and Technology of Petroleum, by J G Speigh, CRC Press.
5. Polymer Chemistry: An Introduction, Malcolm P. Stevens, Oxford University Press.
6. Lubricants and Lubrications, Theo Mang, Wilfeied, Wiley-VCH.
7. Chemistry of water treatment, Samuel Faust & Osman M Aly, CRC Press.
8. Boilers water treatment. Principles and Practice, Colin Frayne, CRC Press.
9. Corrosion Understanding the Basic, by Joseph R Davis, ASM International.
10. Engineering Chemistry, by O.G. Palanna, McGraw Hill Education, India.

Semester I & II
Common for all Engineering branches

BT1FY04-CT04/ BT2FY04-CT04: Communication Skills

Credit: 2
2L+0T+0P

Max. Marks: 100 (IA:20, ETE:80)
End Term Exam: 2 Hours

SN	CONTENTS	Hours
1	Communication: Meaning, Importance and Cycle of Communication. Media and Types of Communication. Verbal and Non-Verbal Communication. Barriers to communication. Formal and Informal Channels of Communication (Corporate Communication). Divisions of Human Communication and Methods to improve Interpersonal Communication. Qualities of good communication.	5
2	Grammar: Passive Voice. Reported Speech. Conditional Sentences. Modal Verbs. Linking Words (Conjunctions)	5
3	Composition: Job Application and Curriculum-Vitae Writing. Business Letter Writing. Paragraph Writing. Report Writing.	5
4	Short Stories: “Luncheon” by Somerset Maugham. “How Much Land Does a Man Need?” by Count Leo Tolstoy. “The Night Train at Deoli” by Ruskin Bond.	5
5	Poems: “No Men are Foreign” by James Kirkup. “If” by Rudyard Kipling. “Where the Mind is without Fear” by Rabindranath Tagore.	5
TOTAL		25

Suggested Readings:

1. Communication Skills, Pushplata & Sanjay Kumar, Oxford University Press, India.
2. The Written Word, Vandana Singh, Oxford University Press, India.
3. Current English Grammar and Usage with Composition, R. P. Sinha, Oxford University Press, India.
4. Rodrigues M. V., ‘Effective Business Communication’, Concept Publishing Company, New Delhi, 1992 reprint (2000).
5. Bansal, R K and Harrison J B, ‘Spoken English’ Orient Longman, Hyderabad.
6. Binod Mishra & Sangeeta Sharma, ‘Communication Skills for Engineers and Scientists, PHI Learning Private Ltd, New Delhi, 2011.
7. Gartside L. ‘Modern Business Correspondence, Pitman Publishing, London.

Semester I & II
Common for all Engineering branches

BT1FY05-CT05/ BT2FY05-CT05: Human Values

Credit: 2
2L+0T+0P

Max. Marks: 100 (IA:20, ETE:80)
End Term Exam: 2 Hours

SN	CONTENTS	Hours
1	<p>Course Introduction - Need, Basic Guidelines, Content and Process for Value Education</p> <p>Understanding the need, basic guidelines, Self Exploration - its content and process; „Natural Acceptance” and Experiential Validation, Continuous Happiness and Prosperity- Human Aspirations, Right understanding, Relationship and Physical Facilities, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario.</p> <p>Method to fulfill the above human aspirations: understanding and living in harmony at various levels</p>	5
2	<p>Understanding Harmony in the Human Being - Harmony in Myself</p> <p>Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’</p> <p>Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha</p> <p>Understanding the Body as an instrument of ‘I’, Understanding the characteristics and activities of ‘I’ and harmony in ‘I’ Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.</p>	5
3	<p>Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship</p> <p>Understanding harmony in the Family, Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) , meaning of Vishwas; Difference between intention and competence, meaning of Samman, Difference between respect and differentiation;</p> <p>the other salient values in relationship, harmony in the society , Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals ,Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)- from family to world family.</p>	5

