FIRST YEAR CURRICULUM

for

UNDERGRADUATE DEGREE COURSES

(Engineering & Technology)

Scheme and Syllabus

(Effective for 2017-18)

University Departments
Rajasthan Technical University, Kota

Approved
Dean, FA & UD

Scheme for 1st Year B. Tech. I Semester

I Semester		Course Title	Credits	L	T	P	Marks		
							IA	External	Total
SN	Subject Code	Theory Papers							
1	1MAU01	Engineering Mathematics-I	4	3	1		50	100	150
2	1EGU02/ 1CSU03	Professional Communication Skills/ Computer Programming	3	3	0		50	100	150
3	1CYU04/ 1PYU05	Engineering Chemistry / Engineering Physics	4	3	1		50	100	150
4	1MEU06/ 1EEU07	Engineering Mechanics/ Basic Electrical and Electronics Engineering	3	3	0		50	100	150
5	1CEU08	Environmental Engineering	2	2	0		50	100	150
6	1CEU09/ 1MEU10	Basic Civil Engineering/ Basic Mechanical Engineering	2	2	0		50	100	150
		Total	**18**	**16**	**2**		**300**	**600**	**900**
	Practical and Sessionals								
7	1EGU11/ 1CSU12	Professional Communication Skills Lab/ Computer Programming Lab	**2**			**3**	**50**	**25**	**75**
8	1CYU13/ 1PYU14	Engineering Chemistry Lab/ Engineering Physics Lab	**1**			**2**	**50**	**25**	**75**
9	1MEU15/ 1EEU16	Mechanical Workshop Practice/ Basic Electrical and Electronics Engineering Lab	**1**			**2**	**50**	**25**	**75**
10	1CEU17	Computer Aided Engineering Graphics-I	**1**			**2**	**50**	**25**	**75**
11	1DECA	Discipline and Extra Curricular Activities	**1**				**50**		**50**
		Total	**24**	**16**	**2**	**9**	**550**	**700**	**1250**

L = Lecture, **T** = Tutorial, **P** = Practical

Scheme for 1st Year B. Tech. II Semester

II Semester		Course Title	Credits	L	T	P	Marks		
							IA	External	Total
SN	Subject Code	**Theory Papers**							
1	2MAU01	Engineering Mathematics-II	4	3	1		50	100	150
2	2EGU02/ 2CSU03	Professional Communication Skills / Computer Programming	3	3	0		50	100	150
3	2CYU04/ 2PYU05	Engineering Chemistry/ Engineering Physics	4	3	1		50	100	150
4	2MEU06/ 2EEU07	Engineering Mechanics / Basic Electrical and Electronics Engineering	3	3	0		50	100	150
5	2CEU08	Human Values and Ethics	2	2	0		50	100	150
6	2CEU09/ 2MEU10	Basic Civil Engineering / Basic Mechanical Engineering	2	2	0		50	100	150
		Total	**18**	**16**	**2**		**300**	**600**	**900**
		Practical and Sessionals							
6	2EGU11/ 2CSU12	Professional Communication Skills Lab/ Computer Programming Lab	2			3	50	25	75
7	2CYU13/ 2PYU14	Engineering Chemistry Lab/ Engineering Physics Lab	1			2	50	25	75
8	2MEU15/ 2EEU16	Mechanical Workshop Practice/ Basic Electrical and Electronics Engineering Lab	1			2	50	25	75
9	2CEU17	Computer Aided Engineering Graphics-II	1			2	50	25	75
10	1DECA	Discipline and Extra Curricular Activities	1				50		50
		Total	**24**	**16**	**2**	**9**	**550**	**700**	**1250**

L = Lecture, **T** = Tutorial, **P** = Practical

Approved
Dean, FA & UD

2MAU01 ENGINEERING MATHEMATICS-I

Objective:
1. To acquire fundamental knowledge and apply in engineering disciplines

Differential Calculus: Leibnitz Theorem, Taylor's Theorem (One variable); Limit, Continuity and Differentiability of Functions of Two variables, Partial Differentiation, Euler's Theorem on Homogeneous Functions, Change of Variables, Chain rule, Gradient, Directional Derivative, Tangent planes and Normals.

Taylor's Theorem (Two Variables),Approximate Calculations, Jacobians, Maxima & Minima of Two and More Independent Variables, Lagrange's Method of Multipliers.

Integral Calculus: Riemann integral and the Fundamental Theorem of Calculus,Double Integral, Triple Integral, Change of Order and Change of variables and their applications on evaluating Areas & Volumes; Beta Function and Gamma Function (Simple Properties).

Vector Calculus: Scalar and vector field, differentiation & integration of vector functions, Gradient, Divergence, Curl and Differential Operator;Line, Surface and volume Integrals; Green's Theorem in a Plane, Gauss's and Stoke's Theorem (without proof) and their Applications**.**

Outcome:
After the completion of the course, students would be able to check the nature and existence of the solution of defined engineering problems, and to use numerical methods to find the solutions of the problems.

