

Syllabus of
UNDERGRADUATE DEGREE COURSE

Civil Engineering



Rajasthan Technical University, Kota
Effective from session: 2024 – 2025



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:30, ETE:70)
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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SYLLABUS

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

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

Credit-2
2L+0T+0P

Max. Marks : 100 (IA:30, ETE:70)
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
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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
2L+0T+0P

Max. Marks : 100 (IA:30, ETE:70)
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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SYLLABUS

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

4CE3-04: BASIC ELECTRONICS FOR CIVIL ENGINEERING APPLICATIONS

Credit: 2

Max. Marks: 100 (IA:30, ETE:70)

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 & Piezoelectric, 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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SYLLABUS

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

4CE4-05: STRENGTH OF MATERIALS

Credit: 3

Max. Marks: 100 (IA:30, ETE:70)

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
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SYLLABUS

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

4CE4-06: HYDRAULICS ENGINEERING

Credit: 3

Max. Marks: 100 (IA:30, ETE:70)

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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SYLLABUS

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

8	Hydrology: Definition, Hydrologic cycle, Application to Engineering problems, measurement of rainfall, rain gauge, peak flow, flood frequency method, catchment area formulae, Flood hydrograph, 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 and semi theoretical approaches (Kennedy's Theory, Lacey's Theory), cross section of channels, silt control in canals.	4
	TOTAL	42



RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

4CE4-07: BUILDING PLANNING

Credits: 2

Max. Marks: 100 (IA:30, ETE:70)

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, bi climatic 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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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

4CE4-08: CONCRETE TECHNOLOGY

Credit: 3

Max. Marks: 100 (IA:30, ETE:70)

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 design (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



RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

4CE21: MATERIAL TESTING LAB

Credit: 01

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

OL+OT+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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SYLLABUS

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

4CE4-22: HYDRAULICS ENGINEERING LAB

Credit: 01

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

OL+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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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

4CE4-23: BUILDING DRAWING

Credit: 1.5

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

OL+OT+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: 100 (IA:60, ETE:40)

OL+OT+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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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

4CE4-25: CONCRETE LAB

Credit: 1.5

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

OL+OT+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 plastisizers 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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