4	<p>Understanding Harmony in the Nature and Existence - Whole existence as Coexistence</p> <p>Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all pervasive Space.</p> <p>Holistic perception of harmony at all levels of existence</p>	5
5	<p>Implications of the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values</p> <p>Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, (b) Ability to identify the scope and characteristics of people-friendly and eco- friendly production systems, technologies and management models. Strategy for transition from the present state to Universal Human Order: (a). At the level of individual: as socially and ecologically responsible engineers, technologists and managers. (b). At the level of society: as mutually enriching institutions and organization.</p> <p>Case studies related to values in professional life and individual life.</p>	5
TOTAL		25

Suggested Readings:

1. R R Gaur, R Sangal, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, Excel Books, 2009. ISBN: 978-9-350-62091-5
2. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
3. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
4. R. Subramanian, Professional Ethics includes Human Values, Oxford Univ. Press.
5. Susan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
6. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.
7. A Nagaraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
8. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
9. A N Tripathy, 2003, Human Values, New Age International Publishers.
10. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
11. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
12. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
13. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
14. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Semester I
Common for all Engineering branches

BT1FY06-CT06/ BT2FY06-CT06: Programming for Problem Solving

Credit: 2
2L+0T+0P

Max. Marks: 100 (IA:20, ETE:80)
End Term Exam: 2 Hours

SN	CONTENTS	Hours
1	Fundamentals of Computer: Stored program architecture of computers, Storage device- Primary memory, and Secondary storage, Random, Direct, Sequential access methods, Concepts of High-level, Assembly and Low-level languages.	6
2	Number system: Data representations, Concepts of radix and representation of numbers in radix r with special cases of r=2, 8, 10 and 16 with conversion from radix r1 to r2, r's and (r-1)'s complement, Binary addition, Binary subtraction, Representation of alphabets.	6
3	Algorithms Statements: Representing algorithms through flowchart and pseudo code. Three construct of Algorithm and flowchart: Sequence, Decision (Selection) and Repetition.	6
4	Fundamental of C programming: Character Set, Identifiers and keywords, Data types, Constants, Variables, input output statements, developing simple C programs, If statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement, development of C programs using above statements	6
5	Functions and file handling Programming: Arrays, functions, parameter passing, recursion, Programming in C using these statements, Structures, files, pointers and multi file handling.	6
TOTAL		30

Suggested Readings:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Semester I & II
Common for all Engineering branches

BT1FY07-CT07/ BT2FY07-CT07: Basic Mechanical Engineering

Credit: 2
2L+0T+0P

Max. Marks: 100 (IA:20, ETE:80)

End Term Exam: 2 Hours

SN	CONTENTS	Hours
1	Fundamentals: Introduction to mechanical engineering, concepts of thermal engineering. Steam Boilers classification and types of steam boilers and steam turbines. Introduction and Classification of power plants.	6
2	Pumps and IC Engines: Applications and working of Reciprocating and Centrifugal pumps. Introduction, Classification of IC Engines, Main Components of IC Engines, Working of IC Engines and its components.	6
3	Refrigeration and Air Conditioning: Introduction, classification and types of refrigeration systems and air-conditioning. Applications of refrigeration and Air-conditioning.	6
4	(a) Transmission of Power: Introduction and types of Belt and Rope Drives, Gears. (b) Engineering Materials and Heat Treatment of Steel: Introduction to various engineering materials and their properties.	6
5	Primary Manufacturing Processes: Metal Casting Process: Introduction to Casting Process, Patterns, Molding, Furnaces. Metal Forming Processes: Introduction to Forging, Rolling, Extrusion, Drawing. Metal Joining Processes: Introduction to various types of Welding, Gas Cutting, Brazing, and Soldering.	6
Total		30

Suggested Readings:

1. G. Shanmugam and S Ravindran, Basic Mechanical Engineering, Mc Graw hill, fourth edition.
2. K Venu Gopal and Prabhu Raja V, Basic Mechanical Engineering, Anuradha agencies pub, Chennai.