Text Books:

1. Thomas' Calculus, George B. Thomas, Jr., Maurice D. Weir, Joel R. Hass, Pearson Educations, 12th Edition.
2. Advanced Engineering Mathematics, 4th Editions, Jain and Iyengar ,Narosa Publications.

Reference Books:
1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9th Edition.
2. Advanced Engineering Mathematics, A. Jeffery, Elsevier India Pvt. Ltd.
3. Higher Engineering Mathematics, B. V. Ramana, 1st Edition, Mc Graw Hill Education.
4. Engineering Mathematics, C. B. Gupta, S. R. Singh and Mukesh Kumar, McGrawHill Education.

1EGU02/2EGU02 PROFESSIONAL COMMUNICATION SKILLS

Objectives:

To develop a level of competence in English required for independent and effective communication for academic and social needs.

Grammar Principles and Vocabulary Building: Exposure to basics of grammar-parts of speech, with emphasis on tenses—active and passive voice- their usage-reported speech –Modal verbs—Idioms and Phrases—their meanings and usage, Vocabulary development through prefixes, suffixes and word roots

Effective Paragraphs Construction: Definition- structure- Types and Composition-unity of theme- coherence organization Patterns

Comprehension of an Unseen Passage: an understanding of the passage in question but also (b) a grasp of general language skills and issues with reference to words and usage within the passage and (c) the power of short independent composition based on themes and issues

raised in the passage. Passages are to be taken from Literary / Scientific / Technical writing as well as from the fields of Engineering / Science / Commerce. One passage is to be given. The length of the passage should be about 250 to 300 words. Questions framed should include those which require recognition as well as analysis, interpretation and evaluation. To be assessed by both objective/ multiple choice and short-answer type tests.

Communication: Objective, Meaning, significance, process, types, Qualities of good communication.

Business Correspondence: Elements of business writing, business letters, components and kinds, memorandum, reports writing, purchase order, job application letters, resume writing etc.

Discussion Meeting and Telephonic Skills: Group discussion, conducting a meeting, attending telephonic calls, oral presentation and role of audio visual aids

Reading Skills- Process of reading, reading purposes, models, strategies, methodologies, reading activities.

Writing Skills: Elements of effective writing, writing style, scientific and technical writing
Listening Skills: The process of listening, the barrier to listening, effective listening skills and feed-back skills

Expected Outcome

The students will be able to express themselves in a meaningful manner to different levels of people in their academic and social domains.

Text Book:

1. Communication Skills for Engineers and Scientist: Sangeeta Sharma and Binod Mishra (PHI Learning Pvt. Ltd.)
2. English communication made Easy : Aradhana Rana (Ane Books Pvt. Ltd.)

Reference Books:

1. Rodriques M V, “Effective Business Communication”, Concept Publishing Company New Delhi, 1992 reprint (2000)
2. Bhattacharya. Indrajit, An Approach to Communication Skills. Dhanpat Rai Co., (Pvt.) Ltd. New Delhi
3. Wright, Chrissie, Handbook of Practical Communication Skills. Jaico Publishing House. Mumbai
4. Gartside L, Modern Business Correspondence. Pitman Publishing London
5. Day, Robert A., How to Write and Publish a Scientific Paper. Cambridge University Press Cambridge
6. Gimson A C, “An Introduction to the Pronunciation of English”, ELBS. (YP)
7. Bansal, R K and Harrison J B “Spoken English”, Orient Longman Hyderabad.

1CSU03/2CSU03 COMPUTER PROGRAMMING

Objectives

1. To learn the problem solving techniques writing algorithms and procedures
2. To learn the syntax and semantics for C, C++ and Java programming language and develop code
3. To understand the constructs of structured programming including conditionals and iterations

C programming: Problem specification, flow chart, data types, assignment statements, 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. Arrays, functions, parameter passing, recursion, programming in C using these statements. Structures, files, pointers and multi file handling.

C++ programming: Introduction to C++, Properties of OOPs , Data types and operators ,Control statements, Classes and Objects Creation, accessing class members , Constructor and Destructor, Inheritance and its types , operator overloading, polymorphism.

JAVA programming: Introduction to Java, Data types, Classes & Arrays, Operators & Flow Control, Classes & Objects, Essential Java Classes, Multithreading, Applets.

Outcome

1. Ability to write algorithms for problems
2. Knowledge of the syntax and semantics of C, C++ and Java programming language
3. Ability to code a given logic in C, C++ and Java language.

