BIKANER TECHNICAL UNIVERSITY

BIKANER

SYLLABUS

NOTE: Adopted Syllabus and Scheme of Rajasthan Technical University, Kota Vide resolution of BOM agenda item No. BOM 1.6 in Meeting held on 07-09-2018

SYLLABUS
I Semester
Common to all branches of UG Engineering & Technology

1FY2-01: Engineering Mathematics-I

Credit: 4   **Max. Marks: 200 (IA:40, ETE:160)**

3L+1T+0P   **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.	6
3	**Fourier Series:** Periodic functions, Fourier series, Euler's formula, Change of intervals,Half range sine and cosine series, Parseval's theorem.	6
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.	10
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.	10
	TOTAL	40

I & II Semester
Common to all branches of UG Engineering & Technology

1FY2-02/ 2FY2-02: Engineering Physics

Credit: 4   **Max. Marks: 200 (IA:40, ETE:160)**
3L+1T+0P   **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.	9
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.	6
3	**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.	4
4	**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.	6
5	**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.	7
6	**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

I & II Semester

Common to all branches of UG Engineering & Technology

1FY2-03/ 2FY2-03: Engineering Chemistry

Credit: 4   **Max. Marks: 200 (IA:40, ETE:160)**

3L+1T+0P   **End Term Exam: 3 Hours**

SN	CONTENTS	Hours
1	**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.	10
2	**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/Junkers calorimeter/Dulongs formula, proximate analysis & ultimate and combustion of fuel.	10
3	**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.	3
4	**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 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.	10

		Emulsification and steam emulsion number.	
5		**Organic reaction mechanism and introduction of drugs:** Organic reaction mechanism: Substitution; SN1, SN2, Elecrophilic 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	**7**
		TOTAL	**40**

I & II Semester
Common to all branches of UG Engineering & Technology

1FY1-04/ 2FY1-04: Communication Skills

Credit: 2   **Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P   **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**

I & II Semester
Common to all branches of UG Engineering & Technology

1FY1-05/ 2FY1-05: Human Values

Credit: 2   **Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education** 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. Method to fulfill the above human aspirations: understanding and living in harmony at various levels	5
2	**Understanding Harmony in the Human Being - Harmony in Myself** Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha 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.	5
3	**Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship** 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; 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.	5
4	**Understanding Harmony in the Nature and Existence - Whole existence as Coexistence** 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	5

	(Sah-astitva) of mutually interacting units in allpervasive Space. Holistic perception of harmony at all levels of existence	
5	**Implications of the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values** 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: At the level of individual: as socially and ecologically responsible engineers, technologists and managers. Case studies related to values in professional life and individual life.	5
	TOTAL	**25**

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-06/ 2FY3-06: Programming for Problem Solving

Credit: 2   **Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P   **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, Representing algorithms through flowchart and pseudo code.	8
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.	8
3	**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.	12
	TOTAL	**28**

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-07/ 2FY3-07: Basic Mechanical Engineering

Credit: 2　　　　　　　　　　　　　　　　**Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P　　　　　　　　　　　　　　　　**End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Fundamentals:** Introduction to mechanical engineering, concepts of thermal engineering, mechanical machine design, industrial engineering and manufacturing technology. Steam Boilers classification and types of steam boilers and steam turbines. Introduction and Classification of power plants.	
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.	
3	**Refrigeration and Air Conditioning:** Introduction, classification and types of refrigeration systems and air-conditioning. Applications of refrigeration and Air-conditioning.	
4	**Transmission of Power:** Introduction and types of Belt and Rope Drives, Gears.	
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	**Engineering Materials and Heat Treatment of Steel:** Introduction to various engineering materials and their properties.	

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-08/ 2FY3-08: Basic Electrical Engineering

Credit: 2   **Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**DC Circuits:** Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, Series-Parallel circuits, Node voltage method, Mesh current method, Superposition, Thevenin's, Norton's and Maximum power transfer theorems.	5
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 (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.	4
3	**Transformers:** Ideal and practical transformer, EMF equation, equivalent circuit, losses in transformers, regulation and efficiency.	4
4	**Electrical Machines:** Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Starting and speed control of induction motor, single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited DC motor. Construction and working of synchronous generators.	7
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.	4
6	**Electrical Installations:** Layout of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, Type of earthing. Power measurement, elementary calculations for energy consumption.	4
	TOTAL	28

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-09/ 2FY3-09: Basic Civil Engineering

Credit: 2　　　　　　　　　　　　　　**Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P　　　　　　　　　　　　　　**End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Introduction to objective, scope and outcome the subject**	1
2	**Introduction:** Scope and Specialization of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country.	2
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; Measurements on sloping ground; Tape corrections, conventional symbols. Angular Measurements: Instruments used; Introduction to Compass Surveying,Bearings and Longitude & Latitude of a Line, Introduction to total station. Levelling: Instrument used, Object of levelling, Methods of levelling in brief, Contour maps.	8
4	**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, Basic concept of R.C.C., Introduction to types of foundation.	3
5	**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.	2
6	**Environmental Engineering:** Environmental Pollution, Environmental Acts and Regulations, Functional Concepts of Ecology, Basics of Species, Biodiversity, Ecosystem, Hydrological Cycle;Chemical Cycles: Carbon, Nitrogen& Phosphorus; Energy Flow in Eco-systems.	4
	Water Pollution: Water Quality standards, Introduction to Treatment & Disposal of Waste Water. Reuse and Saving of Water, Rain Water Harvesting.	3
		2

Solid Waste Management: Classification of Solid Waste, Collection, Transportation and Disposal of Solid. Recycling of Solid Waste: Energy Recovery,Sanitary Land fill, On-Site Sanitation. 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, Global warming& Climate Change, Ozone depletion, Green House effect	**3**	
	TOTAL	**28**

I & II Semester
Common to all branches of UG Engineering & Technology

1FY2-20/ 2FY2-20: Engineering Physics Lab

Credit: 1   **Max. Marks: 50 (IA:30, ETE:20)**

0L+0T+2P

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.