Semester I & II
Common for all Engineering branches

BT1FY08-CT08/ BT2FY08-CT08: Basic Electrical Engineering

Credit: 2
2L+0T+0P

Max. Marks: 100 (IA:20, ETE:80)
End Term Exam: 2 Hours

SN	CONTENTS	Hours
1	DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, Series-Parallel circuits, Node voltage method, Mesh current method, Superposition, Thevenin's, Norton's and Maximum power transfer theorems.	6
2	AC Circuits: Representation of sinusoidal waveforms, peak and r.m.s values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC and RLC combinations, resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.	6
3	Transformers: Ideal and practical transformer, EMF equation, equivalent circuit, losses in transformers, regulation and efficiency. DC machine: Construction, working and types of Generator and motor, EMF equation, torque and speed equation	6
4	Electrical Machines: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor. Starting and speed control of induction motor. Working Principle and types of single-phase induction motor. Construction and working of synchronous generators.	6
5	Power Converters: Semiconductor PN junction diode and transistor (BJT). Characteristics of SCR, power transistor and IGBT. Basic circuits of single phase rectifier with R load, Single phase Inverter, DC-DC converter. Electrical Installations: Layout of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, Type of earthing. Power measurement, elementary calculations for energy consumption.	6
TOTAL		30

Suggested Readings:

- 1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.**
- 2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.**
3. L.S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
5. V.D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
6. Basic Electrical and Electronics Engineering by Sukhija and Nagsarkar, Oxford Publication

Semester I & II
Common for all Engineering branches

BT1FY09-CT09/ BT2FY09-CT09: Basic Civil Engineering

Credit: 2
2L+0T+0P

Max. Marks: 100 (IA:20, ETE:80)
End Term Exam: 2 Hours

SN	CONTENTS	Hours
1	Introduction: Introduction to objective, scope and outcome the subject Scope and Specialization of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country.	6
2	Buildings: Selection of site for Buildings, Layout of Building Plan, Types of buildings, Plinth area, carpet area, floor space index, Introduction to building byelaws, concept of sun light and ventilation. Components of Buildings & their functions, Introduction to types of foundation	6
3	Surveying: Object Principles & Types of Surveying; Site Plans, Plans & Maps; Scales & Unit of different Measurements. Linear Measurements: Instruments used. Linear Measurement by Tape, Ranging out Survey Lines and overcoming Obstructions; Angular Measurements: Instruments used; Introduction to Compass Surveying, Bearings and Longitude & Latitude of a Line, Introduction to total station.	6
4	Transportation: Introduction to Transportation Engineering; Traffic and Road Safety: Types and Characteristics of Various Modes of Transportation; Various Road Traffic Signs, Causes of Accidents and Road Safety Measures.	6
5	Environmental Engineering: Environmental Pollution, Environmental Acts and Regulations, Functional Concepts of Ecology, Basics of Species, Biodiversity, Ecosystem, Hydrological Cycle; Energy Flow in Eco-systems. Water Pollution: Introduction to Treatment & Disposal of Waste Water. Solid Waste Management: Classification of Solid Waste and Disposal of Solid. Air & Noise Pollution: Primary and Secondary air pollutants, Harmful effects of Air Pollution, Control of Air Pollution. Noise Pollution, Harmful Effects of noise pollution, control of noise pollution.	6
	TOTAL	30

Suggested Readings:

1. Palancharny, Basic Civil Engineering, McGraw Hill publishers.
2. Satheesh Gopi, Basic Civil Engineering, Pearson Publishers.
3. Ketki Ranwala Dalal, Essentials of Civil Engineering, Charotar Publishing House.
4. Basic Environmental Engineering by Prof. R.C. Gaur, New Age International Publication.

Semester I & II
Common for all Engineering branches

BT1FY10-CP01/ BT2FY10-CP01: Engineering Physics Lab

Credit: 1
0L+0T+2P

Max. Marks: 50 (ETE:30, IA:20)

1. To determine the wave length of monochromatic light with the help of Michelson's interferometer.
2. To determine the wave length of sodium light by Newton's Ring.
3. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
4. Determination of band gap using a P-N junction diode.
5. To determine the height of given object with the help of sextant.
6. To determine the dispersive power of material of a prism with the help of spectrometer.
7. To study the charge and discharge of a condenser and hence determine the same constant (both current and voltage graphs are to be plotted).
8. To determine the coherence length and coherence time of laser using He – Ne laser.
9. To measure the numerical aperture of an optical fibre.
10. To study the Hall Effect and determine the Hall Voltage and Hall coefficients.