Text Book:

1. Balaguruswamy: Object-oriented Programming with C++.
2. Ashok N. Kamthane : Object Oriented with C++, Pearson Education
3. Herbert Schildt: The Complete reference JAVA TMH Seventh edition

Reference Books:

1. Ritchie & Kernighan, The C Programming language, 2nd Ed., PHI.
2. Dey & Ghosh, Computer Fundamentals and programming in C,
3. Oxford. Kamthane, Programming in C, 2nd Ed., Pearson.
4. Balaguruswamy, Programming in ANSI C, 5th Ed., TMH.
5. Robert Lafore: C++ Programming

1CYU04/2CYU04 ENGINEERING CHEMISTRY

Objectives:

1. To introduce students to water chemistry, fuels, polymers.
2. To develop understanding about lubricants, corrosion and inorganic engineering materials.

Water: Common natural impurities, hardness, determination of hardness by complexometric (EDTA method), degree of hardness. Municipal water supply-requisite of drinking water, purification of water, sedimentation, filtration, sterilization, breakpoint chlorination. Water for steam making and boiler troubles, formation of solids (Scale and Sludge formation) carryover (Foaming and Priming),

boiler corrosion and caustic embrittlement, Methods of boiler water treatment-preliminary treatments, preheating, Lime-Soda process, permutit (zeolite) process, deionization or demineralization, feed water conditioning, internal treatment, blow down. Numerical problems based on Lime-Soda and zeolite process.

Organic Fuels: Origin and classification of fuels. Solid fuels-, coal, classification of coal, significance of constituents, proximate and ultimate analyses of coal, gross and net calorific value, determination of calorific value of coal by Bomb Calorimeter. Metallurgical coke, carbonization processes- Beehive coke oven and Hoffmann Oven (by-products oven) method. Liquid fuels- Advantages of liquid fuels, petroleum and refining of petroleum, reforming, cracking, synthetic petrol, knocking, octane number, anti-knocking agents. Gaseous fuels-advantages, manufacture, composition and uses of coal gas and oil gas, determination of calorific value of gaseous fuels by Junker's calorimeter, flue gas analysis by Orsat's apparatus.

Phase Rule: Statement, definition and meaning of the terms involved, application to one component system- water and sulphur systems, study of two component system: Pb – Ag system.

Polymers: Classification, constituents, general properties of polymers and their uses. Preparation properties and uses of polyethylene, polyethylene terephthalate (PET), nylon 6, nylon 66, nylon 6 10, Kevlar, Bakelite. Elastomers – natural rubber and vulcanization, synthetic rubbers viz. Buna-S, Buna –N Butyl and Neoprene Rubbers. Conducting polymers.

Lubricants: Classification, types of lubrication, properties and uses. Viscosity and viscosity index, flash and fire point, cloud and pour point. Emulsification and steam emulsion number.

Corrosion and its control: Definition and its significance. Mechanism of chemical (dry) and electrochemical (wet) corrosion, galvanic corrosion, concentration type corrosion and pitting corrosion. Protection from corrosion- protective coatings-galvanization and tinning, cathodic protection, sacrificial anode and modifications in design.

Inorganic Engineering Materials: Cement: Manufacture of Portland cement. Rotary kiln technology. Chemistry of hardening and setting of cement. Refractories: Definition properties and classification. Silica and fire clay refractories. Glass-Definition, type and properties of glasses. Manufacture of glass, annealing of glass. Optical fibre grade glass.

Outcome

Students will learn about quality of water, fuels including petroleum, importance of polymers, uses of lubricants and basic process of manufacturing cement, glass.

Text Book:

1. Engineering Chemistry by Monica Jain and P C Jain, Dhanpat Rai Publishing Company (P) Ltd, New Delhi
2. Engineering Chemistry Wiley, India.

Reference Books:

1. The Chemistry and Technology of Coal, by J G Speigh, CRC Press
2. The Chemistry and Technology of Petroleum, by J G Speigh, CRC Press
3. Polymer Chemistry: An Introduction, Malcolm P. Stevens, Oxford University Press

4. Lubricants and Lubrications, Theo Mang, Wilfeied, Wiley-VCH
5. Chemistry of water treatment, Samuel Faust & Osman M Aly, CRC Press
6. Boilers water treatment. Principles and Practice, Colin Frayne, CRC Press
7. Corrosion Understanding the Basic, by Joseph R Davis, ASM International

1PYU05/2PYU05 ENGINEERING PHYSICS

Objectives
To introduce the basic concepts of optics, Lasers & modern science and fundamentals of materials science.

Interference of light: Michelson's Interferometer: Production of circular & straight line fringes; Determination of wavelength of light; Determination of wavelength of separation of two nearby wavelengths. Optical technology: Elementary idea of anti-reflection coating and interference filters.

Diffraction and Polarization of light: Fraunhofer Diffraction at Single Slit. Diffraction grating: Construction, theory and spectrum; Determination of wavelength of light. Resolving power: Raleigh criterion; Resolving power of diffraction grating and telescope. Plane, circular

and elliptically polarized light on the basis of electric (light) vector; Malus law; Double Refraction; Phase retardation plates and their use in production and detection of circularly and elliptically polarized light; Optical activity and laws of optical rotation; specific rotation and its measurement using half-shade device.