I & II Semester
Common to all branches of UG Engineering & Technology

1FY2-21/ 2FY2-21: Engineering Chemistry Lab

Credit: 1   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

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

I & II Semester
Common to all branches of UG Engineering & Technology

1FY2-22/ 2FY2-22: Language Lab

Credit: 1   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

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

1FY2-23/ 2FY2-23: Human Values Activities

Credit: 1   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

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 technogenic 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:
list down all your important desires. Observe whether the desire is related to Self (I) or the Body. If it appears to be related to both, visualize which part of it is related to Self (I) and which part is related to Body.

PS 5:
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

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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 sy 5 to 10 minutes) and draw a line diagram connecting these points. Try observe the link between any two nodes.

PS 6:
1. Chalk out some programs towards ensuring your harmony with the body - in terms of nurturing, protection and right utilization of the body.
2. Find out the plants and shrubs growing in and around your campus, which can be useful in curing common diseases.

PS 7:
Form small groups in the class and make them carry out a dialogue focusing on the following eight questions related to 'TRUST';
1a. Do I want to make myself happy?
2a. Do I want to make the other happy?
3a. Does the other want to make himself/herself happy?
4a. Does the other want to make me happy?
What is the answer?
Intention (Natural Acceptance)
1b. Am I able to always make myself happy?
2b. Am I able to always make the other happy?
3b. Is the other able to always make himself/herself happy?
What is the answer?
Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate yourself and others on the basis of intention/competence.

PS 8:
1. Observe, on how many occasions, you are able to respect your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over-evaluation or otherwise evaluation.
2. Also, observe whether your feeling of respect is based on treating the other as you would treat yourself or on differentiations based on body, physical facilities or beliefs.

PS 9:
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 balues in a difficult situation.

PS 10:
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. Analysis and explain the aspect of mutual fulfillment of each unit with other orders.

PS 11:
Make a chart to show the whole existence as co-existence. With the help of this chart try to identify the role and the scope of some of the courses of your study. Also indicate the areas which are being either over-emphasized or ignored in the present context.

PS 12:
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 basic of natural acceptance of human values. If so, how should one proceed in this direction from

the present situation?

PS 13:
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.

PS 14:
The course is going to be over now. It is time to evaluate what difference in your thinking it has made. Summarize the core massage of this course grasped by you. How has this affected you in terms of;
   a. Thought
   b. Behavior
   c. Work and
   d. Relization

What practical steps are you able to visualize for the transition of the society from its present state.

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.

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-24/ 2FY3-24: Computer Programming Lab

Credit: 1.5   **Max. Marks: 75 (IA:45, ETE:30)**
0L+0T+3P

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

I & II Semester

Common to all branches of UG Engineering & Technology

1FY3-25/ 2FY3-25: Manufacturing Practices Workshop

Credit: 1.5   **Max. Marks: 75 (IA:45, ETE:30)**
0L+0T+3P

Carpentry Shop

1.   T – Lap joint
2.   Bridle joint

Foundry Shop

3.   Mould of any pattern
4.   Casting of any simple pattern

Welding Shop

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

Machine Shop Practice

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

Fitting and Sheet Metal Shop

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

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-26/ 2FY3-26: Basic Electrical Engineering Lab

Credit: 1   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

1.	Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2.	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.
3.	Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents).Phase-shifts between the primary and secondary side.
4.	Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
5.	Torque Speed Characteristic of separately excited dc motor.
6.	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.

1FY3-27/ 2FY3-27: Basic Civil Engineering Lab

Credit: 1   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

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1. Linear Measurement by Tape:
    a) Ranging and Fixing of Survey Station along straight line and across obstacles.
    b) Laying perpendicular offset along the survey line
2. Compass Survey: Measurement of bearing of linesusing 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.
8. To study various Sanitary Fittings.

I & II Semester
Common to all branches of UG Engineering & Technology

1FY3-28/ 2FY3-28: Computer Aided Engineering Graphics

Credit: 1.5   **Max. Marks: 75 (IA:45, ETE:30)**
0L+0T+3P

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.

Common to all branches of UG Engineering & Technology

1FY3-29/ 2FY3-29: Computer Aided Machine Drawing

Credit: 1.5   **Max. Marks: 75 (IA:45, ETE:30)**
0L+0T+3P

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.

II Semester
Common to all branches of UG Engineering & Technology

2FY2-01: Engineering Mathematics-II

Credit: 4   **Max. Marks: 200 (IA:40, ETE:160)**
3L+1T+0P   **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.	10
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.	6
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.	12
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.	6
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.	6
	TOTAL	40

RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year - III Semester: B.Tech. (Civil Engineering)

3CE2-01: ADVANCE ENGINEERING MATHEMATICS-I

Credit: 3   **Max. Marks: 150 (IA:30, ETE:120)**
3L+0T+0P   **End Term Exam: 3 Hours**

SN	Contents	Hrs.
1	**Numerical Methods – 1:** Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Gauss's forward and backward interpolation formulae. Stirling's Formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange'sformulae. Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.	10
2	**Numerical Methods – 2:** Numerical solution of ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Solution of polynomial and transcendental equations-Bisection method, Newton-Raphson method and Regula-Falsi method.	8
3	**Laplace Transform:** Definition and existence of Laplace transform, Properties of Laplace Transform and formulae, Unit Step function, Dirac Delta function, Heaviside function, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace transforms method.	10
4	**Fourier Transform:** Fourier Complex, Sine and Cosine transform, properties and formulae, inverse Fourier transforms, Convolution theorem, application of Fourier transforms to partial ordinary differential equation (One dimensional heat and wave equations only).	7
5	**Z-Transform:** Definition, properties and formulae, Convolution theorem, inverse Z-transform, application of Z-transform to difference equation.	5
	Total	40

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year - III Semester: B.Tech. (Civil Engineering)

3CE1-02/4CE1-02: TECHNICAL COMMUNICATION

Credit: 2   **Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	Contents	Hrs.
1	**Introduction to Technical Communication-** Definition of technical communication, Aspects of technical communication, forms of technical communication, importance of technical communication, technical communication skills (Listening, speaking, writing, reading writing), linguistic ability, style in technical communication.	4
2	**Comprehension of Technical Materials/Texts and Information Design & development-** Reading of technical texts, Readingand comprehending instructions and technical manuals, Interpreting and summarizing technical texts, Note-making. Introduction of different kinds of technical documents, Information collection, factors affecting information and document design, Strategies for organization, Information design and writing for print and online media.	6
3	**Technical Writing, Grammar and Editing**- Technical writing process, forms of technical discourse, Writing, drafts and revising, Basics of grammar, common error in writing and speaking, Study of advanced grammar, Editing strategies to achieve appropriate technical style, Introduction to advanced technical communication. Planning, drafting and writing Official Notes, Letters, E-mail, Resume, Job Application, Minutes of Meetings.	8
4	**Advanced Technical Writing**- Technical Reports, types of technical reports, Characteristics and formats and structure of technical reports. Technical Project Proposals, types of technical proposals, Characteristics and formats and structure of technical proposals. Technical Articles, types of technical articles, Writing strategies, structure and formats of technical articles.	8
	TOTAL	26

Office of Dean Academic Affairs
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3CE1-03/4CE1-03: MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTING

Credit: 2　　　　　　　　　　　　　　　**Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P　　　　　　　　　　　　　　**End Term Exam: 2 Hours**

SN	Contents	Hrs.
1	**Basic economic concepts-**Meaning, nature and scope of economics, deductive vs inductive methods, static and dynamics, Economic problems: scarcity and choice, circular flow of economic activity, national income-concepts and measurement.	4
2	**Demand and Supply analysis**-Demand-types of demand, determinants of demand, demand function, elasticity of demand, demand forecasting – purpose, determinants and methods, Supply-determinants of supply, supply function, elasticity of supply.	5
3	**Production and Cost analysis**-Theory of production- production function, law of variable proportions, laws of returns to scale, production optimization, least cost combination of inputs, isoquants. Cost concepts-explicit and implicit cost, fixed and variable cost, opportunity cost, sunk costs, cost function, cost curves, cost and output decisions, cost estimation	5
4	**Market structure and pricing theory**-Perfect competition, Monopoly, Monopolistic competition, Oligopoly.	4
5	**Financial statement analysis**-Balance sheet and related concepts, profit and loss statement and related concepts, financial ratio analysis, cash-flow analysis, funds-flow analysis, comparative financial statement, analysis and interpretation of financial statements, capital budgeting techniques.	8
	Total	26

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year - III Semester: B.Tech. (Civil Engineering)

3CE3-04: ENGINEERING MECHANICS

Credit: 2
2L+0T+0P

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

SN	CONTENT	Hrs.
1	**Introduction: objective, scope and outcome of the course.**	1
2	**Statics of particles and rigid bodies:** Fundamental laws of mechanics, Principle of transmissibility, System of forces (conservative and non-conservative), 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.	4
3	**Plane trusses:** Types of structures, Trusses, Support Conditions, Types of Loadings, Classification of trusses, Determinacy of trusses, Basic assumptions of truss analysis (zero force member, tension or compression member), Method of joints, Method of sections.	4
4	**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, principle axis and principle moment of inertia.	4
5	**Virtual work:** Principle of Virtual Work, Active forces and active force diagram, Stability of equilibrium. **Work, Energy and Power:** Work of a force, weight and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservation of energy.	4
6	**Friction:** Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction.	2
7	**Springs**: Stiffness of springs, springs in series and parallel, Introduction to laminated plate springs, leaf spring, close coiled helical springs, open coiled springs.	2
8	**Simple Stresses and Strains:** Concept of stress and strain in three dimensions and generalized Hooke's law; Young's modulus, Shear stress, Shear strain, Modulus of rigidity, Complementary shear stress; Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants, Stress and strain thin cylinder and spherical cell under internal pressure.	7
	TOTAL	28

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year - III Semester: B.Tech. (Civil Engineering)

3CE4-05: SURVEYING

Credit: 3
3L+0T+0P

Max. Marks: 150 (IA:30, ETE:120)
End Term Exam: 3 Hours

SN	Contents	Hrs.
1	**Introduction:** objective, scope and outcome of the course.	1
2	**LINEAR AND ANGULAR MEASUREMENTS** Method of linear measurements, Correction to length measured with a chain/tape, Ranging a survey line; direct and indirect Angular measurement by compass, Designation of bearing, Traversing with tape and compass, Correction to measured bearing, Angular measurement by theodolite; Temporary adjustments, Method of horizontal angle measurement and vertical angle, Traverse computation, plotting of traverse and determining the closing error, Balancing traverse.	14
3	**LEVELLING** Measurements of elevations methods of levelling; direct/differential, Indirect/Trigonometrical, and Profile/Cross sectional levelling. Digital and Auto level, Errors in levelling, contours and contour lines; methods of contouring; direct and indirect, characteristics, uses, area and vol. measurements.	8
4	**CURVE SURVEYING** Elements of simple and compound curves, Types of curves, Elements of circular, reverse, and transition curves. Method of setting out simple, circular, transition and reverse curves, Types of vertical curves, length of vertical curves, setting out vertical curves. Tangent corrections.	5
5	**TACHEOMETRY AND PHOTOGRAMMETRY SURVEYING** Advantages of tacheometric surveying, different systems of tacheometric measurements, Stadia system of tacheometry, distance elevation formulae for horizontal sights. Determination of tacheometric constants, distance and elevation formulae for inclined sights with staff vertical. Introduction to basic concepts perspective geometry of aerial photographs, relief and tilt displacements, Terrestrial Photogrammetry, flight planning	8
6	**SETTING OUT WORKS & MODERN FIELD SURVEY SYSTEMS** Instruments and methods for laying out buildings, setting out culverts, setting out sewer lines. Principle of E.D.M. (Electronic Distance Measurements), Modulation, Types of E.D.M., Distomat, Total station, parts of total station, advantages and application.	6
	TOTAL	42

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year - III Semester: B.Tech. (Civil Engineering)

3CE4-06: FLUID MECHANICS

Credit: 2
2L+0T+0P

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

SN	Contents	Hrs.
1	**Introduction to objective, scope and outcome of the course.**	1
2	**Fluids**: Definition, Type of fluids, Ideal fluids, real fluids, Newtonian and non-Newtonian fluids.	1
3	**Properties of Fluids:** Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.	2
4	**Principles of Fluid Statics**: Basic equations, Pascal Law, Type of pressure:-atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, manometers, Bourdon pressure gauge	3
5	**Buoyancy**; Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces. Conditions of equilibrium for floating bodies, meta-centre and analytical determination of meta centric height.	3
6	**Kinematics of Flow**: Visualisation of flow, Types of flow: Steady and unsteady, uniform and non-uniform, rotational and irrotaional flow, Laminar and turbulent flow, streamline, path line, streak line, principle of conservation of mass, equation of continuity, acceleration of fluid particles local and convective, velocity, acceleration, velocity potential and stream function, elementary treatment of flow net, vorticity, circulation, free and forced vortex. Fluid mass subject to horizontal and vertical acceleration and uniform rotation	6
7	**Fluid Dynamics**: Control volume approach, Euler's equation, Bernoulli's equation and its applications, venture-meter, orificemeter, orifices & mouthpieces, time of emptying of tanks by orifices, momentum and angular momentum equations and their applications, pressure on flat plates and nozzles.	6
8	**Laminar Flow through Pipes**: Laminar flow through pipes, Relation between shear & pressure gradient. Flow between plates & pipes. Hagen-Poiseuille equation, Equations for velocity distribution, pressure difference velocity distribution over a flat plate and in a pipe section, Darcy-Weisbach equation, friction factor , minor losses, pipe networks	6
	TOTAL	28

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year - III Semester: B.Tech. (Civil Engineering)

3CE4-07: BUILDING MATERIALS AND CONSTRUCTION

Credit: 3
3L+0T+0P

Max. Marks: 150 (IA:30, ETE:120)
End Term Exam: 3 Hours

SN	Contents	Hrs.
1	**Introduction to objective, scope and outcome of the course.**	1
2	**Basic Civil Engineering Materials (Properties, Types and Uses):** Stone: Compressive strength, Water absorption, Durability, Impact value, Tensile strength; Bricks: Water absorption, Compressive strength, Effloresces, Dimension and Tolerance; Tiles: Water absorption, Tolerance, Impact value and Glazing; Light weight concrete blocks. **Lime**: classification as per IS, properties, standard tests and uses in construction. **Fly-ash:** Properties and Use in manufacturing of bricks & cement; **Miscellaneous**: Gypsum, Plaster of Paris, PVC materials, Paints, Varnish and Distemper.	8
3	**Timber & Steel:** Timber: Definitions of related terms, Classifications and Properties, Defects in Conversion of wood, Seasoning wood, Preservation, Fire proofing, Ply woods, Fibre boards; Steel: Mild steel and HYSD steel, Properties and their use, common tests on steel.	3
4	**Mortarand Plaster:** Mortar preparation methods**:** Functions and tests & their uses in various types of pointing & plastering	2
5	**Brick and Stone Masonry**: Basic principle of masonry work, different types of bonds, relative merits and demerits of English, Single Flemish and Double Flemish bond. Comparison between stone and brick masonry. General principles, classification of stone masonry and their relative merits and demerits.	4
6	**Building Requirements & Construction System:** Building components, their functions and requirements. Types of construction: load bearing and framed structure construction, RCC beam, column and slab construction, Precast and In-situ construction, Relative merits and demerits. Fire resistance construction, FRC. **Ground & Upper floors:** Floor components and their functions, Floor types and Selection of flooring, construction details of ground and upper floors, merits and demerits.	7
7	**Foundation & Site Preparation:** Purpose, types of foundation: like shallow, deep, pile, raft, grillage foundation and their suitability. Depth of foundation, Sequence of construction activity and co-ordination, site clearance, layout of foundation plan.	5

	Temporary structures: Types & methods of shoring, underpinning and scaffolding.	
8	**Damp Proofing:** Causes and Effects of dampness, Methods and materials for damp proofing, Methods and materials for anti-termite treatment. **Construction and Expansion Joints:** Requirements, Types material used, Construction details.	3
9	**Arches and Lintels:** Terms used, types of arches and their construction detail, types of lintels and constructions. **Partition Wall:** Types, purpose and use of partition wall.	3
10	**Stairs:** Terms used, requirements of good staircase, classification, construction details and suitability of different types of stairs, Lifts and Ramps.	2
11	**Roof and Roof Covering:** Purposes, classification of roofs, terms used. Introduction to Solid slab, Flat slab, Shell Roofs and Pitched roofs, and their constructional features. Types of pitched roofs and Trusses, typical constructional details; Roof covering materials, types and typical constructional details.	4
	Total	**42**

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

3CE4-08: ENGINEERING GEOLOGY

Credit: 2   **Max. Marks: 100 (IA:20, ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	Contents	Hrs.
1	Introduction to objective, scope and outcome of the course.	1
2	**General Geology**: Branches and Scope of Geology, Types of Weathering & Geological work of natural agencies like River & Wind. Geological Time Scale. Physical Properties of Minerals.	6
3	**Petrology:** Formation, Texture, Structure and Classification of Igneous, Sedimentary and Metamorphic Rocks. Engineering Properties of Rocks for Building & Road Material. Laboratory and Field & in-situ Test for Site Construction.	6
4	**Structural Geology:** Causes, Terminology, Classification, Recognition, Effects and Engineering consideration of Fold, Fault, Joints and Unconformities.	5
5	**Engineering Geology:** Geophysical methods as applied to Civil Engineering for Subsurface Analysis (Electrical and Seismic methods). Terminology, Types and Geological consideration for site selection of Dam & Tunnel.	6
6	**Remote Sensing & GIS:** Application of Remote Sensing and GIS in Various fields of Civil Engineering.	4
	TOTAL	28

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

3CE4-21: SURVEYING LAB

Credit: 1.5   **Max. Marks: 75 (IA:45, ETE:30)**
0L+0T+3P

List of Experiments

1. Linear Measurement by Tape:
   a. Ranging and Fixing of Survey Station.
   b. Plotting Building Block by offset with the help of cross staff.
2. Compass Survey: Using Surveyor's and Prismatic compass
   a. Measurement of bearing of lines
   b. Adjustment of included angles of compass traverse.
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.
4. Theodolite Survey: Using Vernier Theodolite
   a. To carryout temporary adjustment of Theodolite & Measurement of horizontal and vertical angle: by method of repetition and method of Reiteration.
   b. To measure and adjust the angles of a braced quadrilateral.
5. Trigonometric Levelling: To determine the Height of an object by trigonometriclevelling:
   a. By using Instruments in same vertical plane.
   b. By using Instruments in different vertical planes.
6. Tacheometry Survey:
   a. To determine the tachometric constant.
   b. To determine the horizontal and vertical distance by tachometric survey.
7. To study the various electronic surveying instruments like EDM, Total Station etc.

One-week Survey Camp for topographic/ project survey/Contouring be arranged before or after Term End Exam.

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

II Year - III Semester: B.Tech. (Civil Engineering)

3CE4-22: FLUID MECHANICS LAB

Credit: 01   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

List of Experiments

1. To study the various pressure measuring devices
2. To verify the Bernoulli's theorem.
3. To calibrate the Venturi-meter.
4. To calibrate the Orifice-meter.
5. To determine Metacentric Height.
6. To determine C_c, C_v, C_d of an orifice.
7. To determine C_d of a mouthpiece.
8. To determine C_d of a V-notch.
9. To determine viscosity of a given fluid.
10. To study the velocity distribution in pipes.

3CE4-23: COMPUTER AIDED CIVIL ENGINEERING DRAWING

Credit: 1.5   **Max. Marks: 75 (IA:45, ETE:30)**
0L+0T+3P

List of Assignments

To study and draw the labelled sketch of different Building Components on sheets with exposure to CAD:

1. Drawing of walls

    a. Brick and Stone masonry

    b. Cross section of external wall from foundation to parapet

    c. Partition wall, cavity wall and

2. Pointing, Arches, Lintels and Floors

3. Doors and Windows

4. Stairs, Cross section of Dog legged stairs

5. Roofs: Flat and Pitched roof (Steel truss)

6. Development of Front Elevation and Sectional Elevation from a given plan

7. Development of Plan, Front Elevation and Sectional Elevation from line diagram

Office of Dean Academic Affairs
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3CE4-24: CIVIL ENGINEERING MATERIALS LAB

Credit: 01   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

List of Experiments

1. To determine properties of following materials:

    A. STONE:
       a. Compressive strength,
       b. Water absorption,
       c. Impact value,
       d. Tensile strength;
    B. Bricks:
       a. Water absorption,
       b. Compressive strength,
       c. Dimension and Tolerance;
    C. Tiles:
       a. Water absorption,
       b. Tolerance,
       c. Impact value
    D. Timber: Compressive and Tensile Strength of Timber across and along the Grain

2. To Study the Properties & Utilization of Fly Ash in Construction

3. To Study the Different Aluminum and Steel Sections

4. To Study the Manufacturing and Use of Concrete Hollow Blocks

5. To Study the Properties and Uses of Kota Stone and its Slurry

Office of Dean Academic Affairs
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3CE4-25: GEOLOGY LAB

Credit: 01   **Max. Marks: 50 (IA:30, ETE:20)**
0L+0T+2P

List of Experiments

1. Physical Properties of Minerals
2. Physical Properties of Rocks
3. Identification of Minerals in Hand Specimen
4. Identification of Rocks in Hand Specimen
5. Identification of Geological features through wooden Models
    a. Structural Geological Diagrams
    b. Petrological Diagrams
    c. Engineering Geological Diagrams
6. Interpretation of Geological Map (10 Nos.)
7. Dip & Strike Problems (8 Nos.)

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

II Year-IV Semester: B.Tech. (Civil Engineering)

4CE2-01: ADVANCE ENGINEERING MATHEMATICS-II

Credit: 2
2L+0T+0P

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

SN	CONTENTS	Hrs.
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Probability:** Basic concepts of probability, conditional probability, Baye's theorem.Random variable: Discrete and Continuous random variables, Joint distribution, Marginal distribution, Probability distribution function, Conditional distribution.Mathematical Expectations: Moments, Moment Generating Functions, variance and correlation coefficients, Chebyshev's Inequality, Skewness and Kurtosis. Binomial, Poisson and Normal distribution and their properties.	13
3	**Applied Statistics:** Basic concept of variance, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.	12
	Total	26

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

II Year-IV Semester: B.Tech. (Civil Engineering)

4CS1-03/3CS1-03: MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTING

Credit-2   **Max. Marks : 100 (IA:20,ETE:80)**
2L+0T+0P   **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Basic economic concepts-** Meaning, nature and scope of economics, deductive vs inductive methods, static and dynamics, Economic problems: scarcity and choice, circular flow of economic activity, national income-concepts and measurement.	3
3	**Demand and Supply analysis-** Demand-types of demand, determinants of demand, demand function, elasticity of demand, demand forecasting –purpose, determinants and methods, Supply-determinants of supply, supply function, elasticity of supply.	5
4	**Production and Cost analysis-** Theory of production- production function, law of variable proportions, laws of returns to scale, production optimization, least cost combination of inputs, isoquants. Cost concepts-explicit and implicit cost, fixed and variable cost, opportunity cost, sunk costs, cost function, cost curves, cost and output decisions, cost estimation.	5
5	**Market structure and pricing theory-** Perfect competition, Monopoly, Monopolistic competition, Oligopoly.	4
6	**Financial statement analysis-** Balance sheet and related concepts, profit and loss statement and related concepts, financial ratio analysis, cash-flow analysis, funds-flow analysis, comparative financial statement, analysis and interpretation of financial statements, capital budgeting techniques.	8
	TOTAL	26

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year-IV Semester: B.Tech. (Civil Engineering)

4CS1-02/3CS1-02: TECHNICAL COMMUNICATION

Credit-2   Max. Marks : 100 (IA:20,ETE:80)
2L+0T+0P   **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
	Introduction: Objective, scope and outcome of the course.	**1**
1	**Introduction to Technical Communication-** Definition of technical communication, Aspects of technical communication, forms of technical communication, importance of technical communication, technical communication skills (Listening, speaking, writing, reading writing), linguistic ability, style in technical communication.	**3**
2	**Comprehension of Technical Materials/Texts and Information Design & development-** Reading of technical texts, Reading and comprehending instructions and technical manuals, Interpreting and summarizing technical texts, Note-making. Introduction of different kinds of technical documents, Information collection, factors affecting information and document design, Strategies for organization, Information design and writing for print and online media.	**6**
3	**Technical Writing, Grammar and Editing-** Technical writing process, forms of technical discourse, Writing, drafts and revising, Basics of grammar, common error in writing and speaking, Study of advanced grammar, Editing strategies to achieve appropriate technical style, Introduction to advanced technical communication. Planning, drafting and writing Official Notes, Letters, E-mail, Resume, Job Application, Minutes of Meetings.	**8**
4	**Advanced Technical Writing-** Technical Reports, types of technical reports, Characteristics and formats and structure of technical reports. Technical Project Proposals, types of technical proposals, Characteristics and formats and structure of technical proposals. Technical Articles, types of technical articles, Writing strategies, structure and formats of technical articles.	**8**
	TOTAL	**26**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year-IV Semester: B.Tech. (Civil Engineering)

4CE3-04: BASIC ELECTRONICS FOR CIVIL ENGINEERING APPLICATIONS

Credit: 2   **Max. Marks: 100 (IA:20, ETE:80)**

2L+0T+0P   **End Term Exam: 2 Hours**

SN	CONTENTS	Hrs.
1	**Introduction:** to objective, scope and outcome of the subject.	1
2	**Basic Electronics**: Number systems & Their conversion used in digital electronics, Demorgan's theorem, Logic Gates, half and full adder circuits, R-S flip flop, J-K flip flop.	2
3	Introduction to Semiconductors, Diodes, V-I characteristics, Bipolar junction transistors (BJT) and their working, introduction to CC, CB & CE transistor configurations.	3
4	**Instrumentation**: mechanical, electrical, electronic system and their calibration, Use of automatic and digital levels, electronic theodolites, total stations; Control surveys using GNSS, Total station and traversing methods (adjustment and computations of coordinates).	4
5	**Measurement errors**: Gross error and systematic errors, absolute and relative errors, accuracy, precision, resolution and significant figures. Full-field measurements;	2
6	**Data acquisition system and data processing**: analog systems, digital systems using personal computers, dynamic measurement, numerical and graphical data processing and archiving.	3
7	**Sensors & Transducers**: various types of sensors for displacement, velocity, acceleration, pressure, loads, strains, Displacement sensors, Mass &Piezoeletric, strain gauges, Temperature sensors thermocouple, flow sensors : Ultrasonic, electromagnetic, laser and thermal	5
8	**Sensor types characteristics**: types of resolution, FOV, IFOV, PSF; Geometric and radiometric distortions, Geo-referencing, re-sampling methods; Atmospheric errors and removal; Satellite orbits and characteristics; Applications of optical and microwave remote sensing techniques in Civil Engineering.	5
9	**Digital Image Processing**: Digital image, introduction to digital image processing, pre-processing, enhancement, classification, accuracy assessment.	3
	TOTAL	28

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

II Year-IV Semester: B.Tech. (Civil Engineering)

4CE4-05: STRENGTH OF MATERIALS

Credit: 3   **Max. Marks: 150 (IA:30, ETE:120)**

3L+0T+0P   **End Term Exam: 3 Hours**

SN	CONTENTS	Hrs.
1	**Introduction:** to objective, scope and outcome of the subject	1
2	**Simple Stresses and Strains in different members:** Stresses in prismatic & non prismatic members and in composite members; Thermal stresses; Stresses in composite members, Compatibility condition.	5
3	**Compound Stress:** Two dimensional stress system: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr's circle &its application. Introduction to theories of failures.	6
4	**Bending of Beams:** Bending moment, Shear force and Axial thrust diagrams for statically determinate beams subjected to various types of loads and moments, Point of Contra-flexure, relation between load, SF and BM.	8
5	**Theory of simple bending**: Distribution of bending and shear stresses for simple and composite sections, Combined direct and bending stress,	6
6	**Torsion:** Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion;	4
7	**Columns:**Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads; Euler's theory and its limitation, concept of effective length of columns; Rankine & Secant formulae, middle third rule, core of a section.	5
8	**Deflection of Beams:** Differential relation between load, shear force, bending moment, slope deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method and their application to statically determinate prismatic beams.	7
	TOTAL	42

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SYLLABUS
II Year-IV Semester: B.Tech. (Civil Engineering)

4CE4-06: HYDRAULICS ENGINEERING

Credit: 3   **Max. Marks: 150 (IA:30, ETE:120)**

3L+0T+0P   **End Term Exam: 3 Hours**

SN	CONTENTS	Hrs.
1	**Introduction:** to scope, objective and outcome of subject	1
2	**Dimensional Analysis & Models:** Dynamical Similarity and Dimensional Homogeneity Model experiment, geometric, Kinematic and Dynamic similarity. Reynold's, froudes, Weber's, Euler and Mach numbers. Distorted river models and undistorted models, proper choice of scale ratios. Scale effect. Principle of dimensional analysis Rayleigh method, Buckingham theorem.	4
3	**Turbulent flow**, Reynolds equations, Prandtl's mixing length theory, Equations of velocity distribution and friction coefficient **Boundary Layer Theory**: Concept of boundary layer, laminar and turbulent boundary layers, boundary layer thickness, von Karman integral equation, laminar sub-layer, hydro-dynamically smooth and rough boundaries, separation of flow and its control, cavitation.	6
4	**Open channel Flow** Uniform, Non-Uniform and variable flow. Resistance equations of Chezy and Manning. Section factor for uniform flow. Most Efficient rectangular, triangular and trapezoidal sections. Velocity distribution in open channels.	5
5	**Gradually varied flow** in Prismatic channels. Specific energy of flow. Critical depth in prismatic channels. Alternate depths. Rapid, critical and sub critical Flow Mild, steep and Critical Slopes. Classification of surface curves in prismatic channels and elementary computation	4
6	**Rapidly varied flow**: Hydraulic jump or standing wave in rectangular channels. Conjugate or sequent depths Losses in jump, location of jump. velocity distribution in open channels. Energy correction factor. Moment correction factor	4
7	**Impact of free Jets:** Impact of a jet on a flat or a curved vane, moving and stationary vane. **Introduction of Hydraulic machine –** Type of pumps and turbine and its brief description. Draft tube and its principle	3

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8	**Hydrology:** Definition, Hydrologic cycle, Application to Engineering problems, measurement ofrainfall, rain gauge, peak flow, flood frequency method, catchment area formulae, Floodhydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination,Estimation of run off.	8
9	**Ground Water**: Aquifers and its types, Confined and unconfined aquifer, Darcy's Law, hydraulic conductivity, transmissivity, well hydraulics.	3
10	**Canal Hydraulics:** Types of canals, parts of canal irrigation system, channel alignment,assessment of water requirements, estimation of channel losses, design of channels, regime andsemi theoretical approaches (Kennedy's Theory, Lacey's Theory), cross section of channels, siltcontrol in canals.	4
	TOTAL	**42**

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SYLLABUS
II Year-IV Semester: B.Tech. (Civil Engineering)

4CE4-07: BUILDING PLANNING

Credits: 2   **Max. Marks: 100 (IA:20, ETE:80)**

2L+0T+0P   **End Term Exam: 2 Hours**

SN	CONTENTS	Hrs.
1	**Introduction:** to scope, objective and outcome of subject	1
2	**Introduction**: Types of buildings, criteria for location and site selection, site plan and its detail.	2
3	**Sun Consideration :** Different methods of drawing sun chart, sun shading devices, design of louvers.	3
4	**Climatic and comfort Consideration**: Elements of climate, global climate, climatic zones of India, thermal comfort, biclimatic chart,	3
5	**Orientation:** Meaning, factors affecting orientation, orientation criteria for tropical climate.	1
6	**Building Bye Laws and NBC Regulations:** Objective of by-laws, regulation regarding; means of access, lines of building frontages, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation.	3
7	**Principles of Planning:** Different factors affecting planning viz-aspect, prospect, furniture requirement,roominess, grouping, circulation, elegance, privacy etc.	3
8	**Vastu Shastra In Modern Building planning:** Factors considered in Vastu, site selection, orientation,planning and design of residential buildings, school/hospital	3
9	**Functional Design And Accommodation Requirements Of Non Residential Buildings:** viz-school buildings, rest house, primary health centers, post office etc.	3
10	**Services in Buildings** (A) Lighting and ventilation, doors and windows, lifts. (B) Acoustics, sound insulation and noise control. (C) Fire fighting provisions	6
	TOTAL	28

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SYLLABUS
II Year-IV Semester: B.Tech. (Civil Engineering)

4CE4-08: CONCRETE TECHNOLOGY

Credit: 3   **Max. Marks: 150 (IA:30, ETE:120)**

3L+0T+0P   **End Term Exam: 3 Hours**

SN	CONTENTS	Hrs.
1	**Introduction:** to objective, scope and outcome of the subject	1
2	**Ingredients of concrete:** Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gel-space ratio etc.	2
3	**Aggregates:** types, physical properties and standard methods for their determination, including Grading of aggregates as per IS. Manufactured sand- properties and IS Specifications for use in concrete.	2
4	**Concrete:** Grade of concrete, proportioning of ingredients, water content and its quality, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. Factors affecting, methods of determination.	4
5	Properties of hardened concrete such as strengths, permeability, creep, shrinkage,factors influencing, Standard tests on fresh and hardened concrete as per IS code. Aggregate- cement interface, its effect on properties of concrete.	4
6	**NDT**: Introduction and their importance. Application & use of Rebound Hammer, Ultra-sonic pulse velocity meter, Rebar & Cover meter, half-cell potential meter, corrosion resistivity meter, core sampling. Interpretation of their results,	4
7	**Concrete Handling in Field:** Batching, mixing, placing and transportation of concrete, equipments for material handling, various methods their suitability and precautions. Compaction of concrete: methods &equipments. Curing of concrete: various methods their suitability.	4
8	Durability of concrete. Causes of deterioration, Carbonation, Tests for durability assessment	3
9	**Admixture in concrete:** Chemical and mineral admixtures, their types and uses: accelerator, retarders, water-proofing, plasticisers, super plasticizers-types, their suitability. Fly ash-properties for use in concrete, specifications of flyash as per IS 3812, and effect on properties of concrete. GGBFS, Microsilica and metakaolin- propertie, specifications and utility in concrete.	7

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10	Concrete mix deign (IS method)- with and without water reducing admixtures	2
11	**Form work:** Requirements, their types. Typical formworks and shuttering/centering for Columns, beams, slabs, walls, etc. Slip and moving formwork.	3
12	**Special types of concrete:** Sulphate resisting concrete, under water concreting, pumpable concrete: methods and issues in making, salient properties and applications.	3
13	Concretes with tailored properties- including high performance concrete, with specific properties in fresh and hardened states, self-compacting concrete-materials, mix proportioning, test methods, use and applications with case studies.	3
	TOTAL	**42**

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4CE21: MATERIAL TESTING LAB

Credit: 01   **Max. Marks: 50 (IA:30, ETE:20)**

0L+0T+2P

1. Tests on Mild steel and HYSD Bar –To determine compressive and tensile strength, yield strength, percentage elongation etc.
2. Tests on Cement and concrete cubes/ core to establish their strength
3. Hardness Test – Rockwell Hardness and Brinell Hardness
4. Impact Test – Izod and Charpy
5. Modulus of Rupture of Wooden Beam
6. Fatigue Test
7. Spring Test
8. Torsion Test

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4CE4-22: HYDRAULICS ENGINEERING LAB

Credit: 01   **Max. Marks: 50 (IA:30, ETE:20)**

0L+0T+2P

1. To determine the minor losses.
2. To determine the friction factor.
3. To determine Cd of Broad crested weir.
4. To verify the momentum equation.
5. To determine the discharge of venturimeter.
6. To determine Manning's & Chezy's coefficient of roughness for the bed of a given Channel.
7. To study and plot characteristics curve of hydraulic jump.
8. To study velocity distribution in open channel flow.

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4CE4-23: BUILDING DRAWING

Credit: 1.5   **Max. Marks: 75 (IA:45, ETE: 30)**

0L+0T+3P

1- To plan and draw working drawing of a Residential building with following detail.

   (a) Site plan

   (b) Foundation plan

   (c) Plan

   (d) Two sectional elevations

   (e) Front elevation

   (f) Furniture plan

   (g) Water supply and sanitary plan

   (h) Electric fitting plan

2- To design and draw a Primary Health Center

3- To design and draw a Primary School

4- To design and draw a Rest House

5- To design and draw a Post Office

6- To design and draw a Bank

7- To design and draw a College Library

8- To design and draw a Cinema Theatre

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS
II Year-IV Semester: B.Tech. (Civil Engineering)

4CE4-24: ADVANCED SURVEYING LAB

Credit: 01   **Max. Marks: 50 (IA:30, ETE:20)**

0L+0T+2P

1. To measure the horizontal and vertical angles by Theodolite.
2. To determine the Height of an object by trigonometric leveling (Instruments in same vertical plane).
3. To determine the Height of an object by trigonometric leveling (Instruments in different vertical planes).
4. Measurement of angles, length of survey line using Total Station, finding the coordinate of station
5. To measure and adjust the angles of a braced quadrilateral.
6. To prepare the map of given area by plane tabling.
7. Measurement of area of a traverse by Total Station

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4CE4-25: CONCRETE LAB

Credit: 1.5   **Max. Marks: 75 (IA: 45, ETE: 30)**

0L+0T+3P

1. To determine the fineness of Cement by Blaine's air permeability test.
2. To determine the flexural strength of Concrete.
3. To determine Soundness of cement by Le-chatelier apparatus.
4. To determine the specific gravity of fine aggregate (sand) by Pycnometer.
5. To determine the bulking of fine aggregate and to draw curve between water content and bulking.
6. Sieve analysis of coarse aggregates and fine aggregates.
7. To determine the workability of given concrete mix by slump test.
8. To determine the optimum dose of super plastsizers by Flow table test.
9. To design concrete mix of M-20 grade in accordance with I S 10262.
10. To design concrete mix of M-40 grade with super plasticizer in accordance with I S 10262.
11. To determine the Permeability of Concrete.
12. Study of Core cutter, UPV & Rebound Hammer equipment.

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