Semester I & II
Common for all Engineering branches

BT1FY11-CP02/ BT2FY11-CP02: Engineering Chemistry Lab

Credit: 1
0L+0T+2P

Max. Marks: 50 (ETE:30, IA:20)

1. Determination the hardness of water by EDTA method
2. Determination of residual chlorine in water
3. Determination of dissolved oxygen in water
4. Determination of the strength of Ferrous Ammonium sulphate solution with the help of $K_2Cr_2O_7$ solution by using diphenyl amine indicator
5. Determination of the strength of $CuSO_4$ solution iodometrically by using hypo solution
6. Determination of the strength of $NaOH$ and Na_2CO_3 in a given alkali mixture
7. Proximate analysis of Coal
8. Determination of the flash & fire point and cloud & pour point of lubricating oil
9. Determination of the kinematic viscosity of lubricating oil by Redwood viscometer no. 1 at different temperature
10. Synthesis of Aspirin/ Paracetamol

Semester I & II
Common for all Engineering branches

BT1FY12-CP03/ BT2FY12-CP03: Language Lab

Credit: 1
0L+0T+2P

Max. Marks: 50 (ETE:30, IA:20)

1. Phonetic Symbols and Transcriptions.
2. Extempore.
3. Group Discussion.
4. Dialogue Writing.
5. Listening comprehension.

Suggested Readings:

1. Technical Communication: principles and Practice, Meenakshi Raman & Sangeeta Sharma, Oxford University Press, India.
2. Effective Technical Communication, Barun K. Mitra, Oxford University Press, India.
3. Binod Mishra & Sangeeta Sharma, 'Communication Skills for Engineers and Scientists, PHI Learning Private Ltd, New Delhi, 2011.
4. Communication Skills, Pushplata & Sanjay Kumar, Oxford University Press, India.
5. Bhattacharya, Indrajit, An Approach to Communication Skills, Dhanpat Rai & Co. (Pvt) Ltd., New Delhi.
6. Wright, Crissy, Handbook of Practical Communication Skills, Jaico Publishing House, Mumbai.
7. Gimson, A C, 'An Introduction to the Pronunciation of English', ELBS.

Semester I & II
Common for all Engineering branches

BT1FY13-CP04/ BT2FY13-CP04: Human Values Activities and Sports

Credit: 1
0L+0T+2P

Max. Marks: 50 (ETE:30, IA:20)

PS 1:

Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your salient achievements and shortcomings in your life? Observe and analyze them.

PS 2:

Now-a-days, there is a lot of talk about many techno-genic maladies such as energy and material resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. - all these seem to be manmade problems, threatening the survival of life Earth - What is the root cause of these maladies & what is the way out in opinion?

On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, breakdown of relationships, generation gap, depression & suicidal attempts etc. - what do you think, is the root cause of these threats to human happiness and peace - what could be the way out in your opinion?

PS 3:

1. Observe that each of us has the faculty of „Natural Acceptance“, based on which one can verify what is right or not right for him. (As such we are not properly trained to listen to our „Natural Acceptance“ and may a time it is also clouded by our strong per-conditioning and sensory attractions).

Explore the following:

- (i) What is „Naturally Acceptable“ to you in relationship the feeling of respect or disrespect for yourself and for others?
 - (ii) What is „naturally Acceptable“ to you - to nurture or to exploit others? Is your living in accordance with your natural acceptance or different from it?
2. Out of the three basic requirements for fulfillment of your aspirations - right understanding, relationship and physical facilities - observe how the problems in your family are related to each. Also observe how much time & effort you devote for each in your daily routine.