Elements of Material Science: Bonding in solids; covalent bonding and Metallic bonding; Classification of solids as Insulators, Semiconductors and Conductors; X-ray diffraction and Bragg's Law. Hall Effect: Theory, Hall Coefficient and applications.

Quantum Mechanics: Compton effect & quantum nature of light; Derivation of time dependent and time independent Schrodinger's Wave Equation; Physical interpretation of wave function and its properties; boundary conditions; Particle in one dimensional box.

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.

Laser and Holography: Theory of laser action; Einstein's coefficients; Components of laser; Threshold conditions for laser action; Theory, Design and applications of He-Ne and semiconductor lasers; Holography versus photography, Basic theory of holography; basic requirement of a Holographic laboratory; Applications of Holography in microscopy and interferometry.

Outcome
1. The student will be able to understand technologies based on lasers, optical fibers and holography.
2. Student can also appreciate elements of materials science required for engineering applications and devices.

Text Book:

1. Engineering Physics: Malik and Singh (Tata McGraw Hill)
2. Engineering Physics: Naidu (Pearson)

Reference Books:

1. Optics : Ajay Ghatak (Tata McGraw Hill)
2. Concepts of Modern Physics : Beiser (McGraw Hill)
3. Fundamental of Optics : Jetkins and White (Tata McGraw Hill)
4. Material Science : Smith (McGraw Hill)

1MEU06/2MEU06 ENGINEERING MECHANICS

Objectives:

1. To explain the importance of mechanics in the context of engineering and conservation equations.
2. To explain the significance of centroid, centre of gravity and moment of inertia.
3. To introduce the techniques for analyzing the forces in the bodies.
4. To apply the different principles to study the motion of a body, and concept of relative velocity and acceleration.
5. To describe the trajectory of a particle under projectile motion.

Statics of particles and rigid bodies: Fundamental laws of mechanics, Principle of transmissibility, System of forces, Resultant force, Resolution of force, Moment and Couples, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem.

Plane trusses: Types of structures, Trusses, Support Conditions, Types of Loadings, Classification of trusses, Determinacy of trusses, Basic assumptions of truss analysis, Method of joints, Method of sections.

Centroid & Moment of inertia (M.I): Location of centroid, Moment of inertia (mass and area), Parallel axis and perpendicular axis theorems, M.I of composite section, M.I. of solid bodies, Polar moment of inertia.

Virtual work: Principle of Virtual Work, Active forces and active force diagram, Stability of equilibrium.

Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction.

Kinematics of particles and rigid bodies: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration, Radial and transverse velocities and accelerations, Projectiles motion on plane and Inclined Plane, Relative Motion.

Kinetics of particles and rigid bodies: Newton's second law, Equation of motion in rectangular coordinate, Equation of motion in radial and transverse components, Equation of motion in plane for a rigid body, D'Alembert principle.

Work, Energy and Power: Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Non-conservative Force, Conservation of energy.
Impulse and Momentum: Linear and angular momentum, Linear and angular

impulse, Principle of momentum for a particle and rigid body, Principle of linear impulse and momentum for a particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular momentum, Angular momentum of rigid body, Principle of impulse and momentum for a rigid body, Central impact, Oblique impact, System of variable mass, Rocket.

Vibrations: Free vibrations of particles, Simple, compound and torsional pendulum, Energy Method.

Outcome:
The student on successful completion of course would be able to identify and analyze the problems by applying the fundamental principles of engineering mechanics and to proceed to design and development of the mechanical systems.

Text Book
1. Engineering Mechanics, Sharma, Pearson Education.

Reference Books
1. Engineering Mechanics, Beer and Johnston, Tata McGraw-Hill.
2. Engineering Mechanics, Hibbeler, Pearson Education.
3. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
4. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
5. Engineering Mechanics, Shames, Pearson Education.

1EEU07/2EEU07 BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Objectives
1. To equip the students with a basic understanding of Electrical circuits and machines for specific types of applications.
2. To equips students with an ability to understand basics of digital electronics.

Basic Concepts of Electrical Engineering: Electric Current, Electromotive force, Electric Power, Ohm's Law, Active & Passive Elements, Basic Circuit Components, Electromagnetic Induction, Kirchhoff's laws, Dependent & Independent Sources, Resistive Networks, Series-Parallel Circuits, Node Voltage Method, Mesh Current Method, Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems applicable to dc networks.

Alternating Quantities: Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, Single Phase Circuits (R, L, C, R-L, R-C, and R-L-C Circuits), Introduction to 3-Phase AC System, Star-delta conversion.

Ideal Transformer, Construction and operation of single phase Transformer, Phasor diagram, Open Circuit, Short Circuit test of single test Transformer Circuit Parameters, Voltage Regulation and efficiency, Rotating Electrical Machines; DC Machines: Principle of Operation of DC Machine as Motor and Generator, EMF Equation.