PS 4:

1. a. Observe that any physical facility you use, follows the given sequence with time:
Necessary and tasteful - unnecessary but still tasteful - unnecessary and tasteless - intolerable
b. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If not acceptable, you want it continuously and if not acceptable, you do not want it any moment!
2. List down all your important activities. Observe whether the activity is of „I“ or of Body or with the participation of both or with the participation of both „I“ and Body.
3. Observe the activities within „I“. Identify the object of your attention for different

moments (over a period of say 5 to 10 minutes) and draw a line diagram connecting these points. Try to observe the link between any two nodes.

PS 5:

1. Write a narration in the form of a story, poem, skit or essay to clarify a salient Human Value to the children.
2. Recollect and narrate an incident in your life where you were able to exhibit willful adherence to values in a difficult situation.

PS 6:

List down some common units (things) of Nature which you come across in your daily life and classify them in the four orders of Nature. Analyse and explain the aspect of mutual fulfillment of each unit with other orders.

PS 7:

Identify any two important problems being faced by the society today and analyze the root cause of these problems. Can these be solved on the basis of natural acceptance of human values? If so, how should one proceed in this direction from the present situation?

PS 8:

1. Suggest ways in which you can use your knowledge of Science/Technology/Management etc. for moving towards a universal human order.
2. Propose a broad outline for humanistic Constitution at the level of Nation.

Project:

Every student required to take-up a social project e.g. educating children in needy/weaker section; services in hospitals, NGO's and other such work i.e. social work at villages adopted by respective institute/ college.

Sports:

- a) Planning in Sports,
- b) Sports & Nutrition
- c) Yoga and Lifestyle
- d) Measures Physical Education & Sports for CWSN (Children with Special needs - Divyang)
- e) Children & Sports
- f) Women & Sports
- g) Test & Measurement in Sports
- h) Physiology & Sports
- i) Sports Medicine
- j) Kinesiology, Biomechanics & Sports
- k) Psychology & Sports
- l) Training in Sports

Semester I & II
Common for all Engineering branches

BT1FY14-CP05/ BT2FY14-CP05: Computer Programming Lab

Credit: 2
0L+0T+3P

Max. Marks: 100 (ETE:60, IA:40)

1. To learn about the C Library, Preprocessor directive, Input-output statement.
2. Programs to learn data type, variables, If-else statement
3. Programs to understand nested if-else statement and switch statement
4. Programs to learn iterative statements like while and do-while loops
5. Programs to understand for loops for iterative statements
6. Programs to learn about array and string operations
7. Programs to understand sorting and searching using array
8. Programs to learn functions and recursive functions
9. Programs to understand Structure and Union operation
10. Programs to learn Pointer operations
11. Programs to understand File handling operations
12. Programs to input data through Command line argument

Semester I & II
Common for all Engineering branches

BT1FY15-CP06/ BT1FY15-CP06: Manufacturing Practices Workshop

Credit: 2
0L+0T+3P

Max. Marks: 100 (ETE:60, IA:40)

Carpentry Shop

1. T – Lap joint
2. Bridle joint

Welding Shop

3. Lap joint by gas welding
4. Butt joint by arc welding
5. Lap joint by arc welding
6. Demonstration of brazing, soldering & gas cutting

Machine Shop Practice

7. Job on lathe with one step turning and chamfering operations

Fitting and Sheet Metal Shop

8. Finishing of two sides of a square piece by filing
9. Making mechanical joint and soldering of joint on sheet metal
10. To cut a square notch using hacksaw and to drill a hole and tapping

Suggested Readings:

1. Elements of Workshop Technology Hajra & Choudhary, Media Promoters & Publisher.
2. Workshop Practice HS Bawa, Tata McGraw Hill 2nd ed. India.
3. Mechanical Workshop Practice, K.C. John, PHI Learning New Delhi.
4. Workshop Technology, W.A.J.Chapman, CBS Publisher & Distributor New Delhi.

Semester I & II
Common for all Engineering branches

BT1FY16-CP07/ BT2FY16-CP07: Basic Electrical Engineering Lab

Credit: 1
0L+0T+2P

Max. Marks: 50 (ETE:30, IA:20)

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. To understand Series & Parallel circuit
3. To verify Mesh Analysis and to verify Nodal Analysis
4. To verify Superposition, Thevenin's, Norton's Theorem
5. To analyse the phase relationships for Series RL AC Circuit
6. To analyse phase relationships for Series RC AC Circuit
7. To understand series RLC resonant Circuit
8. Transformers: Observation of the no-load current waveform on an oscilloscope. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
9. Demonstration of cut-out sections of machines: dc machine (commutator- brush arrangement),
10. Demonstration of cut-out sections of induction machine (squirrel cage rotor).
11. Demonstration of cut-out sections of synchronous machine (field winding - slip ring arrangement).
12. Demonstration of cut-out sections of single-phase induction machine.
13. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

Semester I & II
Common for all Engineering branches

BT1FY17-CP08/ BT2FY17-CP08: Basic Civil Engineering Lab

Credit: 1
0L+0T+2P

Max. Marks: 50 (ETE:30, IA:20)

1. Linear Measurement by Tape:
 - a) Ranging and Fixing of Survey Station along straight line and across obstacles.
 - b) Laying perpendicular offset along the surveyline
2. Compass Survey: Measurement of bearing of lines using Surveyor's and Prismatic compass
3. Levelling: Using Tilting/ Dumpy/ Automatic Level
 - a) To determine the reduced levels in closed circuit.
 - b) To carry out profile levelling and plot longitudinal and cross sections for road by Height of Instrument and Rise & Fall Method.
4. To study and take measurements using various electronic surveying instruments like EDM, Total Station etc.
5. To determine pH, hardness and turbidity of the given sample of water.
6. To study various water supply Fittings.
7. To determine the pH and total solids of the given sample of sewage.

Semester I & II
Common for all Engineering branches

BT1FY18-CP09/ BT2FY18-CP09: Computer Aided Engineering Graphics

Credit: 2
0L+0T+3P

Max. Marks: 100 (ETE:60, IA:40)

Introduction: Principles of drawing, lines, type of lines, usage of Drawing instruments, lettering, Conic sections including parabola, hyperbola, Rectangular Hyperbola (General method only); Scales- Plain, Diagonal and Vernier Scales.

Projections of Point & Lines: Position of Point, Notation System, Systematic Approach for projections of points, front view & Top view of point, Position of straight lines, line parallel to Both the RPs, Line perpendicular to either of the RPs, Line inclined to one RP and parallel to the other, Line inclined to Both the RPs, Traces of a line (One drawing sheet, one assignment in sketch book).

Projection of Planes: Positions of planes, Terms used in projections of planes, plane parallel to RP, plane inclined to one RP and perpendicular to the other RP, plane perpendicular to Both the RPs, plane Inclined to Both the RPs, True shape of the plane, Distance of a point from plane, Angle between two planes.

Projections of Regular Solids: frustum and truncated solids, those inclined to both the Planes- Auxiliary Views.

Section of Solids: Theory of sectioning, section of prisms and cubes, section of pyramids and Tetrahedron section of Cylinders, section of cones, section of spheres (One drawing sheet, one assignment in sketch book)

Overview of Computer Graphics : Covering theory of CAD software [such as: The menu System, Toolbars (standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.: Isometric Views of lines, Planes, Simple and compound Solids.

Suggested Readings:

1. Engineering Drawing Geometrical Drawing P.S.Gill , S.K.Katara & Sons
2. Engineering Drawing,Dhanarajay A Jolhe ,Tata McGraw Hill.
3. Engineering Drawing, Basant Agarwal & CM Agarwal ,Tata McGraw Hill
4. Engineering Drawing, N.D.Bhatt, Charotar Publishing House Pvt. Ltd.
5. Engineering Drawing with an introduction to AutoCAD, Dhananjay A Jolhe
6. Engineering Drawing with AutoCAD, B.V.R. Gupta and M. Rajaroy
7. AutoCAD 2017 for Engineers & Designers (Basic and Intermediate), Sham Tickoo,

Semester I & II
Common for all Engineering branches

BT1FY19-CP10/ BT1FY19-CP10: Computer Aided Machine Drawing

Credit: 1
0L+0T+3P

Max. Marks: 75 (IA:45, ETE:30)

Introduction: Principles of drawing, conventional representation of machine components and materials, lines, types of lines, dimensioning types, rules of dimensioning.