Introduction to AC Rotating Machines: Construction & Working Principle of Operation for 3-Phase and 1-Phase Induction Motor.

Basic Electronics: Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behaviour of the PN Junction, PN Junction Diode, Zener Diode.

Rectifiers, Introduction to L, C, & L-C filters, Construction and working principle of Bipolar Junction Transistor & its characteristics, Transistor as a switch and an Amplifier.

Digital Electronics: Boolean algebra, Binary System, Logic Gates and Their Truth Tables.

Outcome

The students shall develop an intuitive understanding of the circuit analysis, basic concepts of electrical machines, and basics of electronics and be able to apply them in practical situation.

Texts Books

1. A. E. Fitzgerald: Basic Electrical Engineering, McGraw Hill Education (India) Private Limited
2. D. P. Kothari, and I. J. Nagrath: Basic Electrical Engineering, McGraw Hill Education (India) Private Limited, 3e
3. V. N. Mittle, and Arvind Mittal: Basic Electrical Engineering, McGraw Hill Education (India) Private Limited,

References Books

1. V. Del Toro: Electrical Engineering Fundamentals; PHI, 1994.
2. W.H. Hayt and J.E. Kemmerly: Engineering Circuit Analysis; McGraw-Hill, 1993.
3. Van Valkenburge : Basic Electrical & Electronics Engineering, Cengage learning Indian Edition
4. Leonard S. Bobrow: Fundamentals of Electrical Engineering by, Oxford University Press

1CEU08 ENVIRONMENTAL ENGINEERING

Basics of Environment: Environmental Pollution, Environmental Acts and Regulations, Functional concepts of Ecology, Basics of species, Ecosystem, Hydrological and chemical cycles, Energy flow in ecosystems. Biodiversity, population dynamics.

Water Pollution: Water pollutants, effects of oxygen demand, water quality in lakes, reservoirs and groundwater, contaminant transport, self cleaning capacity of streams and water bodies, water quality standards, Waste water management, Treatment & disposal of wastewater. Reuse and saving in use of water, Rain water harvesting.

Solid Waste Management: Classification of solid waste, Collection, transportation, treatment, and disposal of solid waste. Economic recovery of solid waste. Sanitary landfill, on site sanitation. Energy interaction from solid waste.

Air Pollution: Primary and Secondary air pollutants, Air Pollution, Harmful effects of Air Pollution, Control of Air Pollution. Noise Pollution, Harmful effects of noise pollution, control of noise pollution, Global warming, Acid rain, Ozone depletion, Green House effect

Disaster Management: Understanding Disasters and Hazards and related issues social and environmental. Risk and Vulnerability.
Types of Disasters, their occurrence/ causes, technical terminology involved, impact and preventive measures:

Natural Disasters: Hydro-meteorological Based Disasters like Flood, Flash Flood, Cloud Burst, Drought, Cyclone, Forest Fires; Geological Based Disasters like Earthquake, Tsunami, Landslides, Volcanic Eruptions.

Man made Disasters: Chemical Industrial Hazards, Major Power Break Downs, Traffic Accidents, Fire Hazards, Nuclear Accidents.

Disaster profile of Indian continent. Study of recent major disasters.
Disaster Management Cycle and its components.

Reference Books:

1. Towards Basics of Natural Disaster Reduction by Prof. D.K. Sinha. Researchco Book Center,Delhi.
2. Understanding Earthquake Disasters by Amita Sinvhal. Tata McGraw Hill, New Delhi.
3. Selected Resources available on www.nidmindia.nic.in

1CEU09/2CEU09 BASIC CIVIL ENGINEERING

Objectives

1. To give an overview of the fundamentals of the Civil Engineering fields to the students of all branches of Engineering
2. To realize the importance of the Civil Engineering Profession in fulfilling societal needs

Introduction: Specialization of Civil Engineering, scope of Civil Engineer, Role of civil Engineer in Society, Impact of infrastructural development on economy of country.

Surveying: Object & principles of Surveying, primary divisions, classification of surveying, plans and maps, Scales, Unit of measurement.

Linear measurements: Direct measurements- Tape & Chain, instruments used in chaining, Ranging out survey lines, taking measurements of sloping ground, errors, Tape correction, conventional symbols.

Compass Surveying: Types and uses of compass, bearing, WCB & Reduced bearing, and Angle measurement.

Leveling: Object & uses, terms used, instruments used, methods of leveling, recording and methods of reducing, errors in leveling, record measurements in field work, contours characteristics & applications.

Building & Building materials: Selection of site for Buildings, types of buildings, plinth area, carpet area, floor space index, construction materials, Stone, Brick, Cement, Mortar, concrete, steel – their properties & uses. Introduction to building byelaws.

Components of Buildings & their functions, soil & types of soils, foundation types.

Transportation: Types and characteristics of various modes of transportation, Road development, types & characteristics of pavements viz. rigid, flexible, semi-rigid.

Outcome

1. The students will gain knowledge on site selection, construction materials, components of buildings, roads.
2. A basic appreciation of multidisciplinary approach when involved in Civil Related Projects.

Reference Books:

1. Palancharmy, 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.

1MEU10/2MEU10 BASIC MECHANICAL ENGINEERING

Objectives:

1. To explain the importance of concepts of Mechanical Engineering

2. To identity the Basic elements of a mechanical system.

3. To introduce the various properties of materials.

Fundamentals: Introduction to mechanical engineering, concepts of thermal engineering, mechanical machine design, industrial engineering and manufacturing technology.

Steam Boilers, Steam Turbines and Power Plants:

Introduction, classification and types of steam boilers and steam turbines, Discuss working of steam boilers and steam turbines.

Introduction and Classification of Power plants.

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.

Refrigeration and Air Conditioning:

Introduction, classification and types of refrigeration systems and air conditioning. Application of refrigeration and Air- conditioning.

Transmission of Power:

Introduction and types of Belt and Rope Drives.

Introduction to Gears and Gear Trains.

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.

Metal Removal or Machining Processes: Introduction to machining process and various machine tools.

Engineering Materials and Heat Treatment of Steel:

Introduction to various engineering materials and their properties.

Introduction to Heat Treatment and types of Heat Treatment Processes.

Introduction to CAD, CAM, FMS, MEMS and CIM:

Introduction to modern manufacturing systems and their applications.

Outcome:

The outcome of the course is that, a student would be able to identify, appreciate and analyze the problem by applying the fundamentals of mechanical engineering,

Text Book:

1. G. Shanmugam and S. Ravindran, Basic Mechanical Engineering, Mc Graw hill, fourth edition.

Reference book:

1. K. Venu Gopal and Prabhu Raja V, Basic Mechanical Engineering, Anuradha agencies pub, Chennai.

1EGU11/ 2EGU11 PROFESSIONAL COMMUNICATION SKILLS LAB

1. Phonetics
2. Report Writing
3. Conducting a Meeting
4. Group Discussion
5. Oral Presentation
6. Interviews
7. Grammar

1CSU12/2CSU12 COMPUTER PROGRAMMING LAB

1. C Program to make use of the if else statement.

2. C Program to make use of the switch statement.
3. C Program to make use of the nested for loop.
4. C Program to make use of the nested while loop.
5. C Program to implement do-while loop.
6. C Program to find the factorial of a number using functions.
7. C Program to print the Fibonacci series using functions.
8. C Program to find palindrome using string.
9. C Program to display the details of a employee record using nested structures.
10. C Program to display the result card of student record using Union.
11. C Program to calculate the area of rectangle and square using classes.
12. C Program using functions.
13. C Program to perform insertion and deletion operations on arrays.
14. C Program to merge two arrays.
15. File handling program like (read, write, append text etc.)

16. Sample programs on C++.
17. Write a C++ program to find the largest of three numbers
18. C++ program to find the length of a string.
19. Write a C++ program to sort an array of integer in ascending order using a function called exchange( ) which accepts two integer arguments by reference.
20. Write a C++ program to implement function overloading .
21. Write a C++ programs to implement multilevel inheritance.
22. Write a C++ program to implement operator overloading.
23. Sample programs on JAVA.
24. JAVA programs to implement classes.
25. Write a JAVA program to implement interfaces.
26. Write a program to draw a car using applet.

These are the sample programs. Instructor may prepare another programs that cover all the concepts of C language and basic concepts of C++ and JAVA.

1CYU13/2CYU13 ENGINEERING CHEMISTRY LAB

1. To determine the hardness of water by HCL method.
2. To determine the hardness of water by EDTA method
3. Measurement of conductivity of a given sample by conductivity meter.
4. Study of Bomb Calorimeter.
5. To determine the strength of Ferrous Ammonium sulphate solution with the help of $K_2Cr_2O_7$ solution.
6. To determine the strength of $CuSO_4$ solution with the help of hypo solution.
7. To determine the strength of NaOH and Na_2CO_3 in a given alkali mixture.
8. To determine the flash and fire point of a given lubricating oil.
9. To determine the viscosity of a given lubricating oil by Redwood viscometer.
10. To determine cloud and pour point of lubricating oil.

1PYU14/2PYU14 ENGINEERING PHYSICS LAB

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 specific rotation of glucose (sugar) solution using polarimeter.

4. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
5. To study the variation of a semiconductor resistance will temperature and hence determine the band gap of the semi conductor in the form of reverse based P-N junction diode.
6. To determine the height of water tank with the help of sextant.
7. To determine the dispersive power of material of a prim for violet and yellow colour's of mercury light with the help of spectrometer.
8. To study the charge and discharge of a condenser and hence determine the same constant (both current and voltage graphs are to be plotted.
9. To verify the expression for the resolving power of a Telescope.
10. To determine the ferromagnetic constants retentively, permeability and susceptibility by tracing B-H curve using C.R.O.
11. To determine the specific resistance of the material of a wire by Carey Froster's bridge.

1MEU15/2MEU15 MECHANICAL WORKSHOP PRACTICE

Objectives:
Introduction to the use of tools and machinery in Carpentry, Welding, Foundry, Fitting and Sheet Metal Working.

Carpentry Shop:
1. T – Lap joint
2. Bridle joint

Foundry Shop:
1. Mould of any pattern
2. Casting of any simple pattern

Welding Shop:
1. Lap joint by gas welding
2. Butt joint by arc welding
3. Lap joint by arc welding
4. Demonstration of brazing, soldering & gas cutting

Machine Shop Practice:
1. Job on lathe with one step turning and chamfering operations

Fitting and Sheet Metal Shop
1. Finishing of two sides of a square piece by filing
2. Making mechanical joint and soldering of joint on sheet metal
3. To cut a square notch using hacksaw and to drill a hole and tapping

Text Book:

1. Elements of Workshop Technology Hajra &Choudhary, Media Promoters &Publisher.

Reference Books:

1. Mechanical Workshop Practice, K.C. John, PHI Learning New Delhi.
2. Workshop Technology, W.A.J.Chapman, CBS Publisher & Distributor New Delhi.

1EEU16/2EEU16 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

ELECTRICAL LAB

1. Introduction to basic measuring devices & instruments used for measurements of electrical and non electrical parameters such as Voltmeter, Ammeter, Wattmeter, Energy-meter, pf meter, Analog/Digital Multi- Metres and Function/Signal Generator, Multimeter, tongtester, CRO, Megger, etc.
2. Assemble house wiring including earthing for 1-phase energy meter, MCB, ceiling fan, tube light, three pin socket and a lamp operated from two different positions. Basic functional study of components used in house wiring.
3. Prepare the connection of ceiling fan along with the regulator and vary the speed.
4. Prepare the connection of single phase induction motor through 1-Phase Auto-transformer and vary the speed.
5. Prepare the connection of Fluorescent Lamp, Sodium Vapour and Halogen Lamp and measure voltage, current and power in the circuit.

ELECTRONICS LAB

1. Identification, testing and application of Resistors, Inductors, Capacitors, PN-Diode. Zener Diode, LED, LCD, BJT, Photo Diode, Photo Transistor,.
2. Measure the frequency, voltage, current with the help of CRO.
3. Assemble the single phase half wave and full wave bridge rectifier.
4. Verify the truth table of AND, OR, NOT, NOR and NAND gates.

1CEU17/2CEU17 COMPUTER AIDED ENGINEERING GRAPHICS-I

Introduction to Engineering Drawing: Prerequisite for Engineering Drawing, Drawing Instruments, Drawing Margins & title Block, Lettering, Lines & Dimensions

Scales: Representative fraction, Types of scales, construction of Scales: plain Scales Vernier Scales, Diagonal Scales, Comparative scales

Projections of Point & Lines: Positions of Point, Notation system, systematic Approach for projections of points, Front view & Top view of point, Positions 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

Projections 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 RPs, True shape of the plane, Distance of a point from plane, Angle between two planes

Projection of solids: Basic solids, Frustums and truncated solids, Positions of the solids, solid with Axis perpendicular to an RP, solid with axis inclined to one RP and parallel to the other solid with axis Inclined to Both the RPs Solid with Axis parallel to Both the RPs,

Section of solids: Theory of sectioning, section of prisms and cubes, sections of pyramids and Tetrahedron section of Cylinders, Section of cones, Section of spheres

Development of surfaces: Methods of development, parallel line developments, Radial line Development, Anti- Development

Isometric Projection: Principle of Isometric Projection Isometric scale, Isometric projections and Isometric Views, Isometric Views of standard shapes, Isometric views of standard solids,

Computer Aided Drafting: Introduction to CAD, Advantages of CAD software's,

Auto CAD, Auto CAD Commands and tool bars, Creating the Drawing, Charging properties, Dimensioning other object, Text editing, Isometric drawing

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.

2MAU01 MATHEMATICS II

Matrices: Rank of a matrix, Gauss Jordan Methods for Inverse of matrix, Normal forms, Consistency of systems of linear simultaneous equations and its solutions, Linear Dependence of vectors, Eigen values and Eigen vectors, Cayley-Hamilton Theorem (without proof),Orthogonal Matrices, Diagonalization of matrix.

Ordinary Differential Equations: Linear differential equations of first order, Reducible to Linear form, Exact differential equations,Reducible to Exact form; Linear DE of Higher Order with Constant Coefficients, Simultaneous Linear DE.
Second Order Linear ODE with Variables Coefficients, Homogenous and Exact Forms, Change of dependent and
Independent variables; Variation of Parameters, Method of Undetermined Coefficients,Euler-Cauchy Equations.

Fourier Series: Orthogonal Functions, Periodic Functions, Trigonometric Series, Fourier Series of Periodic Functions, Euler Formula, Change of Intervals, Even and Odd functions, half range Fourier sine and cosine series;

Partial Differential Equations: Order and Degree, Formation, Linear Partial Differential Equations of First Order: Lagrange's Form, Standard Forms, Charpit's Method.
Solutions of Partial Differential Equation of Second order and theirclassifications.

Text Books:

1. Advanced Engineering Mathematics, 4th Edition, Dennis G. Zill, Warren S. Wright, Jones & Bartlett Publications.

Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9th Edition.
2. Higher Engineering Mathematics, B. V. Ramana, 1st Edition, Mc Graw Hill Education.
3. Advanced Engineering Mathematics, 4th Editions, Jain and Iyengar ,Narosa Publications.
4. Advanced Engineering Mathematics, 7th Edition,Peter V. O'Neil, Cengage Learning.
5. Advanced Engineering Mathematics, Peter O Neil, Cengage Learning Publication.
6. Advanced Engineering Mathematics, 2nd Edition, Michael Greenberg, Pearson Education.

2CEU08 HUMAN VALUES AND ETHICS

Course Objectives

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Course Outcomes

On completion of this course, the students will be able to

1. Understand the significance of value inputs in a classroom and start applying them in their life and profession
2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
3. Understand the value of harmonious relationship based on trust and respect in their life and profession
4. Understand the role of a human being in ensuring harmony in society and nature.
5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

Catalog Description

Every human being has two sets of questions to answer for his life: a) what to do? and, b) how to do?. The first set pertains to the value domain, and the other to the skill domain. Both are complimentary, but value domain has a higher priority. Today, education has become more and more skill biased, and hence, the basic aspiration of a human being, that is to live with happiness and prosperity, gets defeated, in spite of abundant technological progress. This course is aimed at giving inputs that will help to ensure the right understanding and right feelings in the students in their life and profession, enabling them to lead an ethical life. In this course, the students learn the process of self-exploration, the difference between the Self and the Body, the naturally acceptable feelings in relationships in a family, the comprehensive human goal in the society, the mutual fulfillment in the nature and the co-existence in existence. As a natural outcome of such inputs, they are able to evaluate an ethical life and profession ahead.

Text Books

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

Reference Books

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA

2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972. Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Course Content

Unit I: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education **9 lecture hours**

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

Unit II: Understanding Harmony in the Human Being - Harmony in Myself **9 lecture hours**

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Swasthya

Unit III Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship **9 lecture hours**

13. Understanding harmony in the Family- the basic unit of human interaction
14. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;
Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
15. Understanding the meaning of *Vishwas*; Difference between intention and competence
16. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
17. Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals

18. Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!

Unit IV Understanding Harmony in the Nature and Existence - Whole existence as Co-existence **6 lecture hours**

19. Understanding the harmony in the Nature
20. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
21. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
22. Holistic perception of harmony at all levels of existence

Unit V Implications of the above Holistic Understanding of Harmony on Professional Ethics **9 lecture hours**

23. Natural acceptance of human values
24. Definitiveness of Ethical Human Conduct
25. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
26. 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

27. Case studies of typical holistic technologies, management models and production systems
28. 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

2CEU17 COMPUTER AIDED ENGINEERING GRAPHICS-II

Objectives

The student is expected to possess the efficient drafting skill depending on the operational function in order to perform day to day activity. Irrespective of engineering discipline, it has become mandatory to know the basics of engineering drawing.
It is to provide neat structure of industrial drawing and enables the knowledge about position of the component and its forms. It is going to help interpretation of technical graphics assemblies, preparation of machine components and related parts.

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.

Sectional view : (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: (1 drawing sheet) 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, types of rivets, types of riveted joints etc.

Assembly drawing: (1 drawing sheet) Introduction to assembly drawing, assembly drawing of simple machine elements; like rigid or flexible coupling, muff coupling, plummer block, footstep bearing, bracket etc.

Free hand sketching: Need for free hand sketching, Free hand sketching of conventional representation of materials, screw fasteners, foundation bolts, studs.

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.

Computer aided drafting: Introduction to computer aided drafting, advantages and applications of CAD, concepts of computer aided 2D drafting using any drafting software like AutoCAD/ Solid works/Creo etc., basic drawing and modify commands, making 2D drawings of simple machine parts. (At least 5 problem)

Outcome

Towards the end of the course it is expected that the students would be matured to visualize the engineering components.

Text Book:

1. Laxminarayan and M.L. Mathur, Machine Drawing, Jain Brothers

Reference Books:

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