Conversion of pictorial views into orthographic views: (1 drawing sheet) Introduction to orthographic projection, concept of first angle and third angle projection, drawing of simple machine elements in first angle projection, missing view problems covering Principles of Orthographic Projections.

Sectional views of mechanical components: (1 drawing sheet) Introduction, cutting plane line, type of sectional views-full section, half section, partial or broken section, revolved section, removed section, offset section, sectioning conventions-spokes, web rib, shaft, pipes, different types of holes, conventions of section lines for different metals and materials.

Fasteners and other mechanical components: (Free hand sketch) Temporary and permanent fasteners, thread nomenclature and forms, thread series, designation, representation of threads, bolted joints, locking arrangement of nuts, screws, washers, foundation bolts etc., keys, types of keys, cotter and knuckle joints. Riveted joints, rivets and riveting, type of rivets, types of riveted joints etc. Bearing: Ball, roller, needle, foot step bearing. Coupling: Protected type, flange, and pin type flexible coupling. Other components: Welded joints, belts and pulleys, pipes and pipe joints, valves etc.

Overview of Computer Graphics: (2 drawing sheets) Covering theory of CAD software such as: The menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Command Line (Where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.: Isometric Views of Lines, Planes, Simple and compound Solids.

Suggested Readings:

1. Laxminarayan and M.L. Mathur, Machine Drawing, Jain Brothers
2. Gill P S, Machine Drawing, Kataria & Sons 2009
3. Basudeb Bhattacharya, Machine Drawing, Oxford University Press 2011
4. Dhawan, R.K., A Text Book of Machine Drawing, S. Chand & Company, 1996
5. Ostrowsky, O., Engineering Drawing with CAD Applications, ELBS, 1995
6. Siddeshwar N., P Kannaiah, VVS Shastry, Machine Drawing, Tata McGraw Hill

Semester II
Common for all Engineering branches

BT2FY01-CT01 : Engineering Mathematics-II

Credit: 4
3L+1T+0P

Max. Marks: 200 (IA:40, ETE:160)

End Term Exam: 3 Hours

SN	CONTENTS	Hours
1	Matrices: Rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.	8
2	First order ordinary differential equations: Linear and Bernoulli's equations, Exact equations, Equations not of first degree: equations solvable for p , equations solvable for y , equations solvable for x and Clairaut's type.	8
3	Ordinary differential equations of higher orders: Linear Differential Equations of Higher order with constant coefficients, Simultaneous Linear Differential Equations, Second order linear differential equations with variable coefficients: Homogenous and Exact forms, one part of CF is known, Change of dependent and independent variables, method of variation of parameters, Cauchy- Euler equation; Power series solutions including Legendre differential equation and Bessel differential equations.	8
4	Partial Differential Equations – First order: Order and Degree, Formation; Linear Partial differential equations of First order, Lagrange's Form, Non Linear Partial Differential equations of first order, Charpit's method, Standard forms.	8
5	Partial Differential Equations– Higher order: Classification of Second order partial differential equations, Separation of variables method to simple problems in Cartesian coordinates including two dimensional Laplace, one dimensional Heat and one dimensional Wave equations.	8
TOTAL		40

Suggested Readings:

1. Advanced Engineering Mathematics, Peter O Neil, Cengage Learning Publication.
2. Advanced Engineering Mathematics, 4th Edition, Dennis G. Zill, Warren S. Wright, Jones & Bartlett Publications.
3. Engineering Mathematics, S. Pal and S.C. Bhunia, Oxford University Press.
4. Engineering Mathematics, C.B. Gupta, S.R. Singh and Mukesh Kumar, McGrawHill Education.
5. Advanced Engineering Mathematics, Jain and Iyengar, Narosa Publications.
6. Higher Engineering Mathematics, B.V. Ramana, McGraw Hill Education.
7. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley.