RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING

(B.TECH. CE)

SESSION 2023 ONWARDS

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Common For All Branches)

New Scheme Based On AICTE Flexible Curricula

Semester – I

Course Content

Semester-I

SL. No.	Category	Subject Code	Subject Name	Periods			Credits	Marks Distribution				
								Internal	External		Total	
				L	T	P		Max	Max	Min	Max	Min
1	**Basic Science Course**	BT101	Engineering Chemistry	3	0	0	**3**	30	70	21	100	35
2	**Basic Science Course**	BT102	Engineering Mathematics-I	3	1	0	**4**	30	70	21	100	35
3	**Humanities and Social Science**	BT103	Technical Communication	2	0	0	**2**	30	70	21	100	35
4	**Engineering Science Course**	BT104	Basic Electrical &Electronics Engineering	3	0	0	**3**	30	70	21	100	35
5	**Engineering Science Course**	BT105	Engineering Graphics& Design	2	0	0	**2**	30	70	21	100	35
6	**Humanities and Social Science**	BT106	Universal Human Value-2	3	0	0	**3**	30	70	21	100	35
							PRACTICAL DEMONSTRATION					
1	**Basic Science Course**	BT151	Engineering Chemistry Lab	0	0	2	**1**	30	20		50	25
2	**Engineering Science Course**	BT 154	Basic Electrical &Electronics Engineering Lab	0	0	2	**1**	30	20		50	25
3	**Engineering Science Course**	BT 155	Engineering Graphics& Design Lab	0	0	2	**1**	30	20		50	25
4	**Engineering Science Course**	BT156	Workshop/ Manufacturing Practices	0	0	4	**2**	30	20		50	25
TOTAL				16	1	10	**22**					

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Semester – I

Course Content

Branch	Subject Title	Subject Code
B.Tech (Common)	Engineering Chemistry	BT101

COURSE OBJECTIVES: The course should enable the students to:

1. Apply the electrochemical principles in batteries, understand the fundamentals of corrosion.
2. Analysis of water for its various parameters and its significance in industrial and domestic Applications.
3. Analyze microscopic chemistry in terms of atomic, molecular orbitals and Intermolecular forces
4. Analysis of major chemical reactions that are used in the synthesis of molecules.
5. Understand the chemistry of various fuels and their combustion.

Module-I

Electrochemistry and Water:

Electrochemistry: Law of chemical equilibrium, equilibrium constants and their significance, Weak and strong electrolytes, Conductors, Insulators , Dielectrics, galvanic cells, Standard electrode potential and its application to different kinds of half cells, Batteries and Fuel Cells with examples, Arrhenius Theory of Ionisation, Degree of Ionisation & factors affecting degree of ionization. Ostwald's dilution law, pH, buffer. Numerical problems

Water and corrosion : Sources, Impurities, Hardness & it's different units, Degree of Hardness, Softening of water by Zeolite and Ion exchange method, Boiler trouble causes (Sludge and Scale), Characteristics of municipal water & its treatment, Chemical and Electrochemical corrosion, Factors affecting the rate of corrosion, General method of corrosion prevention

Module-II

Periodic Properties and Chemical Bonding:

Periodic properties: Brief introduction to Periodic table, Ionization energy, electron affinity, electro negativity, electronicconfigurations, atomic and ionic sizes, polarizability

Chemical Bonding: VSEPR theory, oxidation states, coordination numbers and geometries, hard soft acids and bases, Crystal field theory, colour & magnetic properties of coordination complexes. Types of bonds-Ionic bond, Covalent bonds,Metallic Bonds, Hydrogen bond, etc.

Module-III

Spectroscopy and Photochemistry

Spectroscopy: Principles of spectroscopy and selection rules, Electronic spectroscopy-Absorption and emission Spectroscopy, Principles and applications of UV-Visible, Factors influencing for UV-vis spectrum; Rotational and Vibrational spectroscopy, Principle of FT-IR, and NMR spectroscopy. Modern techniques in structural elucidation ofcompounds by UV-Vis, IR, & NMR Spectroscopy.

Photochemistry: Photochemical reaction, Lambert-Beers Law, Fluorescence and Phosphoresence, Jablonskii diagram,Einstein photochemical reaction.

Module-IV

Thermochemistry and Fuels

Thermochemistry: Free energy, entropy, Enthaply, EMF. Hess's law, entropy, enthalpy and combustion calculations, Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria.

Fuels: Classification of the fuel and its characteristics, Calorific value, HCV, LCV, Determination of calorific value by Bomb calorimeter, application of fossil fuels, solid fuels (coal), liquid fuels (petrol and diesel), gaseous fuels (water gas, producer gas, coal gas and biogas), carbonization and gasification, refining, reforming, , knocking and anti knocking properties, octane and cetane numbers

Module-V

Polymerization and Common Organic Reactions

Polymers: Introduction, Types, classification and properties of polymers, Different methods of synthesis- Addition, condensation. Molecular weights of polymers (M_n, M_w, M_v), glass transition temperature (T_g), synthesis of commercially important polymers and their uses

(Nylon 6, Nylon 6,6, Polyethyelene, PET, PS, PVC), an introduction to green chemistry. and, Synthesis of commercially important polymers and their uses- PVC, Teflon, Nylon 6, Nylon 66, Decoran, Vulcanization of Rubber.

Organic reactions: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclizationand ring openings with examples.

COURSE OUTCOMES

1. Describe and understand the operation of electrochemical systems for the production of electric energy, i.e. batteries
2. .Explain the mode by which potable water is produced through the processes of screening, micro Straining, aeration, coagulation and flocculation, sedimentation, flotation, filtration and disinfection.
3. Recognize that molecular orbital theory is a method used by chemists to determine the energy of the electron in a molecule as well as its geometry.
4. Demonstrate an ability to design, implement, and evaluate the results of experimentation using standard scientific methodologies such as hypothesis formulation and testing
5. Understand and analyze the combustion mechanisms of various fuels.

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Course	**Subject Title**	**Subject Code**
B.Tech.	**Engineering Chemistry Lab**	BT151

1. Determination of Total hardness by EDTA method.
2. Determination of mixed alkalinity

- OH^- & $CO3^{2-}$
- $CO3^{2-}$ & $HCO3^-$

3. Determination of Flash & Fire Points by Pensky Marten Apparatus.
4. Determination of Flash & Fire Points by by Abel's Apparatus.
5. Determination of Flash & Fire Points by Cleveland's Open Cup Apparatus.
6. Determination of Calorific Value by Bomb Calorimeter.
7. Determination of Viscosity and Viscosity index by Redwood viscometer No.1.
8. Determination of Viscosity and Viscosity index by Redwood viscometer No.2.
9. Determination of percentage of carbon by Proximate analysis of coal
10. To Determine the Strength of NaOH Solution (Standard Oxalic Acid Solution Supplied)
11. To Determine the Strength of HCl Solution (Standard NaOH Solution Supplied)
12. Salt analysis: Dry Test &Wet Test acid and basic radicals

Books /References

1. Chemistry in Engineering and Technology - Vol.1 & 2 Kuriacose and Rajaram, McGraw Hill Education
2. Fundamental of Molecular Spectroscopy C.N. Banwell , McGraw Hill Education
3. Engineering Chemistry – B.K. Sharma, Krishna Prakashan Media (P) Ltd., Meerut.
4. Basics of Engineering Chemistry – S.S. Dara & A.K. Singh, S. Chand &Company Ltd., Delhi.
5. Applied Chemistry – Theory and Practice, O.P. Viramani, A.K. Narula, New Age International Pvt. Ltd.Publishers, New Delhi.
6. Elementary Spectroscopy ,Y .R. Sharma , S. Chand Publishing
7. Polymer Science, Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar, New Age International Pvt. Ltd
8. Advanced Inorganic Chemistry, G.R. Chatwal, Goal Publishing house
9. Engineering Chemistry (NPTEL Web-book) B.L. Tembe, Kamaluddin and M.S. Krishna
10. Engineering Chemistry Jain & Jain Dhanpat Rai and Sons

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B.Tech. (Common for All Branches)

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Semester – I

Course Content

Branch	Subject Title	Subject Code
B.Tech (Common)	**Engineering Mathematics-I**	**BT102**

COURSE OBJECTIVES:-

To provide the students with sufficient knowledge in calculus and matrix algebra, this can be used in their respective fields.

Module-I: Calculus: Successive Differentiation, Rolle's theorem, Mean Value theorems, Expansion of functions by Mc. Laurin's and Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation, Maxima & Minima (two and three variables), Method of Lagranges Multipliers.

Module-II: Calculus: Definite Integral as a limit of a sum and Its application in summation of series; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Multiple Integral, Change the order of the integration, Applications of multiple integral for calculating area and volumesof the curves.

Module-III: Sequences and series: Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Module-IV: Matrices: Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization of Matrices, Cayley-Hamilton theorem and its applications to find inverse.

Module-V: Boolean Algebra: Algebra of Logic, Boolean Algebra, Principle of Duality, Basic Theorems, Boolean Expressions and Functions. Elementary Concept of Fuzzy Logic Graph Theory: Graphs, Subgraphs, Degree andDistance, Tree, cycles and Network.

COURSE OUTCOMES:-

1. Apply elementary transformations to reduce the matrix into the echelon form and normal form to determine its rank and interpret the various solutions of system of linear equations
2. Identify the special properties of a matrix such as the eigen value, eigen vector, employ orthogonal transformations to express the matrix into diagonal form, quadratic form and canonical form
3. Equip themselves familiar with the functions of several variables and mean value theorems

Books/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

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B.Tech. (Common for All Branches)

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Semester – I

Course Content

Branch	Subject Title	Subject Code
B.Tech. (Common)	**Technical Communication**	**BT103**

COURSE OBJECTIVES:-

Specifically designed for the students of Higher Degree, this course aims at preparing them for the communicative challenges of both the types: Oral as well as written which they may face in their professional world. It provides them adequate practice so as to increase their confidence and effectiveness when presenting their technical ideas in interpersonal and group communication situations.

Module-I

Identifying Common errors in writing: Articles, Subject-Verb Agreement, Prepositions, Active and Passive Voice,Reported Speech: Direct and Indirect, Sentence Structure.

Module-II

Unit-II Vocabulary building and Comprehension: Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, synonyms, antonyms, Reading comprehension, Paragraph writing, Unseen passage.

Module-III

Unit-III Communication: Introduction, Meaning and Significance, Process of Communication, Oral and Written Communication, 7 c's of Communication, Barriers to Communication and Ways to overcome them, Importance of Communication for Technical students, nonverbal communication, Types and forms of Communication, Skills of Communication.

Module-IV

Unit-IV Developing Writing Skills: Planning, Drafting and Editing, Precise Writing, Précis, Technical definition and Technical description. Report Writing: Features of writing a good Report, Structure of a Formal Report, Report of Trouble, Laboratory Report, Progress Report, Note making.

Module-V

Unit-V Business Correspondence: Importance of Business Letters, Parts and Layout; Application, Contents of good Resume, guidelines for writing Resume, Calling/ Sending Quotation, Order, Complaint, E-mail and Tender.

COURSE OUTCOMES:- Having successfully completed all the modules of the course, students should be able to

1. Communicate effectively in professional life
2. use correct and appropriate language in oral and written communication
3. make effective oral presentations write business letters, memos, emails and reports
4. participate in various kinds of group communications
5. face and also conduct job interviews
6. write research papers, dissertation and thesis

Books/References:-

1. 'Technical Communication : Principles and practice', Meenakshi Raman and Sangeeta Sharma (Oxford)
2. 'Effective Business Communication', Krizan and merrier (Cengage learning)
3. 'Communication Skill, Sanjay Kumar and Pushlata, OUP2011
4. "Practical English Usage Michael Swan OUP, 1995.
5. "Exercises in spoken English Parts I-III CIEFL, Hyderabad, Oxford University Press
6. On writing well, William Zinsser, Harper Resource Book 2001.
7. Remedial English Grammar, F.T. Wood, Macmillan 2007.

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B.E. (Common For All Branches)

New Scheme Based On AICTE Flexible Curricula

Semester – I

Course Content

Branch	Subject Title	Subject Code
B.Tech. Common	**Basic Electrical & Electronics Engineering**	**BT104**

Course Objectives:- To understand the laws of electrical engineering

Module-I

AC & DC CIRCUITS

Circuit parameters, Ohms law, Kirchhoff's law. Average and RMS values, concept of phasor representation. RLC series circuits and series resonance, RLC parallel circuits (includes simple problems in DC & AC circuits) Introduction to three phase systems – types of connections, relationship between line and phase values. (qualitative treatment only) Voltage and current sources, dependent and independent sources, source conversion, DC circuits analysis using mesh & nodal method, star-delta transformation. 1-phase AC circuits under sinusoidal steady state, active, reactive and apparent power, physical meaning of reactive power, power factor, 3-phase balanced and unbalanced supply, star and delta connections.

Module-II

TRANSFORMERS

Review of laws of electromagnetism, mmf, flux, and their relation, analysis of magnetic circuits. Single-phase transformer, basic concepts and construction features, voltage, current and impedance transformation, equivalent circuits, phasor diagram, voltage regulation, losses and efficiency, OC and SC test.

Module-III

ROTATING ELECTRIC MACHINES-

Constructional details of DC machine, induction machine and synchronous machine, Working principle of DC machines, classification of DC machine, EMF equation, armature

reaction, characteristic of separately excited and self excited generator. Working principle of DC motor, Importance of back EMF, Starting of DC motor, speed torque characteristic of separately excited and self excited DC motor.

Module-IV

WIRING & LIGHTING

Types of wiring, wiring accessories, staircase & corridor wiring, Working and characteristics of incandescent, fluorescent, SV & MV lamps. Basic principles of earthling, simple layout of generation, transmission & distribution of power.

Module-V

ELECTRONICS

Binary Number system binary addition, subtraction, multiplication and division, subtraction operation using 1's and 2's complement forms, Octal number system, hexadecimal number system conversion of number system from one number system to another number system, types of Resistor, Inductor and capacitor, color coding of resistor and capacitor P-type and N-type semiconductor, semiconductor diode its operation in forward and reverse bias, V-1 characteristics, half wave and full wave rectification, application.

COURSE OUTCOMES:-

Students will gain knowledge regarding the various laws and principles associated with electrical systems.

Students will gain knowledge regarding electrical machines and apply them for practical problems.

Students will gain knowledge regarding various types' semiconductors.

Student will gain knowledge digital electronics.

Student will gain knowledge on electronic system

Books/References:

1. Basic Electrical & Electronics Engineering by V.N. Mittle & Arvind Mittle.
2. Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition
3. S.Ghosh, Fundamentals of Electrical and Electronics Engineering, PHI, II Edition.
4. Millman, Halkias & Parikh, Integrated Electronics, Mc Graw Hill, II Edition
5. Nagrath & Kothari, Basic Electrical Engineering, TMH.
6. J.S. Katre, Basic Electronics Engg, Max Pub. Pune.
7. Hughes, Electrical and Electronic Technology, Pearson Education IX Edition

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Semester – I

Course Content

Branch	Subject Title	Subject Code
B.Tech. Common	**Engineering Graphics & Design**	**BT105**

Course Objectives:

1. The course is aimed at developing Basic Graphic skills.
2. Develop Skills In Preparation Of Basic Drawings.
3. Skills in Reading and Interpretation of Engineering Drawings.

Module-I

GEOMETRICAL CONSTRUCTION, USE OF INSTRUMENTS, SCALES; Representative factor, plain scales, diagonal scales, scale of chords. engineering curves; Construction of ellipse, parabola, hyperbola, Cycloid, Epi-cycloid, Hypo-cycloid, Involutes, Archimedean and logarithmic spirals.

Module-II

Projections of points, lines, planes and solids. Section of Solids: Section of right solids by normal and inclinedplanes.

Module-III

Development of Surfaces: Parallel line and radial - line method for right solids.

Isometric Projections: Isometric scale, Isometric axes, Isometric Projection from orthographic drawing. Intersection of cylinders.

Module-IV

Computer Graphics: Introduction to general purpose graphics software, plotting techniques, coordinate systemtransformations, line drawing, polygon an circle generation. Drawing entity commands of Computer drafting. Sectional and dimensional drawing using computer.

Module-V

Working in sketcher environment, Drawing sketch, line, circle, rectangle, ellipse, arc, spline etc. Deleting & trimming sketching entities, Dimensioning the sketches ,Modifying dimension of sketches, Modifying dimensionof sketches, Creating text, Transformation of sketch entiies-mirror, scale, rotate, Drawing views, Determining visible area of the view ,Creating a cross-section views, Modifying cross-section views, Editing cross-section views, Modify the drawing views, Dimensioning & detailing the drawing views.

COURSE OUTCOMES:-

1. Use the drawing instruments effectively and able to dimension the given figures
2. Appreciate the usage of engineering curves in tracing the paths of simple machine components
3. Understand the concept of projection and acquire visualization skills, projection of points
4. Able to draw the basic views related to projections of Lines, Planes

Text/ Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
5. (Corresponding set of) CAD Software Theory and User Manuals

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Semester – I

Course Content

Branch	Subject Title	Subject Code
B.Tech. Common	**Workshop/ Manufacturing Practices**	**BT156**

Module-I

Introduction: Manufacturing Processes and its Classification, Casting, Machining, Plastic deformation and metalforming, Joining Processes, Heat treatment process, Assembly process. Powder Metallurgy, introduction to computers in manufacturing. Black Smithy Shop Use of various smithy tools. Forging operations: Upsetting, Drawing down, Fullering, Swaging, Cutting down, Forge welding, Punching and drafting. Suggested Jobs: Forging of chisel., forging of Screw Driver

Module-II

Carpentry Shop: Timber : Type, Qualities of timber disease, Timber grains, Structure of timber, Timber, Timber seasoning, Timber preservation .Wood Working tools: Wood working machinery, joints & joinery. Various operations of planning using various carpentry planes sawing & marking of various carpentry joints. Suggested Jobs : Name Plate ,Any of the Carpentry joint like mortise or tennon joint

Module-III

Fitting Shop: Study and use of Measuring instruments, Engineer steel rule, Surface gauges caliper, Height gauges, feeler gauges, micro meter. Different types of files, File cuts, File grades, Use of surface plate, Surface gauges drilling tapping Fitting operations: Chipping filling, Drilling and tapping. Suggested Jobs: Preparation of job piece by making use of filling, sawing and chipping , drilling and tapping operations.

Module-IV

Foundry: Pattern Making: Study of Pattern materials, pattern allowances and types of patterns. Core box and core print, .Use and care of tools used for making wooden patterns. Moulding: Properties of good mould & Core sand, Composition of Green, Dry and Loam sand. Methods used to prepare simple green and bench and pit mould dry sand bench mould using single piece and split patterns.

Module-V

Welding: Study and use of tools used for Brazing, Soldering, Gas & Arc welding. Preparing Lap & Butt joints using gas and arc welding methods, Study of TIG & MIG welding processes. Safety precautions.

Course Objectives:- After completion of this course, students will be able to:

1. Understand the appropriate tools, materials, instruments required for specific operations in workshop.
2. Apply techniques to perform basic operations with hand tools and power tools such as center lathe machine, drilling machine using given job drawing.
3. Understand the figures of the hand tools used in fitting, carpentry, foundry, welding shop and machine tools such as lathe machine and drilling machine.
4. Understand a report related to hand tools and machine tools description referring to library books and laboratory manuals.

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Semester – II

Course Content

Branch	Subject Title	Subject Code
B.Tech. Common	**Universal Human value (UHV)-2**	**BT106**

Course Objectives:

1. To help the students appreciate the essential complimentarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.
4. Thus, this course is intended to provide a much needed orientation input in value education to the young enquiring minds.

Module-I

Introduction to Value Education

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, Self-exploration as the Process for Value Education , Continuous Happiness and Prosperity – the Basic Human Aspirations**,** Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations

Module-II

Harmony in the Human Being

Understanding Human being as the Co-existence of the Self and the Body**,** Distinguishing between the Needs of the Self and the Body **,**The Body as an Instrument of the Self , Understanding Harmony in the Self **,**Harmony of the Self with the Body, Programme to ensure self-regulation and Health

Module-III

Harmony in the Family and Society

Harmony in the Family – the Basic Unit of Human Interaction ,Trust' – the Foundational Value in Relationship , 'Respect' – as the Right Evaluation , Other Feelings, Justice in Human-to-Human Relationship **,** Understanding Harmony in the Society **,**Vision for the Universal Human Order

Module-IV

Harmony in the Nature/Existence

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels **,**The Holistic Perception of Harmony in Existence

Module-V

Implications of the Holistic Understanding – a Look at Professional Ethics

Natural Acceptance of Human Values , Definitiveness of (Ethical) Human Conduct ,A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies Strategies for Transition towards Value-based Life and Profession

Practical

Sharing about Oneself ,Exploring Human Consciousness**,** Exploring Natural Acceptance, Exploring the difference of Needs of Self and Body, Exploring Sources of Imagination in the Self, Exploring Harmony of Self with the Body, Exploring the Feeling of Trust **,** Exploring the Feeling of Respect , Exploring Systems to fulfill Human Goal, Exploring the Four Orders of Nature , Exploring Co-existence in Existence, Exploring Ethical Human Conduct Exploring Humanistic Models in Education Exploring Steps of Transition towards Universal Human Order

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Semester – II

Course Content

Semester-II

SL. No.	Category	Subject Code	Subject Name	Periods			Credits	Marks Distribution				
				L	T	P		Internal	External		Total	
								Max	Max	Min	Max	Min
1	**Basic Science Course**	BT201	Engineering Physics	4	0	0	**4**	30	70	21	100	35
2	**Basic Science Course**	BT202	Engineering Mathematics-II	3	1	0	**4**	30	70	21	100	35
3	**Engineering Science Course**	BT203	Basic Mechanical Engineering	2	0	0	**2**	30	70	21	100	35
4	**Engineering Science Course**	BT204	Basic Civil Engineering & Mechanics	3	0	0	**3**	30	70	21	100	35
5	**Engineering Science Course**	BT205	Programming for Problem Solving With C	2	0	0	**2**	30	70	21	100	35
	PRACTICAL DEMONSTRATION											
1	**Basic Science Course**	BT251	Engineering Physics Lab	0	0	2	**1**	30	20		50	25
2	**Engineering Science Course**	BT253	Basic Mechanical Engineering Lab	0	0	2	**1**	30	20		50	25
3	**Engineering Science Course**	BT255	Programming for Problem Solving with C Lab	0	0	4	**2**	30	20		50	25
4	**Engineering Science Course**	BT254	Basic Civil Engineering & Mechanics Lab	0	0	2	**1**	30	20		50	25
5	**Humanities and Social Science**	BT256	Language Laboratory	0	0	2	**1**	30	20		50	25
6	**Athletic Union**	BT257	Sports & NSS/Yoga	0	0	2	**1**	30	20		50	25
TOTAL				14	1	10	**22**					

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Semester – II

Course Content

Branch	Subject Title	Subject Code
B.Tech. Common	Engineering Physics	BT201

Course Objectives

1. To impart knowledge in basic concepts of physics relevant to engineering applications
2. To introduce advances in technology for engineering applications

Module-I

Wave Optics

Interference: Fresnel's biprism, Interference in thin films, Newton's rings and Michelson's interferometer experiments. Diffraction at single slit, double slit and n-slit. Diffraction grating. Rayleigh criterion, resolving power of a telescope, grating and prism. Concept of polarized light, Brewster's laws, Double refraction, Nicol prism, quarter & half wave plate. Idea about circularly & elliptically polarized light.

Module-II

Nuclear Physics

Nuclear Structure & Nuclear properties, Quantitative treatment of nuclear models: liquid drop and shell models, Linear Particle accelerator, Cyclotron, Synchrotron, Synchrocyclotron, and Betatron, Nuclear cross section, chainreaction, critical size. Application of E = mc2 ,Q-Value, Nuclear fusion & fission, Nuclear reactors, Geiger- Muller Counter, Bainbridge and Auston mass Spectrograph.

Module-III

Semiconductors & Nano-Physics

Free Electron model of solids, Qualitative Analysis of Kronig Penny model ,Effective mass, Fermi level for Intrinsic and Extrinsic Semiconductors: p-n junctions, Zener break down, photodiode, solar-cells, Hall effect. Elementary idea about Nano structures and Nano materials.

Module-IV

Laser and Fiber Optics

Laser: Stimulated and spontaneous emission, Einstein's A & B Coefficients, transition probabilities, active medium, population inversion, pumping, Optical resonators, characteristics of laser beam. Coherence, directionality and divergence. Principles and working of Ruby, Nd:YAG, He-Ne & Carbon dioxide Lasers with energy level diagram.. Fundamental idea about optical fiber, types of fibers, acceptance angle & cone, numerical aperture, V-number, propagation of light through step index fiber (Ray theory) pulse dispersion, attenuation, losses & various uses. Engineering uses & applications of laser and Optical Fiber

Module-V

Quantum Physics

Origin of Quantum hypothesis, DeBroglie's hypothesis of matter wave & its experimental verification. Group and particle velocities & their relations. Uncertainty principle with elementary proof & its application to Electron microscope, Compton effect. Wave function and its physical significance, general idea andapplication of time dependent and time independent Schrodinger wave equation.

Course Outcomes:-

1. To design and conduct simple experiments as well as analyze and interpret data in
2. engineering applications Capability to understand advanced topics in engineering
3. Identify formula and solve engineering problems
4. Apply quantum physics to electrical phenomena

List of suggestive core experiments: -

1. Biprism, Newton's Rings, Michelsons Interferometer.
2. Resolving Powers –Telescope, Microscope, and Grating.
3. G.M. Counter
4. Spectrometers-R.I., Wavelength, using prism and grating
5. Optical polarization based experiments: Brewster's angle, polarimeter etc.
6. Measurements by LASER-Directionality, Numerical aperture, Distance etc.
7. Uses of Potentiometers and Bridges (Electrical)..

8. Experiments connected with diodes and transistor.
9. Measurement of energy band gap of semiconductor.
10. Other conceptual experiments related to theory syllabus.

Books/References: -

1. Engineering Physics- V. S. Yadava, TMH
2. A T.B. of Optics by Brijlal and Subhraininyan.
3. Optics By Ghatak, TMH
4. Engineering physics by M.N. Avadhanulu and P.G. Kshirsagar. S. Chand & Co.
5. Fundamentals of engineering physics by P. Swarup, Laxmi Publications. Atomic and Nuclear physics by Brijlal and Subraminiyan.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Common For All Branches)

New Scheme Based On AICTE Flexible Curricula

Semester – II

Course Content

Branch	Subject Title	Subject Code
B.Tech. Common	**Engineering Mathematics-II**	**BT202**

Course Objectives

1. To elaborate the basic concepts of complex algebra and analysis for applications in engineering subjects.
2. To demonstrate the basics of numerical methods for different kind of interpolations; finding roots of algebraic and transcendental equations etc.
3. To demonstrate the basics of numerical differentiation and integrations and their applications
4. To display the theories of Laplace, Fourier transformations and their applications in differential equations.

Module-I

Ordinary Differential Equations I : Differential Equations of First Order and First Degree (Leibnitz linear, Bernoulli's, Exact), Differential Equations of First Order and Higher Degree, Higher order differential equations with constants coefficients, Homogeneous Linear Differential equations, Simultaneous Differential Equations.

Module-II

Ordinary differential Equations II: Second order linear differential equations with variable coefficients, Method of variation of parameters, Power series solutions; Legendre polynomials, Bessel functions ofthe first kind and their properties.

Module-III

Partial Differential Equations: Formulation of Partial Differential equations, Linear and Non-Linear Partial Differential Equations, Homogeneous Linear Partial Differential Equations with Constants Coefficients.

Module-IV

Vector Calculus: Differentiation of Vectors, Scalar and vector point function, Gradient, Geometrical meaning of gradient, Directional Derivative, Divergence and Curl, Line Integral, Surface Integral and Volume Integral, Gauss Divergence, Stokes and Green theorems.

Module-V

Functions of Complex Variable: Functions of Complex Variables: Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations (without proof), Line Integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for Evaluation of Real Integral (Unit Circle).

Course Outcomes:-Upon the completion of the course, the students will be able to:

1. Create the required mathematical foundation. He/she will be confident enough to solve various mathematical problems arising in their engineering problems and apply as per their requirement.
2. Identify the use of matrix theory to solve the system of linear equations and apply in various engineering problems Recall the concepts of eigenvalues and eigenvectors in future engineering applications.
3. Apply the knowledge of complex analysis for analyzing engineering problems and develop solution techniques for complex problems
4. Measure the techniques of integral equations to solve physical and other engineering problems

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Text books/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn.,Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
9. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.E. (Common for All Branches)

New Scheme Based On AICTE Flexible Curricula

Semester – II

Course Content

Branch	Subject Title	Subject Code
B.Tech. Common	**Basic Mechanical Engineering**	**BT203**

Course Objectives:

1. Gain fundamental knowledge of Thermodynamics, Fluid Mechanics and I.C. Engines.
2. Develop skills for material selection for different devices/ components.
3. Gain knowledge of steam formation and properties of steam.

Module-I

Materials: Classification of engineering material, Composition of Cast iron and Carbon steels, Iron Carbon diagram. Alloy steels their applications. Mechanical properties like strength, hardness, toughness , ductility, brittleness , malleability etc. of materials , Tensile test- Stress-strain diagram of ductile and brittle materials, Hooks law and modulus of elasticity, Hardness and Impact testing of materials, BHN etc.

Module-II

Measurement: Concept of measurements, errors in measurement, Temperature, Pressure, Velocity, Flow strain, Force and torque measurement, Vernier caliper, Micrometer, Dial gauge, Slip gauge, Sine-bar and Combination set.

Production Engineering: Elementary theoretical aspects of production processes like casting, carpentry, welding etc Introduction to Lathe and Drilling machines and their various operations.

Module-III

Fluids : Fluid properties pressure, density and viscosity etc. Types of fluids , Newton's law of viscosity , Pascal's law , Bernoulli's equation for incompressible fluids, Only working principle of Hydraulic machines, pumps, turbines, Reciprocating pumps .

Module-IV

Thermodynamics: Thermodynamic system, properties, state, process, Zeroth, First and second law of thermodynamics, thermodynamic processes at constant pressure, volume, enthalpy & entropy.

Steam Engineering: Classification and working of boilers, mountings and accessories of boilers, Efficiency and performance analysis, natural and artificial draught**,** steam properties, use of steam tables.

Module-V

Reciprocating Machines:

Working principle of steam Engine, Carnot, Otto, Diesel and Dual cycles P-V & T-S diagrams and its efficiency, working of Two stroke & Four stroke Petrol & Diesel engines. Working principle of compressor.

Course Outcomes:

1. Enhancement of fundamental knowledge of Thermodynamics.
2. Enhancement of fundamental knowledge of Fluid Mechanics and I.C. Engines.
3. Acquiring knowledge of materials and their properties for engineering applications
4. Enhancement of analytical skills by Learning different mechanism of machines.
5. Evaluate properties of steam. Demonstrate various types of boilers and their relative merits and demerits. Learning problem solving in particular domain

Books/References:

1- Kothandaraman & Rudramoorthy, Fluid Mechanics & Machinery, New Age . 2- Nakra & Chaudhary , Instrumentation and Measurements, TMH.

2- Nag P.K, Engineering Thermodynamics , TMH . 4- Ganesan , Internal Combustion Engines, TMH .

1. 5- Agrawal C M, Basic Mechanical Engineering ,Wiley Publication. 6- Achuthan M , , Engineering Thermodynamics ,PHI.

List of Suggestive Core Experiments:

Theory related Eight to Ten experiments including core experiments as follows:-

1- Study of Universal Testing machines.
2- Linear and Angular measurement using, Micrometer, Slip Gauges, Dial Gauge and Sine-bar.
3- Study of Lathe Machine.
4- Study of Drilling Machines.
5- Verification of Bernoulli's Theorem.
6- Study of various types of Boilers.
7- Study of different IC Engines.
8- Study of different types of Boilers Mountings and accessories.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Common For All Branches)

New Scheme Based On AICTE Flexible Curricula

Semester – II

Course Content

Branch	Subject Title	Subject Code
B.Tech. Common	**Basic Civil Engineering & Engineering Mechanics**	**BT204**

Course Objectives:

1. Gain fundamental knowledge of Building Materials, Fluid Mechanics and Timber
2. Gain fundamental knowledge of Surveying, GIS, Remote sensing
3. Gain knowledge of engineering mechanics,

Building Materials & Construction

Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing, Low cost housing building materials.

Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability

Module-II

Surveying & Positioning:

Introduction to surveying Instruments – levels, thedolites, plane tables and related devices. Electronic surveying instruments etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods, measurement of elevations by Different methods and different methods of leveling.

Module-III

Mapping & Sensing:

Mapping details and contouring, Profile Cross sectioning and measurement of areas, volumes, application of measurements in quantity computations, Survey stations, Introduction of remote sensing, GIS and GPS and its applications.

Engineering Mechanics

Module-IV

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non-concurring Co- planner forces, free Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses: Method of joints, Method of Sections. Frictional force in equilibrium problems

Module-V

Centre of Gravity and moment of Inertia: Centroid and Centre of Gravity, Moment Inertia of Area and Mass,Radius of Gyration, Introduction to product of Inertia and Principle Axes.

Support Reactions, Shear force and bending moment Diagram for Cantilever & simply supported beam with concentrated, distributed load and Couple.

Reference Books:

1. S. Ramamrutam & R. Narayanan; Basic Civil Engineering, Dhanpat Rai Pub.
2. Prasad I.B., Applied Mechanics, Khanna Publication.
3. Punmia, B.C., Surveying, Standard book depot.
4. Shesha Prakash and Mogaveer; Elements of Civil Engg & Engg. Mechanics; PHI
5. S.P,Timoshenko, Mechanics of stricture, East West press Pvt.Ltd.
6. Surveying by Duggal – Tata McGraw Hill New Delhi.
7. Introduction to GIS by Chang
8. Surveying and Leveling by N.M. Basak, McGraw Hill

List of suggestive core Experiments:

Students are expected to perform minimum ten experiments from the list suggested below by preferablyselecting experiments from each unit of syllabus.

S. No. Title

1. To perform traverse surveying with prismatic compass, check for local attraction and determine correctedbearings and to balance the traverse by Bowditch's rule.
2. To perform leveling exercise by height of instrument of Rise and fall method.
3. To measure horizontal and vertical angles in the field by using Theodolite.
4. To determine (a) normal consistency (b) Initial and Final Setting time of a cement Sample.
5. To determine the workability of fresh concrete of given proportions by slump test or compaction factortest.
6. To determine the Compressive Strength of brick.
7. To determine particle size distribution and fineness modulus of course and fine Aggregate.
8. To verify the law of Triangle of forces and Lami's theorem.
9. To verify the law of parallelogram of forces.
10. To verify law of polygon of forces

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B.Tech. (Common For All Branches)

New Scheme Based On AICTE Flexible Curricula

Semester – II

Course Content

Branch	Subject Title	Subject Code
B.Tech. Common	Programming for Problem Solving	BT205

Course objectives:

1. Design solutions to simple engineering problem by applying the basic programming principles of C language and basic mathematical knowledge.
2. Choose a suitable C-construct to develop C code for a given problem.
3. Recognize the bugs in the C program.
4. Apply the C-language syntax rules to correct the bugs in the C program.
6. Develop simple C programs to illustrate the applications of different data types such as arrays, pointers, functions.

Module-I

INTRODUCTION OF COMPUTERS: Computer System, System Characteristics and capabilities, Types of Computers: Analog, Digital (Micro, Mini, Mainframe & Super Computers), Generation of Computers.

COMPUTER ORGANISATION: Block Diagram of Computer and its functional units.

Module-II

INPUT DEVICES: KeyBoard, Scanner, Mouse, Light Pen, Bar Code Reader, OMR, OCR, MICR., Track ball, Joystick, Touch Screen etc.

OUTPUT DEVICES: Monitors – Classification of Monitors based on Technology (CRT Monitor & Flat panel LCD Monitor), Printers – Dot Matrix Printer, Ink Jet Printer, Laser Printer and Plotters, Types of Plotters – DrumPlotter and Flat Bed Plotters, LCD Projectors.

STORAGE DEVICES: Magnetic tapes, Floppy Disks, Hard Disks, Compact Disc – CD-ROM, CD-RW, VCD, DVD, DVD-RW.

PROGRAMMING LANGUAGES: History, Classifications – Low Level, Assembly & High Level languages, Advantages & Disadvantages Programming Languages.

Module-III

INTRODUCTION TO PROGRAMMING: Idea of Algorithm: steps to solve logical and numerical problems.Representation of Algorithm: Flowchart/Pseudocode with examples.

From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax andLogical Errors in compilation, object and executable code.

Module-IV

Arithmetic expressions and precedence, Conditional Branching and Loops, Writing and evaluation of conditionalsand consequent branching, Iteration and loops.

PROGRAM PLANNING: Purpose of Program Planning, Steps in Program Development, Characteristics of aGood Program, Algorithms, Flow Charts through examples.

Module-V

TYPES OF SOFTWARE: System Software – Translators (Compilers, Interpreters, Assemblers), Operating System, Linkers, Libraries & Utilities, Application Software – Packaged & Tailored Softwares.

OPERATING SYSTEMS: Introduction, Types of O.S. – Single User, Multi User – Multi Programming, MultiTasking, Real Time, Time Sharing, Batch Processing, Parallel Processing, Distributed Processing.

Course outcomes: After the completion of this course, students will be able to:

1. Illustrate and explain the basic computer concepts and programming principles of C language.
2. Develop C programs to solve simple mathematical and decision making problems.
3. Develop C programs to solve simple engineering problems using looping constructs.
4. Develop C programs to demonstrate the applications of derived data types such as arrays, pointers, strings and functions.

TEXT BOOK/ Reference:

1. COMPUTER FUNDAMENTALS BY *P.K. SINHA*
2. OPERATING SYSTEM BY *Peterson*
3. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
4. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
5. ASY APPROACH TO COMPUTER COURSE BY *G.K. IYER*
6. COMPUTER TODAY BY *S.K. BASANDRA*
7. OPERATING SYSTEM BY *Godbole*
8. 'O' LEVEL PROGRAMMING CONCEPTS & SYSTEMS BY *V.K. JAIN*
9. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Common For All Branches)

New Scheme Based On AICTE Flexible Curricula

Semester – II

Course Content

Branch	Subject Title	Subject Code
B.Tech. Common	**Spots and Yoga /NSS**	**BT257**

Course Objective:

1. To make the students understand the importance of sound health and fitness principles as they relate to better health.
2. To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness.
3. To create a safe, progressive, methodical and efficient activity based plan to enhance improvement and minimize risk of injury.
4. To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health.

Course Contents:

Module-I: Introduction to Physical Education

o Meaning & definition of Physical Education

o Aims & Objectives of Physical Education

o Changing trends in Physical Education

Module-II: Olympic Movement

o Ancient & Modern Olympics (Summer & Winter)

o Olympic Symbols, Ideals, Objectives & Values

o Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayanchand Award, Rajiv Gandhi Khel Ratna Award etc.)

Module-III: Physical Fitness, Wellness & Lifestyle

o Meaning & Importance of Physical Fitness & Wellness

o Components of Physical fitness

o Components of Health related fitness

o Components of wellness

o Preventing Health Threats through Lifestyle Change

o Concept of Positive Lifestyle

Module-IV: Fundamentals of Anatomy & Physiology in Physical Education, Sports and Yoga

o Define Anatomy, Physiology & Its Importance

o Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)

Module-V: Kinesiology, Biomechanics & Sports

o Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports

o Newton's Law of Motion & its application in sports.

o Friction and its effects in Sports.

Practical

1. To practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation.
2. To learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.
3. To learn breathing exercises and healthy fitness activities
5. To understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination.
6. To perform yoga movements in various combination and forms.
7. To assess current personal fitness levels.
8. To identify opport Moduleies for participation in yoga and sports activities.
9. To develop understanding of health-related fitness components: cardiorespiratory endurance, flexibility and body composition etc.
10. To improve personal fitness through participation in sports and yogic activities.
11. To develop understanding of psychological problems associated with the age and lifestyle.
12. To demonstrate an understanding of sound nutritional practices as related to health and physical performance.
13. To assess yoga activities in terms of fitness value.
14. To identify and apply injury prevention principles related to yoga and physical fitness activities.

Text Books/References:

1. Modern Trends and Physical Education by Prof. Ajmer Singh.

2. Light on Yoga by B.K.S. Iyengar.

3. Health and Physical Education – NCERT (11th and 12th Classes)

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Common For All Branches)

New Scheme Based On AICTE Flexible Curricula

Semester – II

Course Content

Branch	Subject Title	Subject Code
B.Tech. Common	**Language Laboratory**	**BT256**

Course Objective: The purpose of a language lab is to involve students to actively participate in language learning exercises and get more practice than the traditional classroom environment.

Communicative Language Laboratory: Course objective: The language laboratory focuses on the practice of English through audio-visual aids and Computer software. It intends to enable the students to speak English correctly with confidence and intends to help them to overcome their inhibitions and self –consciousness while speaking in English.

Topics to be covered in the Language laboratory sessions:

1. Listening Comprehension
2. Pronunciation, Intonation, Rhythm
3. Practicing everyday dialogues in English
4. Interviews
5. Formal Presentation
6. Public Speaking and oral skills with emphasis on conversational practice, extempore speech, JAM (Just a minute sessions), describing objects and situations, giving directions, debate, telephonic etiquette.

Books/References:-

(i) Practical English Usage. Michael Swan. OUP. 1995.

(ii) Remedial English Grammar. F.T. Wood. Macmillan.2007

(iii) On Writing Well. William Zinsser. Harper Resource Book. 2001

(iv) Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

(v) Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.

(vi) Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – III

New Scheme Based On AICTE Flexible Curriculam

Course Contents

Semester-III

SL. No.	Category	Subject Code	Subject Name	Periods			Credits	Marks Distribution				
				L	T	P		Internal	External		Total	
								Max	Max	Min	Max	Min
1	**Basic Science Course**	BT301	Engineering Mathematics – III	4	0	0	**4**	30	70	21	100	35
2	**Professional Core Course**	CEP 302	Engineering Geology	3	0	0	**3**	30	70	21	100	35
3	**Professional Core Course**	CEP 303	Strength of Materials	3	1	0	**4**	30	70	21	100	35
4	**Professional Core Course**	CEP 304	Building Design and Drawing	2	0	0	**2**	30	70	21	100	35
5	**Engineering Science Course**	CES 305	Object Oriented Programming withC++	2	0	0	**2**	30	70	21	100	35
6	**Basic Science Course**	BT 306	Environmental Science	2	0	0	**2**	30	70	21	100	35
							PRACTICAL DEMONSTRATION					
1	**Professional Core Course**	CEP 353	Strength of Materials Lab	0	0	2	**1**	30	20		50	25
2	**Professional Core Course**	CES354	Building Design and Drawing	0	0	2	**1**	30	20		50	25
3	**Engineering Science Course**	MES355	Object Oriented Programming with C++ Lab	0	0	2	**1**	30	20		50	25
4	**EXTRA ACTIVITY**	BT357	Extra Activities (NSO/NSS/NCC/Yoga/Creative Arts /Mini Project)	0	0	2	**1**	30	20		50	25
TOTAL							**21**					

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – III

New Scheme Based On AICTE Flexible Curriculam

Course Contents

Branch	Subject Title	Subject Code
B.Tech. CE	**Engineering Mathematics-III**	**BT301**

Course Objective

1. To develop logical understanding of the subject.
2. To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from engineering fields.
3. To make aware students about the importance and symbiosis between Mathematics and Engineering.

Module-I

Fourier series: Introduction of Fourier series, Fourier series for Discontinuous functions, and Fourier series for even and odd function. Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations.

Module-II

Difference Operators, Interpolation (Newton Forward & Backward Formulae, Central Interpolation Formulae, Lagrange's and divided difference formulae), Numerical Differentiation and Numerical Integration.

Module-III

Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regula Falsi, Newton-Raphson, Iterative, Secant Method), Solution of simultaneous linear equations by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods.

Module-IV

Solution of Ordinary Differential Equations (Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method), Correlation and Regression, Curve Fitting (Method of Least Square).

Module-V

Concept of Probability: Probability: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Testing of Hypothesis |: Students t-test, Fisher's z-test, Chi-Square Method.

Course Outcomes:-

i) Student will demonstrate basic knowledge of L.D.E.,P.D.E., Vector & F.T.

ii) Student will show the understanding of impact of Engg. Mathematics on Mech.

iii) Student will demonstrate their understanding of mathematical ideas from multiple perspectives, such as by (a) using the internal connections between geometry, algebra, and numerical computation, (b) applying the connections between theory and applications, or (c) distinguishing between a formal proof and a less formal arguments and understanding the different roles these play in mathematics.

Books/References

(i) Higher Engineering Mathematics by BS Grewal, Khanna Publication
(ii) Advance Engineering Mathematics by D.G.Guffy
(iii) Mathematics for Engineers by S. Arumungam, SCITECH Publication
(iv) Engineering Mathematics by S S Sastri. P.H.I.
(v) Numerical Methods for Scientific and Engg. Computation by MK Jain, Iyengar and RK Jain, New AgeInternational Publication
(vi) Mathematical Methods by KV Suryanarayan Rao, SCITECH Publuication
(vii) Probability and Statistics by Ravichandran, Wiley India
(viii) Mathematical Statistics by George R., Springer

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Civil Engineering) Semester – III

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech. (CE)	**Engineering Geology**	**CEP302**

Objectives

The main objectives of the course are:

1- Study the formation of the earth sphere.

2- Initial structure of the earth.

3- Crystal system and how the minerals crystallized in different systems.

4- Different type of the minerals, with studies the optical and cohesive properties of the minerals.

5- Study the rocks and rock cycle.

Module-I

Basic Geology:

General Geology, Mineralogy, Petrology (igneous, sedimentary and metamorphic), Structural geology, Crystallography.

Module-II

Engineering properties of rocks :

Geomorphology (Geomorphic processes weathering, Erosion, Origin and formation of solids).

Module-III

Geological hazards

(landslides, earthquakes and volcanoes), Groundwater, Recent concepts in Geology, Plate tectonics and Sea – floor spreading.

Module-IV

Applied Geology:

Geophysical mapping: seismic, resistivity, gravity, radar, geotomography, logging; Geological exploration of an engineering site.

Module-V

S. I. Desk Study: Site investigation Boreholes: Remote sensing, GIS and GPS: Basic principle and their Applications in studying and monitoring Lithosphere, Hydrosphere, Cryosphere and Atmosphere.

Module-VI

Cut Slopes in rocks and clays;

Geological factors affecting the construction of dams, reservoirs and tunnels.Criteria and factors for site selection for Dam, tunnels, waste/radioactive disposal sites, Indian Geology, Outline of stratigraphy of India.

Course outcomes

1) As a students in the Bachelor of Engineering (Civil Engineering) will undertake courses in geology Such as Rock and mineral.
2) Students are able to understand the different geological structures and their impact on civil engineering structure.
3) Students are able to decide the suitable site selection for civil engineering structures
4) Students are able to know the different geological hazards and its mitigation
5) Students are able to understand the different method of geological exploration
6) Students are able to identify the different rocks and minerals based on their property
7) Students are able to understand the use of different rock and mineral

Text Books/References:

1. Principles of Engineering Geology by Johnston. R. B. and DeGraff. J. V., John Wiley and Sons, New York.
2. Fundamental of Engineering Geology by Waltham, T., Spon Press, London.
4. A Textbook of Engineering and general Geology by Singh. P., S. K. Kataria and Sons, New Delhi.
5. A Textbook of Geology by Mukherjee P. K., Te world press Pvt. Ltd., Kolkata.
6. Engineering Geology by D V Reddy, Vikash Publishing House Pvt. Ltd.
7. Element of Mineralogy in Engineering Geology by Read, H. H. Rutley's, CBS Publisher.
8. Experiments in Engineering Geology by Gokhale, K. V. G. K. and Roa, D. M., Tata McGraw Hill.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – III

New Scheme Based On AICTE Flexible Curriculam

Branch	Subject Title	Subject Code
CE	**Strength of Materials**	**CEP 303**

Course Objectives

To provide basic knowledge in mechanics of materials so that the students can solve real engineering problems and design engineering systems.

Course Objective

Module-I

Simple Stress and Strains: Concept of Elastic body, stress and Strain, Hooke's law, various types of stress and strains, Elastic constants, Stresses in ompound bars, composite and tapering bars, Temperature stresses. Complex Stress and Strains: Two dimensional and three dimensional stress system. Normal and tangential stresses, Principal Planes, Principal Stresses and strains, Mohr's circle of stresses, Combined Bending and Torsion, Theories of failure

Module-II

Bending & Deflection: Theory of simple bending: Concept of pure bending and bending stress, Equation of bending. Neutral axis, Section-Modulus, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed loading. Bending & shear stress distribution across a section in Beams. Deflection of beams: Double Integration Method. Conjugate Beam Method, Macaulay's Method Area Moment Method.

Module-III

Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow shafts, Open and closed coil springs, Leaf Spring, Spiral Spring, Pressure Vessels: Thin and Thick walled cylinders and spheres. Stress due to internal pressure, Change in diameter and volume, Compound cylinders and shrink fittings.

Module-IV

Unsymmetrical Bending: Principal moment of Inertia, Product of Inertia, Bending of a beam in a plane which is not a plane of, symmetry. Shear center; Curved beams: Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis.

Module-V

Columns and Struts: Euler's buckling load for uniform section, various end conditions, slenderness Ratio, Stress in columns, Rankine formulae, Eccentric loading on columns.

Course Outcomes Students who successfully complete this course will have demonstrated ability to:

1. Understand the concepts of stress and strain at a point as well as the stress-strain relationships for homogenous, isotropic materials.
2. Calculate the stresses and strains in axially-loaded members, circular torsion members, and members subject to flexural loadings.
3. Calculate the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels.
4. Determine the stresses and strains in members subjected to combined loading and apply the theories of failure for static loading.
5. Determine and illustrate principal stresses, maximum shearing stress, and the stresses acting on a structural member.
6. Determine the deflections and rotations produced by the three fundamental types of loads: axial, torsional, and flexural.
7. Analyze slender, long columns subjected to axial loads. (a, e) 8. Design simple bars, beams, and circular shafts for allowable stresses and loads.

Books/Reference

1. Nash; Strength of Materials (Schaum), TMH.
2. Rattan SS; strength of Materials; TMH
3. Negi; Strength of materials; TMH
4. Sadhu Singh; Strength of Materials, ,
5. Ramamrutham; Strength of Materials, ,
6. Subramaniam; Strength of Materials; R; Oxford
7. National Building Code of India, Part-IV

List of Experiments

The experimental work to cover:- tension, compression, bending and impact test etc. on steel, cast iron, RCC and timber, Fire Resistant Test of Structures and Combustibility of Building Materials Test as per I.S.I. and other experiments based on the syllabus.

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Civil Engineering) Semester – III

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.TECH CE	**Building Design & Drawing**	**CEP 304**

COURSE OBJECTIVE

To understand the concept of building planning and architecture. To understand the various building codes to be followed while planning a building. To have the knowledge of various building component**s**

Module-I

Conventions and Symbols: Conventions as per IS 962, symbols for different materials such as earth work, brick work, Stone work, concrete, wood work and glass. Graphical symbols for doors and windows, Abbreviations, symbols for sanitary and electrical installations.Types of lines- visible lines, centre line, hidden line, section line, dimension line, extension line, pointers, arrow head or dots. Appropriate size of lettering and numerals for titles, sub-titles notes and dimensions.Types of scale, criteria for Proper Selection of scale for various types of drawing.

Sizes of various standard papers/sheets.

Module-II

Drawing of Building Elements – Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

Module-III

Building Planning – Provisions of National Building Code, Building bye-laws, open area, set backs, FAR terminology, principle of architectural composition (i.e. unity, contrast, etc.), principles of planning, orientation.

Module-IV

Building Services – Introduction of Building Services like water supply and drainage, electrification, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings. Design and Drawing of Building – Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, detailing of doors, windows, ventilators and staircases etc.

Module-V

Vastushastra:- Introduction of Vastushastra , Definition of Vastu , Importance of Vastu , Scientific Explanation about Vastushastra , Role of Vastushastra in today's life

COURSE OUTCOME

1. Understanding of building planning, orientation, drawing and architectural aspects.
2. Representation of a building on Pape

Book/ References

1. Malik & Meo; Building Design and Drawing By
2. Shah, Kale & Patki; Building Design and Drawing; TMH
3. Gurucharan Singh & Jgdish Singh Building Planning, Design and Scheduling

List of Experiments (Expandable)

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators, lintels andarches stairs foundations etc.
3. One drawing sheet each for services and interiors of buildings.
4. One drawing sheet containing detailed planning of one/two bed room residential building (common to allstudent)
5. One drawing sheet each of residential and institutional building (Each student perform different drawing).

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Civil Engineering) Semester – III

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech. CE	Environmental Science	BT306

Course Objectives

1. To study about environment and ecosystems
2. To study about different types of natural resource.
3. Knowledge and concept of biodiversity and its conservation.
4. Basic knowledge and concept of causes, effect and control of different type of environmental pollution.
5. To study population growth and its impact on environment

Module-I: Introduction to environmental studies and Ecosystems

Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development, ecosystem, Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession, Case studies of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Module-II: Natural Resources: Renewable and Non-renewable Resources

Land resources and land use change; Land degradation, soil erosion and desertification, Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations, Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state), Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Module- III: Biodiversity and Conservation & Environmental Pollution

Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversitypatterns and global biodiversity hot spots, India as a mega-biodiversity nation; Endangered and endemic species of India, Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation , Environmental pollution: types, causes, effects and controls; Air, water, soil

and noise pollution ,Nuclear hazards and human health risks ,Solid waste management: Control measures of urban and industrial waste ,Pollution case studies.

Module-IV: Environmental Policies- Practices and Human communities

Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture, Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD), Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons; case studies, Disaster management: floods, earthquake, cyclones and landslides. Case studies (e.g., factory pollutioning Ranchi)

COURSE OUTCOMES

1. Gain knowledge about environment and ecosystem.
2. Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
3. Gain knowledge about the conservation of biodiversity and its importance.
4. Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.
5. Students will learn about increase in population growth and its impact on environment

Reference Books·

1. Encyclopedia of Environment and Society by Paul Robbins (Editor) · Encyclopedia of World Environmental History by Shepard Krech
2. Bibliography Dey A. K., Environmental Chemistry, Willey Eastern Pvt. Ltd, New Delhi. Dr. Bharucha Erach, Text Book of Environmental Studies for UG Course,

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – III

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech. CE	Object Oriented Programming with c++	**BT305**

COURSE OBJECTIVES

1. Introduce the student to the concepts of C++ in computer science.
2. Acquire knowledge to make functions , Files etc.

COURSE CONTENT

Module-I

Introduction to C++ and Object oriented Concepts C++ Standard Library, Basics of a Typical C++ Environment, Pre- processors Directives, illustrative Simple C++ Programs. Header Files and Namespaces, library files. Introduction to Objects and Object Oriented Programming, Encapsulation (Information Hiding), Access Modifiers: Controlling access to a class, method, or variable (public, protected, private, package), Other Modifiers, Polymorphism: Overloading, Inheritance, Overriding Methods, Abstract Classes, Reusability, Class's Behaviors.

Module-II

Classes and Data Abstraction:

Introduction, Structure Definitions, Accessing Members of Structures, Class Scope and accessing Class Members, Separating Interface from Implementation, Controlling Access Function And Utility Functions, Initializing Class Objects: Constructors, Using Default Arguments With Constructors, Using Destructors, Classes : Const (Constant) Object And Const Member Functions, Object as Member of Classes, Friend Function and Friend Classes, Using This Pointer, Dynamic Memory Allocation with New and Delete, Static Class Members, Container Classes And Integrators, Proxy Classes, Function overloading.

Module-III

Operator Overloading, Inheritance, and Virtual Functions and Polymorphism: Fundamentals of Operator Overloading, Restrictions On Operators Overloading, Operator Functions as Class Members vs. as Friend Functions,Overloading, <<, >> Overloading Unary Operators, Overloading Binary Operators. Introduction to Inheritance, Base Classes And Derived Classes, Protected

Members, Casting Base- Class Pointers to Derived- Class Pointers, Using Member Functions, Overriding Base – Class Members in a Derived Class, Public, Protected and Private Inheritance, Using Constructors and Destructors in derived Classes, Implicit Derived –Class Object To Base-Class Object Conversion, Composition Vs. Inheritance. Introduction to Virtual Functions, Abstract Base Classes And Concrete Classes, Polymorphism, New Classes And Dynamic Binding, Virtual Destructors, Polymorphism, Dynamic Binding.

Module-IV

Files and I/O Streams and Templates and Exception Handling:

Files and Streams, Creating a Sequential Access File, Reading Data From A Sequential Access File, Updating Sequential Access Files, Random Access Files, Creating A Random Access File, Writing Data Randomly To a Random Access File, Reading Data Sequentially from a Random Access File. Stream Input/ Output Classes and Objects, Stream Output, Stream Input, Unformatted I/O (with read and write), Stream Manipulators, Stream FormatStates, Stream Error States.

Function Templates, Overloading Template Functions, Class Template, Class Templates and Non-Type Parameters, Templates and Inheritance, Templates and Friends, Templates and Static Members. Introduction, Basics of C++ Exception Handling: Try Throw, Catch, Throwing an Exception, Catching an Exception, Re throwing an Exception,Exception specifications, Processing Unexpected Exceptions, Stack Unwinding, Constructors, Destructors and Exception Handling, Exceptions and Inheritance.

COURSE OUTCOMES

1. Knowledge of programming language.
2. Be aware about OOP’s concept..
3. Basic understanding on programming.

Text Book/References

1. C++ How to Program by H M Deitel and P J Deitel, 1998, Prentice Hall
2. Object Oriented Programming in Turbo C++ by Robert Lafore, 1994, The WAITE Group Press.3.Programming with C++ By D Ravichandran, 2003, T.M.H
3. 1.Object oriented Programming with C++ by E Balagurusamy, 2001, Tata McGraw-Hill 2.Computing Concepts with C++ Essentials by Horstmann, 2003, John Wiley,
4. The Complete Reference in C++ By Herbert Schildt, 2002, TMH

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Civil Engineering) Semester – IV

New Scheme Based On AICTE Flexible Curriculam

Course Content

Semester-IV

SL. No.	Category	Subject Code	Subject Name	Periods			Credits	Marks Distribution				
				L	T	P		Internal	External		Total	
								Max	Max	Min	Max	Min
1	**Professional Core Course**	CEP 401	Geotechnical Engineering	3	1	0	**4**	30	70	21	100	35
2	**Professional Core Course**	CEP 402	Structural Analysis	3	1	0	**4**	30	70	21	100	35
3	**Professional Core Course**	CEP 403	Surveying	3	0	0	**3**	30	70	21	100	35
4	**Professional Core Course**	CEP 404	Fluid Mechanics	2	1	0	**3**	30	70	21	100	35
5	**Professional Elective Course**		Professional Elective-I	3	0	0	**3**	30	70	21	100	35
Professional Elective-I												
1	**Professional Elective Course**	CEPE 405	Disaster Preparedness & Planning	3	0	0	**3**	30	70	21	100	35
2	**Professional Elective Course**	CEPE 406	Civil Engineering - Societal & Global Impact									
3	**Professional Elective Course**	CEPE 407	Structural Dynamics									
PRACTICAL DEMONSTRATION												
1	**Professional Core Course**	CEP 451	Geotechnical Engineering Lab	0	0	2	**1**	30	20		50	25
2	**Professional Core Course**	CEP 453	Surveying	0	0	2	**1**	30	20		50	25
3	**Professional Core Course**	CEP 454	Fluid Mechanics Lab	0	0	2	**1**	30	20		50	25
	INTERNSHIP	IN456	Internship/Tour & Training/Industr ialtraining	0	0	0	**1**					
TOTAL							**21**					

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Semester – IV

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	**Subject Title**	**Subject Code**
B.Tech. CE	Geotechnical Engineering	CEP 401

Course Objectives: This course will enable students

1. To appreciate basic concepts of soil mechanics as an integral part in the knowledge of civil engineering. Also to become familiar broadly with geotechnical engineering problems such as, foundation engineering, flow of water through soil medium and terminologies associated with geotechnical engineering.
2. To know the basic engineering properties and the mechanical behaviour of different types of soil. This includes strength-deformation characteristics under shearing stresses. Also consolidation properties of clayey soils.
3. To determine the improvement in mechanical behaviour by densification of soil deposits using compaction.
5. To know how the properties of soils that can be measured in the lab

Module-I

Fundamentals of Soil Mechanics -Introduction: Three-phase system : – soil solids, water and air; Basic definitions and functional relationships : -Specific gravity; Void ratio; Porosity; water content; Unit Weights & Density : -bulk, dry, saturated, submerged and natural; Degree of saturation & Density index ; Structure of soil; soil texture:- Size, range and shapes of individual soil particles; field identification of soils, Particles size distribution: Sieve analysis; distribution curve characteristics; grain size analysis for fine-grained and mixed soils; use of hydrometer; Consistency limits and indices; Activity and Sensitivity of clays. Classification of Soils.

Module-II

Soil Moisture Relationships - Capillarity in soils; Free and adsorbed water; Permeability of soils: Darcy's Law; Determination of coefficient of permeability by constant head & falling head tests, Permeability of stratified soil deposits. Factors affecting permeability; Seepage Analysis: Head, Gradient & Potential, Seepage pressure. Two dimensional flow -Laplace equation; Phreatic line in

Earth dams; Graphical method of flow net construction: for flow below sheet piles, earth dams with or without core / filter; Seepage discharge across hydraulic structures; Flow net – electrical analogy; Pore water pressure and the concept of effective stress; Quick sand condition, Difference between Compaction and Consolidation; Compaction tests : Standard and Modified Proctor ; Factors affecting compaction; Field compaction; One-dimensional consolidation –spring analogy; Terzaghi's theory of one-dimensional consolidation; Consolidation of undisturbed & remoulded soils; Laboratory consolidation test – analysis and results; Coefficient of volume change, Coefficient of consolidation, Compression index, Degree of consolidation; Secondary consolidation

Module-III

Shear Strength Measurement of shear strength –Unconfined strength test; Direct shear tests; Vane shear test and Triaxial tests –strain-controlled tests; Concepts of both Unconsolidated and Consolidated specimens subjected to shear without drainage (with or without pore water pressure measurement); drained shear; Mohr strength envelopes for Total and Effective stresses; MohrCoulomb failure theory

Module-IV

Terminology: Ultimate and Safe Bearing Capacities; Allowable Bearing Pressure Gross and Net Bearing Capacities; Net Soil pressure for a specified settlement; Bearing capacity from equations of Terzaghi, Skempton, and Meyerhoff; I. S. Code of Practice; Bearing capacity from N-values; Effect of ground water table, Plate Load test: Procedure& Limitations, determination of permissible bearing capacity for footings in sand and clay soils, Eccentrically loaded footings – useful width concept

Course Outcomes: -

1) Students are able to classify soils

2) Students are able to know how water affect the soil parameters

3) Students are able to understand the compaction, consolidation and shear strength parameters of soil.

4) Students are able to calculate the compaction, consolidation and shear strength of soil

Text/ Reference Books:

1. Soil Mechanics by Craig R.F., Chapman & Hall
2. Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
3. An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ
4. Principles of Geotechnical Engineering, by Braja M. Das, Cengage Learning
5. Principles of Foundation Engineering, by Braja M. Das, Cengage Learning

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – IV

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech. CE	Structural Dynamics	CEPE407

Course Objectives: This course will enable students to

1. Understand the behavior of structure especially building to various dynamic loads: such as wind, earthquake, machine vibration and ambient vibration
2. Basic understanding of structural analysis and knowledge of engineering mathematics.
3. Understand response of a single degree of freedom system to dynamic excitation and Vibration Control Techniques.

Module-I: O**bjective of structural dynamic analysis** - types of prescribed loading - essential Characteristics of a dynamic problem - method of dis- cretization: lumped mass procedure - generalized displacements - the finite-element

Module-II: Single degree of freedom systems: Components of the basic dynamic system formulation of the equations of motion - direct equilibration using D'Alembert's principle - principle of virtual displacements - generalized SDOF systems - rigid body assemblage

Module-III: Free vibration response: Solution of the equation of motion – undamped free vibrations - damped free vibrations - critical damping – under damped systems – over damped systems - negative damping

Module-IV Response to harmonic loading: Undamped system complementary solution - particular solution - general solution - response ratio - damped system – resonant

Module- V: Response to periodic loading: Fourier series expression of the loading - response to the fourier series loading - exponential form of fourier series solution

Module-VI: Response to impulsive loads: General nature of impulsive loads - sine-wave impulse – rectangular impulse - triangular impulse - shock load.

Module-VII: Response to general dynamic loading: Duhamel integral for an undamped system – numerical evaluation of the duhamel integral for an undamped system - response of damped

systems - response

Analysis through the frequency domain

Module-VIII: Multi degree of freedom systems: Formulation of the MDOF equations of motion - selection of the degrees of freedom - orthogonality conditions - normal co-ordinates - uncoupled equations of motion - undamped & damped - mode superposition procedure

Module-IX: Continuous parameter systems: Vibration analysis by Rayleigh's method - basis of the method - approximate analysis of a general system - selection of the vibration shape - improved Rayleigh method

Module-X Practical vibration analysis: Preliminary comments - stodola method - fundamental mode analysis – proof of convergence - analysis of second mode - analysis of third and higher modes – analysis of highest mode - Rayleigh's method in discrete co-ordinate systems.

Course Outcomes: -

Structural dynamics is a basic course in defining and understanding dynamic problems mainly related to civil engineering. Prerequisite knowledge acquired from the courses Mechanics 2 TKT 4122/4123 is assumed. The course is intended to provide necessary knowledge to establish the equations of motion and for the determination of structural response from dynamic loads and experience in the modeling and calculation of dynamic response for simple structural systems. Structural dynamics aims at the following learning outcomes

Books/References:

1. Clouch R.W. & Penzien J., Dynamics of Structures, McGraw Hill
2. Weaver W., Jr. Timoshenko S.P., Young D.H, Vibration Problem in Engineering, John Wiley
3. Meivovitch L., Elements of Vibration Analysis, McGraw Hill
4. Seto W.W., Mechanical Vibrations, Schaum's Outline Series, McGraw Hill
5. Srinivasan P., Mechanical Vibration Analysis, Tata McGraw Hill
6. A K Chopra; Dymanics of Structures; Prentice-Hall
7. Earthquake Resistant Design of Structures; Pankaj Agrawal, Manish Shrikhande; Prentice Hall of India

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – IV

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech. CE	Disaster Preparedness & Planning	CEPE405

Course objectives

i) To Understand basic concepts in Disaster Management

ii) To Understand Definitions and Terminologies used in Disaster Management

iii) To Understand Types and Categories of Disasters

iv) To Understand the Challenges posed by Disasters

v) To understand Impacts of Disasters Key Skills

Module-I

Introduction - Concepts and definitions: disaster, hazard, vulnerability, risks- severity, frequency and details, capacity, impact, prevention, mitigation).

Module-I

Disasters - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

Module-III

Disaster Impacts - Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

Module-IV

Disaster Risk Reduction (DRR) - Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Postdisaster environmental response (water, sanitation, food safety, waste management, disease control, security,

communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

Module-V

Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental

Friendly recovery; reconstruction and development methods.

Course Outcomes: -

1. Students having acquired on the basic knowledge and information on DRR and CC are well prepared to respond to such hazards.
2. Students disseminate the acquired knowledge, skills and techniques with the people living in and around them.
3. Better safeguard their lives structural and nonstructural elements at risk in pre, during and post disasters situation with the knowledge acquired.

Text/Reference Books:

(i) http://ndma.gov.in/ (Home page of National Disaster Management Authority)

(ii) http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).

(iii) Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.

(iv) Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.

(v) Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation

(vi) Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – IV

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech. CE	Civil Engineering - Societal & Global Impact	CEPE406

Course Objectives

1. Awareness of the importance of Civil Engineering and the impact it has on the Society and at global levels
2. Awareness of the impact of Civil Engineering for the various specific fields of human endeavour
3. Need to think innovatively to ensure Sustainability

Module-I

Introduction to Course and Overview; Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution; Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Ecosystems in Society and in Nature; the steady erosion in Sustainability; Global warming, its impact and possible causes; Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis;

Module-II

Understanding the importance of Civil Engineering in shaping and impacting the world; The ancient and modern Marvels and Wonders in the field of Civil Engineering; Future Vision for Civil Engineering

Module-III

Infrastructure - Habitats, Megacities, Smart Cities, futuristic visions; Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy); Water provisioning; Telecommunication needs (towers, above-ground and underground cabling); Awareness of

various Codes & Standards governing Infrastructure development; Innovations and methodologies for ensuring Sustainability;

Module-IV

Environment- Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution; Global warming phenomena and Pollution Mitigation measures, Stationarity and nonstationarity; Environmental Metrics & Monitoring; Other Sustainability measures; Innovations and methodologies for ensuring Sustainability

Module-V

Civil Engineering Projects – Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; New Project Management paradigms & Systems (Ex. Lean Construction), contribution of Civil Engineering to GDP, Contribution to employment(projects, facilities management), Quality of products, Health & Safety aspects for stakeholders; Innovations and methodologies for ensuring Sustainability during Project development;

Course Outcomes:

1. The impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently and effectively.
2. The extent of Infrastructure, its requirements for energy and how they are met: past, present and future
3. The Sustainability of the Environment, including its Aesthetics,
4. The potentials of Civil Engineering for Employment creation and its Contribution to the GDP

Text/Reference Books:

(i) *Žiga* Turk (2014), Global Challenges and the Role of Civil Engineering, Chapter 3 in: Fischinger M. (eds) Performance-Based Seismic Engineering: Vision for an

(ii) Earthquake Resilient Society. Geotechnical, Geological and Earthquake Engineering, Vol. 32. Springer, Dordrecht

(iii) Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social,

(iv) Economical and Working Environment, 120th ASEE Annual Conference and Exposition

(v) NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer 2004.

(vi) Allen M. (2008) Cleansing the city. Ohio University Press. Athens Ohio.

(vii) Ashley R., Stovin V., Moore S., Hurley L., Lewis L., Saul A. (2010). London Tideway Tunnels Programme – Thames Tunnel Project Needs Report – Potential source control and SUDS applications: Land use and retrofit options

(viii) http://www.thamestunnelconsultation.co.uk/consultation-documents.aspx

(ix) Ashley R M., Nowell R., Gersonius B., Walker L. (2011). Surface Water Management and Urban Green Infrastructure. Review of Current Knowledge. Foundation for Water Research FR/R0014

(x) Barry M. (2003) Corporate social responsibility – unworkable paradox or sustainable paradigm? Proc ICE Engineering Sustainability 156. Sept Issue ES3 paper 13550. p

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – IV

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
CE	**Fluid Mechanics**	**CEP 404**

Course Objectives

The objective of this course is to introduce the concepts of fluid mechanics useful in Civil Engineering applications. The course provides a first level exposure to the students to fluid statics, kinematics and dynamics. Measurement of pressure, computations of hydrostatic forces on structural components and the concepts of Buoyancy all find useful applications in many engineering problems. A training to analyse engineering problems involving fluids – such as those dealing with pipe flow, open channel flow, jets, turbines and pumps, dams and spillways, culverts, river and groundwater flow - with a mechanistic perspective is essential for the civil engineering students. The topics included in this course are aimed to prepare a student to build a good fundamental background useful in the application-intensive courses covering hydraulics, hydraulic machinery and hydrology in later semesters.

Module - I: Basic Concepts and Definitions – Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Module - II: Fluid Statics - Fluid Pressure: Pressure at a point, Pascals law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

Module-III:Fluid Kinematics- Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three -dimensional continuity equations in Cartesian coordinates.

Module - IV: Fluid Dynamics- Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced;

Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber *Number and Euler Number; Buck ingham's* π-Theorem.

Module - V: **Laminar Flow**-Laminar flow through :circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity

Module - VI: Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity, Rayleigh method, Buckingham's Pi method and other methods. Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model

Studies to fluid flow problem. Dynamic Similitude- Definitions of Reynolds Number, Froude Number, Mach number, Weber *Number and Euler Number.*

Module - VII: Flow through Pipes: Loss of head through pipes, Darcy- Wies batch equation, minor losses, total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel, flow through laterals, flows in dead end pipes, siphon, power transmission through pipes, nozzles. Analysis of pipe networks: Hardy Cross method, water hammer in pipes and control measures, branching of pipes, three reservoir problem

Module - VIII Turbulent Flow- Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes, Moody's diagram

Course Outcomes

1. Student are able to understand the fluid characteristics and their application in different material manufacturing industry
2. Student are able to measure the pressures at various conditions with different types of pressure measuring devices
3. Students are able to calculate the discharges of fluid
4. Student are able to calculate the force acting on submerged bodies

Lab Experiments

1. Measurement of viscosity
2. Study of Pressure Measuring Devices
3. Stability of Floating Body
5. Hydrostatics Force on Flat Surfaces/Curved Surfaces
6. Verification of Bernoulli‘s Theorem
7. Venturimeter
8. Orifice meter
9. Impacts of jets
10. Flow Visualisation -Ideal Flow
11. Length of establishment of flow
12. Velocity distribution in pipes
13. Laminar Flow

Text/Reference Books:

1. Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010.
2. Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Standard Book House.
3. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
4. Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J.

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – IV

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
CE	**Surveying**	**CEP- 403**

Course Objectives: This course will enable students to;

1. Understand the basic principles of Surveying
2. Learn Linear and Angular measurements to arrive at solutions to basic surveying problems.
3. Employ conventional surveying data capturing techniques and process the data for computations.
4. Analyze the obtained spatial data to compute areas and volumes and draw contours to represent 3D data on plane figures.

Module-I

Chain Surveying-Introduction, Types of surveying, types of chain, tapes, Principle of survey, Errors and Obstacles in chain survey; Compass surveying, Bearings, Traversing, Magnetic declination; introduction- plane table survey.

Module-II

Introduction- Leveling,types, Principle of Leveling, Curvature and Refraction corrections, Reciprocal levelling; Contouring; Introduction-Theodolite, Types of Theodolite, Measurement of angles with theodolite

Module-III

Types of curves, Simple curves – Chain & Tape methods, Rankine's method' Obstacles in curve setting, Compound curve, Reversecurve, Introduction to Transition curve and Vertical curve.

Module-IV

Plane Table Surveying: Details surveying and contouring using plane table and micro-optic alidade. Computation of area andvolume.

Module-V

Total Station: Principle of electronic measurement of distance and angles; construction and working with Total Station; Errors; Application and recent developments in Total Station. Auto level, GPS.

Book/References

1. Punmia, B.C., Jain, A.K., Jain, A.K. "Surveying" – Vol. 1 and
2. Laxmi Publications (P) Ltd.
3. Kanetkar, T.P., Kulkarni S.V. "Surveying and Levelling." – Part 1 and 2, Pune Vidyarthi Griha Prakashan.
4. Duggal, S.K. "Surveying" – Vol. 1 and 2, The McGraw-Hill Companies, New Delhi.
5. Arora, K.R. "Surveying" – Vol. 1 and 2, Standard Book House, New Delhi.

List of Experiments (Expandable)

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators, lintels andarches stairs foundations etc.
3. One drawing sheet each for services and interiors of buildings.
4. One drawing sheet containing detailed planning of one/two bed room residential building (common to allstudent)
5. One drawing sheet each of residential and institutional building (Each student perform different drawing).

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Civil Engineering) Semester – IV

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech. CE	**Structural Analysis**	**CEP402**

Course objectives: This course will enable students to

1. Ability to apply knowledge of mathematics and engineering in calculating slope, deflection, bending moment and shear force using slope deflection, moment distribution method and Kani's method.
2. Ability to identify, formulate and solve problems in structural analysis.
3. Ability to analyze structural system and interpret data.
4. Ability to use the techniques, such as stiffness and flexibility methods to solve engineering problems.
5. Ability to communicate effectively in design of structural elements

Module-I

Analysis of indeterminate structures by force methods, flexibility coefficients, Energy methods: Principle of minimum potential energy, principle of virtual work, Castigliano's theorems, Reciprocal theorem, unit load method,

Module-II

Influence line and Rolling loads, beam, frames and arches, Muller-Breslau Principles and its applications to determinate and indeterminate structures.

Module-III

Analysis of Beams and Frames: Moment Area method, Slope deflection method, Three Moment Equation, Moments distribution methods, effect of symmetry and ant symmetry, sway correction, Lateral load analysis: Portal and Cantilever methods,

Module-IV

Matrix method of structural analysis, Displacement/Stiffness methods.

COURSE OUTCOME

1. Ability to distinguish between determinate and indeterminate structures.
2. Ability to analyze determinate and indeterminate structures.
3. Ability to use influence line diagrams as a valid tool for structural analysis.

Text books/References:

1. C.S. Reddy, Basic Structural Analysis, Second Edition, Tata McGraw Hill, 2005.
2. R.C. Hibbeler, Structural Analysis, Pearson Education, 6th edition, 2009.
3. C.K. Wang, Intermediate Structural Analysis, Tata McGraw Hill, 1984.

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – V

New Scheme Based On AICTE Flexible Curriculam

Course Content

Semester-V

SL. No.	Category	Subject Code	Subject Name	Periods			Credits	Marks Distribution				
				L	T	P		Internal	External		Total	
								Max	Max	Min	Max	Min
1	**Professional Core Course**	CEP 501	Structural Design(R.C.C)	3	4	0	**4**	30	70	21	100	35
2	**Professional Core Course**	CEP 502	Water Resources Engineering	3	0	0	**3**	30	70	21	100	35
3	**Professional Core Course**	CEP 503	Environmental Engineering	3	0	0	**3**	30	70	21	100	35
4	**Professional Core Course**	CEP 504	Transportation Engineering	3	0	0	**3**					
5	**Professional Elective Course**		Professional Elective-I	3	0	0	**3**	30	70	21	100	35
6	**Open Elective Course**		Open Elective-I/MOOC-I	3	0	0	**3**	30	70	21	100	35
Professional Elective-I												
1	**Professional Elective Course**	CEPE505	Bridge Engineering	3	0	0	**3**	30	70	21	100	35
2	**Professional Elective Course**	CEPE506	Railway and Airport Engineering									
3	**Professional Elective Course**	CEPE507	Earthquake Engineering									
Open Elective-I												
1	**Open Elective Course**	EEEOE 507	Industrial Instrumentation	3	0	0	**3**	30	70	21	100	35
2	**Open Elective Course**	MEOE 508	Energy System & Management									
3	**Open Elective Course**	CSEOE 509	Python Programming									
PRACTICAL DEMONSTRATION												
1	**PEC**	CEP 553	Environmental Engineering Lab	0	0	2	**1**	30	20		50	25
2	**PEC**	CEP 554	Concrete Technology Lab	0	0	2	**1**	30	20		50	25
TOTAL							**21**					

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – V

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech. CE	Structural Design (R.C.C.)	CEP501

Course objectives: This course will enable students to

1. Provide basic knowledge in the areas of limit state method and concept of design of RC and Steel structures
2. Identify, formulate and solve engineering problems in RC
3. Give procedural knowledge to design a system, component or process as per needs and specifications of RC Structures
4. like Retaining wall, Footing, Water tanks, Portal Frames and Steel Structures like Roof Truss, Plate Girder and Gantry Girder.
2. Imbibe the culture of professional and ethical responsibilities by following codal provisions in the analysis, design of RC

Module-I

Basic Principles of Structural Design : Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material.

Calculation of various loads for structural design of singly reinforced beam, Partial load factors

Module-II

Design of Beams: Doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement: Redistribution of moments in continuous beams, Circular girders: Deep beams. Design ofbeam for shear and bond.

Module-III

Design of Slabs: Slabs spanning in one direction. Cantilever, Simply supported and Continous slabs, Slabs spanning in twodirections, Circular slabs, Waffle slabs, Flat slabs, Yield line theory.

Module-IV

Columns & Footings: Effective length of columns, Short and long cloumns- Square, Rectangular and Circular columns, Isolated and combined footings, Strap footing, Columns subjected to axial loads and bending moments (sections with no tension), Raft foundation.

Module-V

Staircases: Staircases with waist slab having equal and unequal flights with different support conditions, Slabless tread-riser staircase.

Course outcome

1) Students have explored the stream "Limit State Method of Design for R.C. Structures" and are equipped with knowledge of different methods of design and its classifications.
2) Students have been introduced to Limit State Analysis as well which has opened their wisdom for redistribution of moments.
3) Students are now competent to Design the structures for Limit Sate of Collapse for Flexure (i.e. Singly, Doubly, Fanged beam sections, Slabs, Staircase and Footing etc), Compression (i.e. Column), Beam Torsion and for Shear
4) Students are competent to Design the structures for Limit Sate of Serviceability for Deflection and Cracking

Book/References

1) Varshney RS; Concrete Technology; Oxfored & IBH publishing co.
2) Gambhir ML; Concrete Technology – TMH
3) Sinha SN; Reinforced Concrete Technology; TMH
4) New Building Materials Published by B.M.T.P.C., New Delhi
5) Hand books on Materials & Technology - Published by BMTPC & HUDCO
6) Mohan Rai & M.P. Jai Singh; Advances in Building Materials & Construction
7) Jackson N; Civil Engineering materials.
8) Properties of Concrete - A.M. Neville - Pearson Education.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – V

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
CE	Water Resources Engineering	**CEP502**

Course Objectives: This course will enable students to

1. Understand the concept of hydrology and components of hydrologic cycle such as precipitation, infiltration, evaporation and transpiration.
2. Quantify runoff and use concept of unit hydrograph.
3. Demonstrate different methods of irrigation, methods of application of water and irrigation procedure.
4. Design canals and canal network based on the water requirement of various crops.
5. Determine the reservoir capacity.

Module - I: *Introduction* - hydrologic cycle, water-budget equation, history of hydrology, world water balance, applications in engineering, sources of data.

Module - II: *Precipitation* - forms of precipitation, characteristics of precipitation in India, measurement of precipitation, rain gauge network, mean precipitation over an area, deptharea-duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

Module - III: *Abstractions from precipitation* - evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Module - IV: *Runoff* - runoff volume, SCS-CN method of estimating runoff volume, flow duration curve, flow-mass curve, hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph surface water resources of India, environmental flows.

Module - V: *Ground water and well hydrology* - forms of subsurface water, saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests.

Module - VI: *Water withdrawals and uses* – water for energy production, water for agriculture, water for hydroelectric generation; flood control. Analysis of surface water supply, Water requirement of crops-Crops and crop seasons in India, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships, root zone soil water, infiltration, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.

Module - VII: *Distribution systems* - canal systems, alignment of canals, canal losses, estimation of design discharge. Design of channels- rigid boundary channels, alluvial channels, Kennedy‘s and Lacey‘s theory of regime channels. Canal outlets: non-modular, semi-modular and modular outlets. Water logging: causes, effects and remedial measures. Lining of canals, types of lining. Drainage of irrigated lands: necessity, methods.

Module - VIII: *Dams and spillways* - embankment dams: Classification, design considerations, estimation and control of seepage, slope protection. Gravity dams: forces on gravity dams, causes of failure, stress analysis, elementary and practical profile. Arch and buttress dams. Spillways: components of spillways, types of gates for spillway crests; Reservoirs- Types, capacity of reservoirs, yield of reservoir, reservoir regulation, sedimentation, economic height of dam, selection of suitable site.

Course Outcome:-

1. Student will know the different terminologies related with hydrology.
2. Students will analyze hydrological parameters required for water resource management.
3. Student will assess ground water potential.
4. Students will identify suitable method of irrigation and drainage of waterlogged area.

Text/Reference Books:

1. K Subramanya, Engineering Hydrology, Mc-Graw Hill.
2. K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
3. K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill.
4. G L Asawa, Irrigation Engineering, Wiley Eastern
5. L W Mays, Water Resources Engineering, Wiley.
6. J D Zimmerman, Irrigation, John Wiley & Sons
7. C S P Ojha, R Berndtsson and P Bhunya, Engineering Hydrology, Oxford

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – V

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.TECH CE	Environmental Engineering	**CEP503**

Course Objectives: During this course students will

1. Know sources and characteristic of raw water, quantity and quality of water for drinking purpose.
2. Understand concepts of collection and conveyance of water from source.
3. Acquire an understanding of the fundamental concepts and detailed technical knowledge of the technologies required for water treatment

Module-I: *Water:* -Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design.

Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes

Module-II: *Air* - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations

Module-III: *Noise*- Basic concept, measurement and various control methods.

Module-IV: *Building Plumbing*-Introduction to various types of home plumbing systems for water supply and waste water disposal, high rise building plumbing, Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings used.

Course Outcome:-

1. Explain the structure of drinking water supply systems for urban and rural areas, including sources, forecasting water demand, water transport, treatment processes and distribution and will be able to analyse water quality and interpret the relevance of these in relation to public health and environmental regulations:
2. Explain & design intake works and rising mains:
3. Select treatment process based on quality of raw water and explain & design various conventional water treatment units:
4. Explain disinfection of water:
5. Demonstrate scientific concepts and detailed technical understanding of the technologies required for specific treatment processes for water:
6. Demonstrate scientific concepts and detailed technical understanding of the technologies required for water distribution system, rural water supply and preparation of reports and design of water distribution system

Practical Work: List of Experiments

1. Physical Characterization of water: Turbidity, Electrical Conductivity, pH
2. Analysis of solids content of water: Dissolved, Settleable, suspended, total, volatile, inorganic etc.
3. Alkalinity and acidity, Hardness: total hardness, calcium and magnesium hardness
4. Analysis of ions: copper, chloride and sulfate
5. Optimum coagulant dose
6. Chemical Oxygen Demand (COD)
7. Dissolved Oxygen (D.O) and Biochemical Oxygen Demand (BOD)
8. Break point Chlorination
9. Bacteriological quality measurement: MPN,
10. Ambient Air quality monitoring (TSP, RSPM, SOx, NOx)
11. Ambient noise measurement

Book/References

1. "Wastewater Engineering Treatment and Reuse" by MetCalf & Eddy is considered the Holy Bible for Wastewater treatment of Environmental Engineering.
2. If you are interested in the chemistry involved then "Chemistry for Environmental Engineering and science" by Sawyer, McCarty and Parkin is recommended.
3. The title of this book says what it has inside it — "Industrial Water Pollution Control" by W.W. Eckenfelder Jr..
4. Sticking to wastewater, To know the biological processes involved, try — "Biological Process Design for Wastewater Treatment" by L.W. Benefield and C.W. Randall.
5. For studying Water supply, treatment and distribution, go for — "Water Supply Engineering: Environmental Engineering (volume 1) " by Santhosh Kumar Garg. This book has a twin which deals with wastewater engineering and air pollution. The twin book is "Environmental Engineering : Sewage Disposal and Air Pollution Engineering (Volume - 2)" by Santhosh Kumar Garg
6. If you want an overall understanding of the entire subject i.e., water+waste water+air pollution+solid waste management then, i highly suggest you to read the book titled "Environmental Engineering" - by Howard S. Peavy, Donald R. Rowe and George Tchobanoglous. This book is my personal favorite.

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Civil Engineering) Semester – V

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.TECH CE	Bridge Engineering	**CEPE505**

Course Objective: The main aim of this course is to enable students to choose the appropriate bridge type for a given project, and to analyses and design the main components of the chosen bridge. The course also provides students with fundamental knowledge in a wide range of state-of-the-art practices, including code specifications, in bridge engineering. Upon completion of this course, students should have learned the analysis and design of bridge superstructures, foundations, bearings and deck joints

Module-I Introduction: Definition and components of a bridge, Classification of bridges, Choice of a bridge type.

Module-II Investigation for Bridges: Need for investigation, Selection of bridge site, Determination of design discharge for River Bridge, Linear waterway, Economical span, Vertical clearance, Scour depth, Afflux, Traffic projection.

Module-III Standard Specifications for Road Bridges: IRC Bridge Codes, Width of carriageway, Clearances, Dead load, I.R.C. standard live loads, Impact effect, Wind load, Longitudinal forces, Centrifugal forces, Horizontal forces due to water current, Buoyancy effect, Earth pressure, Deformation stresses, Erection stresses, Temperature effects, and Seismic force.

Module-IV Reinforced Concrete Bridges: Types of RCC bridges; Culverts - Box Culvert, Pipe Culvert, Solid slab bridge, T-beam girder bridges, Hollow girder bridges, Balanced cantilever bridges,

Continuous girder bridges, Rigid frame bridges, Arch bridges, Pre-stressed concrete bridges.

Module-V Steel Bridges: Types of Steel bridges; Beam bridges, Plate girder bridges, Box girder bridges, Truss bridges, Arch bridges, Cantilever bridges, Cable stayed bridges, Suspension bridges.

Module-VI. Sub-structure and Foundation: Piers and abutments, materials for piers and abutments, Types of foundations; Shallow, Pile, and Well foundations. Relative merits of piles and well foundations, Pneumatic Caissons, Box Caissons.

Module-VII Bearings, Joints & Appurtenances: Importance of Bearings, Different types of bearings- Expansion Bearings, Fixed Bearings, Elastomeric Bearings, Expansion joints, Wearing Course, Approach Slab, Footpath, Handrails.

Module-VII Construction and Maintenance of Bridges: Methods of construction of concrete and steel bridges. Form work and false work for concrete bridges, Causes of Bridge failures, Inspection and maintenance.

Course Outcomes: At the end of the course, the student will be able to:

1. Discuss the IRC standard live loads and design the deck slab type bridges.
2. Analyse the box culverts for the given loading and detail the box culverts.
3. Design and detail of T-Beam bridges.
4. Design and check the stability of piers and abutments.
5. Discuss the bridge foundations and prepare the bar bending schedule

Books / References

1. Johnson, Victor, “Essentials of Bridge Engineering”, Oxford University Press.
2. Khadilkar, C. H., “A Text book of Bridge Construction”, Allied Publishers.
3. Rangwala, S. C., “Bridge Engineering”, Charotar Publishing House Pvt. Ltd.
4. Raina, V. K., “Concrete Bridges Handbook”, Shroff Publishers and Distributors.
6. Ponnuswamy, S. “Bridge Engineering”, McGraw Hill Education.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Civil Engineering) Semester – V

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.TECH CE	Railway and Airport Engineering	**CEPE506**

Course Objective: To expose the students to Railway planning, design, construction and maintenance and planning and design principles of Airports and Harbours.

Railway Engineering

Module-I: Introduction to Railway Engineering: History of Railways, Development of Indian Railway, Organisation of Indian Railway, Important Statistics of Indian Railways. Railway Gauges: Definition, Gauges on World Railways, Choice of Gauge, Uniformity of Gauge, Loading Gauge, Construction Gauge.

Module-II: Railway Track: Requirements of a Good Track, Track Specifications on Indian Railways, Detailed Cross-Section of Single/Double Track on Indian Railways. Components of Railway Track: Rails, Sleepers, Ballast, Subgrade and Formation, Track Fixtures & Fastenings, Coning of Wheels, Tilting of Rails, Adzing of Sleepers, Rail Joints, Creep of Rails.

Module-III :Geometric Design of Railway Track: Alignment, Gradients, Horizontal Curve, Super elevation, Equilibrium Cant, Cant Deficiency, Transition Curves.

Module-IV: Points and Crossings: Functions, Working of Turnout, Various types of Track Junctions and their layouts, Level-crossing.

Module-V: Railway Stations & Yards: Site Selection, Classification & Layout of Stations, Marshaling Yard, Locomotive Yard, Equipment at Railway Stations & Yards

Module- VI: Signaling and Interlocking: Objectives, Classification of Signals, Types of Signals in Stations and Yards, Automatic Signaling, Principal of Interlocking.

Module-VII: Modernization of Railway Tracks: High Speed Tracks, Improvement in existing track for high speed, Ballastless Track, MAGLEV, TACV Track.

Airport Engineering

Module-VIII: Introduction to Airport Engineering: Air Transport Scenario in India and Stages of Development, National and International Organizations.

Module-IX: Airport Planning: Aircraft Characteristics, Factors for Site Selection, Airport Classification, General Layout of an Airport. Obstructions and Zoning Laws, Imaginary Surfaces, Approach Zones and Turning Zones.

Module-X: Runway Orientation and Design: Head Wind, Cross Wind, Wind Rose Diagram, Basic Runway Length, Corrections, Geometric Design Elements, Runway Configuration.

Module-XI: Taxiway and Aircraft Parking: Aircraft Parking System. Main Taxiway, Exit Taxiway, Separation Clearance, Holding Aprons.

Module-XII: Visual Aids: Marking and Lighting of Runway and Taxiway, Landing Direction Indicator, and Wind Direction Indicator, IFR/VFR.

Course Outcomes:

On completing the course, the students will have the ability to Plan and Design various civil Engineering aspects of Railways, Airports and Harbour.

Books/References

1. Chandra S., and Aggarwal, "Railway Engineering", M.M. Oxford University Press, New Delhi, 2007.
1. Saxena, S.C., and Arora, S.P., "A Text Book of Railway Engineering", Dhanpat Rai and Sons, Delhi, 1997.
2. J. S. Mundrey, "Railway Track Engineering", McGraw Hill Publishing Co., 2009
3. Khanna, S.K., Arora, M.G., and Jain, S.S., "Airport Planning and Design", Nem Chand & Bros. Roorkee, 1999.
4. Horenjeff, R. and McKelvey, F., "Planning and Design of Airports", McGraw Hill Company, New York, 1994.
5. Norman J. Ashford, Saleh Mumayiz, Paul H. Wright, "Airport Engineering: Planning, Design and Development of 21st Century", Wiley Publishers, 2011

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – V

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.tech CE	Earthquake Engineering	**CEPE506**

Course Objective:

1. To provide a coherent development to the students for the courses in sector of earthquake engineering To present the foundations of many basic engineering concepts related earthquake Engineering
2. To give an experience in the implementation of engineering concepts which are applied in field of earthquake engineering
3. To involve the application of scientific and technological principles of planning, analysis, design of buildings according to earthquake design philosophy

Module-I Introduction to Earthquakes, Causes of Earthquakes, Basic Terminology, Magnitude, Intensity, Peak ground motion parameters.

Module-II Past Earthquakes and Lessons learnt, Various Types of Damages to Buildings.

Module-III Introduction to theory of Vibrations, Sources of Vibrations, Types of Vibrations, Degree of Freedom, Spring action and damping, Equation of motion of S.D.O.F. systems, Undamped, Damped system subjected to transient forces, general solution, green's function.

Module-IV Lateral Force analysis, Floor Diaphragm action, moment resisting frames, shear walls.

Module-V Concepts of seismic design, Lateral Strength, Stiffness, ductility and structural configuration.

Module-VI Introduction to provisions of IS 1893-2002 Part-I for buildings. Estimation of lateral forces due to earthquake.

Module-VII. Introduction to provisions of IS 4326.

Module-VIII. Introduction to provision of IS 13920.

Course Outcomes:

1. The students will gain an experience in the implementation of Earthquake Engineering on engineering concepts which are applied in field Structural Engineering.
2. The students will get a diverse knowledge of earthquake engineering practices applied to real life problems
3. The students will learn to understand the theoretical and practical aspects of earthquake engineering along with the planning and design aspects.

Book/ References:

1. Earthquake Resistant Design of Structures, Pankaj Agrawal, Manish Shrikhande, PHI Learning
2. Dynamics of Structures: Theory and Applications to Earthquake Engineering, AK Chopra, Prentice Hall
3. Dynamics of Structures, R.W. Clough and Joseph Penzien, McGraw-Hill Education
4. Structural Dynamics by Mario & Paz, Springer.
5. Earthquake Resistant Design by David J. Dowrick, Wiley India Pvt. Ltd
6. Elements of Earthquake Engg by Jai Krishna, A.R. Chandrasekaran, Brijesh Chandra, South Asian Publishers.
7. IS 1893-2002 Indian Standard Criteria for Earthquake Resistant Design of Structures.
8. IS 4326-1993 2002 Indian Standard for Earthquake Resistant Design and Construction of Buildings.
9. IS 13920-1993 2002 Ductile detailing of Reinforced Concrete Structures subjected to Seismic Forces.

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – V

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech. CE	Industrial Instrumentation	EEEOE507

Course Objective:

1. To introduce the measurement techniques of force, torque and sped.
2. To introduce the measurement techniques of acceleration, Vibration and density
3. To introduce the measurement Viscosity, Humidity and moisture.
4. To introduce the temperature measurement techniques
5. To introduce the pressure measurement technique.

Module-I

MEASUREMENT OF FORCE, TORQUE AND SPEED

Different types of load cells: Hydraulic, Pneumatic, Strain gauge, Magneto-elastic and Piezoelectric load cells – Different methods of torque measurement: Strain gauge, Relative angular twist. Sped measurement: Capacitive tacho, Drag cup type tacho, D.C and A.C tacho generators – Stroboscope.

Module-II

MEASUREMENT OF ACCELERATION, VIBRATION AND DENSITY

Accelerometers: LVDT, Piezoelectric, Strain gauge and Variable reluctance type accelerometers – Mechanical type vibration instruments – Seismic instruments as accelerometer – Vibration sensor – Calibration of vibration pickups – Units of density and specific gravity – Baume scale and API scale – Densitometers: Pressure type densitometers, Float type densitometers, Ultrasonic densitometer and gas densitometer.

Module-III

MEASUREMENT OF VISCOSITY, HUMIDITY AND MOISTURE

Viscosity: Say bolt viscometer – Rotameter type and Torque type viscometers – Consistency Meters – Humidity: Dry and wet bulb psychrometers – Resistive and capacitive type hygrometers – Dew cell – Commercial type dew meter. Moisture: Different methods of moisture measurements –Thermal, Conductivity and Capacitive sensors, Microwave, IR and NMR sensors, Application of

moisture measurement – Moisture measurement in solids.

Module-IV

TEMPERATURE MEASUREMENT

Definitions and standards – Primary and secondary fixed points – Different types of filed in system thermometers – Sources of errors in filed in systems and their compensation – Bimetallic thermometers – IC sensors – Thermocouples: Laws of thermocouple, Fabrication of industrial thermocouples, Reference junctions compensation, Signal conditioning for thermocouple, Commercial circuits for cold junction compensation, Response of thermocouple, Special techniques for measuring high temperature using thermocouple – Radiation fundamentals – Radiation methods of temperature measurement – Total radiation pyrometers – Optical pyrometers – Two colour radiation pyrometers – Fibre optic sensor for temperature measurement – Thermograph, Temperature switches and thermostats – Temperature sensor selection, Installation and Calibration.

Module-V

PRESSURE MEASUREMENT

Units of pressure – Manometers: Different types, Elastic type pressure gauges: Bourdon tube, Bellows, Diaphragms and Capsules – Electrical methods: Elastic elements with LVDT and strain gauges – Capacitive type pressure gauge – Piezo resistive pressure sensor-Resonator pressure sensor – Measurement of vacuum: McLeod gauge, Thermal conductivity gauge, lionization gauges, Cold cathode type and hot cathode type – Pressure gauge selection, installation and calibration using dead weight ester.

Course Outcomes: Upon completion of the course, students will be able to

1. Understand Principles and working of Viscosity, Humidity, Moisture, temperature, pressure, flow and level measuring Instruments. Calibrate temperature, flow, level and Pressure measuring devices.

BOOKS/REFERENCES::

1. Doebelin, E.O. and Manik, D.N., "Measurement systems Application and Design", 6th McGraw-Hill Education Pvt. Ltd, 2011.
2. A.K. Sawhney and Puneet Sawhney, "Mechanical Measurements and Instrumentation and Control", Dhanpat Rai & Co. (P) Limited, 2015.
3. Liptak, B.G., "Instrumentation Engineers Handbook (Measurement)", CRC Press, 2005.
4. Patranabis, D., "Principles of Industrial Instrumentation", 3rd Edition, McGraw-Hill Education, 2017.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – V

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech. CE	Energy system &Management	MEOE508

Course Objective: To impart basic knowledge to the students about current energy scenario, energy conservation, audit and management. To inculcate among the students systematic knowledge and skill about assessing the energy efficiency, energy auditing and energy management.

Module-I

Energy resources and their utilization: Indian and global energy sources, Energy exploited, Energy planning, Energy Parameters (energy intensity, energy-GDP elasticity), Introduction to various sources of energy, Solar thermal, Photovoltaic, Water power, Wind energy, Biomass, Ocean thermal, Tidal and wave energy, Geothermal energy, Hydrogen energy systems, Fuel cells, Decentralized and dispersed generation.

Module-II

Solar radiations: Extra terrestrial radiation, Spectral distribution, Solar constant, Solar radiations on earth, Measurement of solar radiations, Solar radiation geometry, Flux on a plane surface, Latitude, Declination angle, Surface azimuth angle, Hour angle, Zenith angle, Solar altitude angle expression for angle between incident beam and the normal to a plane surface (no derivation), Local apparent time, Apparent motion of sun, Day length, Solar radiation data for India.

Module-III

Energy Conversion Systems I: Energy, Conversion routes, Direct and indirect way of Energy Conversion, Principles of heat and mass transfer, Thermodynamics, Fluid static and dynamics, Electricity generation, distribution and use, Basic of Solar Thermal Conversion, Technology of Selective Coating, Fundamentals of Flat Plate Collector and Evacuated Collector, Basic of Wind Energy Conversion, Wind machine, Wind electric generator, Wind pump.

Module-IV

Energy Conversion Systems II: Basics of Photovoltaic Conversion technology and PV systems, PV system design methodologies, Basics of Bio-energy conversion, biomethanation technology,

Thermochemical Conversion through Pyrolysis, Gasification and Esterification, Bio Oil, Application of Ocean Thermal Gradient and Geothermal gradient for power generation, Basics of hydropower, Tidal and Wave power, Basics of Hydrogen fuel, Fundamentals of Fuel Cells, Basics of Fusion power, Energy Storage Technologies, Mechanical storage, Chemical storage and Electrical storage, Details of Pb-acid battery, NiCd-alkaline battery, Ni-iron and Na-S batteries, battery maintenance and safety precautions.

Module-V

Energy Management: Fundamental of Energy conservation, Energy Management and Audit, Basics of Energy Demand and Supply, Principles of Economic analysis in the Energy Management and Audit Programme, Supply side and demand side energy management, Boilers and Firing System, Steam, Condensation Systems, Energy Conservation and Management in power plant, Energy conservation in Buildings, Heating, Ventilation and Air Conditioning System, Degree day in energy use monitoring, Energy Conservation Opportunities, in chemical industries, Waste heat recovery, Co-generation, Energy Conservation in Agricultural Sector, Energy conservation in illumination engineering, Combustion stoichiometry, air-fuel ratio, optimum loading in boilers, etc.

Module-VI

Industrial Energy Analysis: Materials and energy balance in the industries, Products and the process, industrial demand and supply networking, Optimization techniques, efficiency analysis, methods, Energy monitoring and ongoing information dissertation in terms of energy consumption, production and cumulative sum of differences. Energy efficiency analysis in various conversion systems like boilers, furnaces, compression systems, controlling systems, etc. Case studies for large scale, medium scale and small scale industries, efficiency integration methodologies.

Course Outcomes:

1. Students will be able to design suitable energy monitoring system to analyz and optimize the energy consumption in an organization.
2. Students will be able to improve the thermal efficieny by designing suitable systems for heat recovery and co-generation.
3. Students will be able to use the energy audit methods learnt to identify the areas deserving tighter control to save energy expenditure.

4. Students will be able to carry out the cost- benefit analysis of various investment alternatives for meeting the energy needs of the organization.
5. Students will be able to guide the employees of the organization about the need and the methods of energy conservation.

BOOKS/REFERENCES:-

1. Albert Thumann, Handbook of Energy Audits, The Fairmont Press Inc., Atlanta gergia, 1979.
2. Murphy W.R and Mckay G, Energy Management, Butterworths, London, 1982.
3. Albert Thumann, Plant Engineer and Management guide to Energy Conservation, Van Nost and Reinhold Co., Newyork.
4. Energy Audits, E.E.O.-Book-lets, U.K. 1988.
5. Craig B.Smith, “Energy Management Principles”, Pergamon Press.
6. The role of Energy Manager, E.E.O., U.K.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – V

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.TECH.CE	**Python Programming**	**CSEOE509**

Course Objective: When students complete Intro to Programming with Python, they will be able to:

Build basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions. Work with user input to create fun and interactive programs.

Module-I

Introduction to Computers, Programs, and Python: Introduction, Programming Languages, Operating Systems, The History of Python, Features of python language, Getting Started with Python, Programming Style and Documentation, Programming Errors.

Elementary Programming: Introduction, Writing a Simple Program, Reading Input from the Console, Identifiers, Variables, Assignment Statements, and Expressions, Simultaneous Assignments, Named Constants, Numeric Data Types and Operators, Evaluating Expressions and Operator Precedence, Augmented Assignment Operators, Type Conversions and Rounding.

Module-II

Mathematical Functions, Strings, and Objects: Introduction, Common Python Functions, Strings and Characters, Introduction to Objects and Methods, Formatting Numbers and Strings.

Control Structures: Selections: Introduction, Boolean Types, Values, and Expressions, if Statements, Two-Way if-else Statements, Nested if and Multi-Way if-elif-else Statements, Logical Operators, Conditional Expressions, Loops: Introduction, The while Loop, The for Loop, Nested Loops, Keywords break and continue

Module-III

Functions: Introduction, Defining a Function, Calling a Function, Functions with/without Return Values, Positional and Keyword Arguments, Passing Arguments by Reference Values, Modularizing code, The Scope of Variables, Default Arguments, Returning Multiple Values.

Lists: Introduction, List Basics, Copying Lists, Passing Lists to Functions, Returning a List from a Function, Searching Lists, Sorting, Processing Two-Dimensional Lists, Passing Two-Dimensional Lists to Functions, Multidimensional Lists.

Module-IV

Tuples, Sets, and Dictionaries: Introduction, Tuples: Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Tuple methods, Sets: Creating Sets, Manipulating and Accessing Sets, Subset and Superset, Set Operations, Comparing the Performance of Sets and Lists, Dictionaries: Creating a Dictionary, Adding, Modifying, and Retrieving Values, Deleting Items, Looping Items, The Dictionary Methods.

Module-V

Objects and Classes: Introduction, Defining Classes for Objects, Immutable Objects vs. Mutable Objects, Hiding Data Fields, Class Abstraction and Encapsulation, Object-Oriented Thinking. Inheritance and Polymorphism: Introduction, Super classes and Subclasses, Overriding Methods, The **object** Class, Polymorphism and Dynamic Binding, The **is instance** Function. Class Relationships: Association, Aggregation, composition.

Files and Exception Handling: Introduction, text input and ouput: opening a file, Writing Data, Testing a File's Existence, Reading All Data from a File, Writing and Reading Numeric Data, Binary IO Using Pickling, Exception Handling, Raising Exception

Course Outcomes:

1. Create your first program in Python IDLE.
2. Implement OOPs concepts in your programming.
3. Use Arrays, and Data structures.
4. Create an application with the support of graphics in Python.
5. Implement error handling.

TEXT BOOK/REFERENCE

1. Y. Daniel Liang, "Introduction to programming using python", Pearson Education; First edition (2017).
2. Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education; Forthedition (2018)
3. Mark Lutz, "Learning Python" O′Reilly Fifth edition (2013)
4. Mark Summerfield, "Programming in Python 3: A Complete Introduction to the Python Language" Pearson Education; Second edition (2018).

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – V

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech. CE	**Transportation Engineering**	**CEP504**

Course objectives: This course will enable students to

1. Gain knowledge of different modes of transportation systems, history, development of highways and the
2. Organizations associated with research and development of the same in INDIA.
3. Understand Highway planning and development considering the essential criteria's (engineering and financial aspects,
4. Regulations and policies, socio economic impact).
5. Get insight to different aspects of geometric elements and train them to design geometric elements of a highway network.
6. Understand pavement and its components, pavement construction activities and its requirements.
7. Gain the skills of evaluating the highway economics by B/C, NPV, IRR methods and also introduce the students to highway financing concepts.

Module-I: Highway development and planning-Classification of roads, road development in India, Current road projects in India; highway alignment and project preparation.

Module-II: Geometric design of highways-: Introduction; highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; design of intersections, problems

Module-III: Traffic engineering & control- Traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems

Module-IV: Pavement materials- Materials used in Highway Construction- Soils, Stone aggregates, bituminous binders, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements. Problems

Module-V: Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements; design of flexible pavements as per IRC; rigid pavements- components and functions; factors affecting design and performance of CC pavements; stresses in rigid pavements; design of concrete pavements as per IRC; problems

Course Outcome : On successful completion of the course, the students shall be able to understand the following

1. Basic concept about Highway Engineering
2. To understand the principles of Highway geometrics design as per IRC standards
3. Perform geometric design for the Highway& Basic concept of Pavement design
4. To understand Types of pavements & Materials required for highway construction.
5. To understand Construction procedure for different type of pavements.
6. To understand maintenance procedure for different type of pavements.
7. To understand the Traffic engineering& different types of traffic control device.
8. Basic idea about the Bridge engineering & Components parts of a bridge

BOOKS/ REFERENCES:

1. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
2. Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
3. Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning,
4. Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis',

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content

Semester-VI

SL. No.	Category	Subject Code	Subject Name	Periods			Credits	Marks Distribution				
				L	T	P		Internal	External		Total	
								Max	Max	Min	Max	Min
1	**Professional Core Course**	CEP601	Steel Structure Design	3	1	0	**4**	30	70	21	100	35
2	**Professional Core Course**	CEP 602	Qty. Surveying & Costing	3	0	0	**3**	30	70	21	100	35
3	**Professional Core Course**	CEP 603	Environmental Engineering-II	3	0	0	**3**	30	70	21	100	35
4	**Professional Elective Course**		Professional Elective-II	3	0	0	**3**	30	70	21	100	35
5	**Open Elective Course**		Open Elective-II/MOOC-II	3	0	0	**3**	30	70	21	100	35
6	**HSMC**		HSS/Management Elective-1	3	0	0	**3**	30	70	21	100	35
			PRACTICAL DEMONSTRATION									
1	**Professional Core Course**	CEP 652	Qty. Surveying & Costing	0	0	2	**1**	30	20		50	25
2	**INTERNSHIP**	CE653	Internship/Tour & Training/Industrial Training	0	0	4	**2**	30	20		50	25
3	**HSMC**	CE654	Introduction to Soft Skills	0	0	2	**1**	30	20		50	25
TOTAL							**23**					

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HSS/Management Elective-I (Any one)												
1	**HSMC**	CEH 611	Project Management	3	0	0	**3**	30	70	21	100	35
2	**HSMC**	CEH612	Operations Research									
3	**HSMC**	CEH613	Managerial Economics									
Open Elective-II (Any one)												
1	**Open Elective Course**	MEOE 608	Renewal Energy Engineering	3	0	0	**3**	30	70	21	100	35
2	**Open Elective Course**	EEEOE 609	PLC & SCADA									
3	**Open Elective Course**	CSEOE610	Soft Computing									
Professional Elective-II (Any one)												
1	**Professional Elective Course**	CEPE 604	Air Pollution And Control	3	0	0	**3**	30	70	21	100	35
2	**Professional Elective Course**	CEPE605	REMOTE SENSING & GIS									
3	**Professional Elective Course**	CEPE606	Traffic Engineering									
4	**Professional Elective Course**	CEPE607	Surveying & Geomatics									

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech. CE	Steel Structure Design	CEP601

Course Objective:

1. To provide a coherent development to the students for the courses in sector of Designing of the Steel Structures.
2. To present the foundations of many basic Engineering concepts related Design of Steel Structures.
3. To give an experience in the implementation of engineering concepts which are applied in field of Steel Structures.
4. To involve the application of scientific and technological principles of planning, analysis, design of buildings.

Module-I

Various loads and mechanism of the load transfer, partial load factors, structural properties of steel, Design of structural connections -Bolted, Rivetted and Weldedconnections.

Module-II

Design of compression members, Tension members, Roof Trusses - Angular & Tubular, Lattice Girders.

Module-III

Design of simple beams, Built-up beams, Plate girders and gantry girders.

Module-IV

Effective length of columns, Design of columns-simple and compound, Lacings &battens. Design of footings for steel structures, Grillage foundation

Module-V

Design of Industrial building frames, multistory frames, Bracings for high rise structures, Design of transmission towers

Course Outcome:-

1. The students will gain an experience in the implementation of Design of Steel Structures on engineering concepts which are applied in field Structural Engineering.
2. The students will get a diverse knowledge of Design of Steel engineering practices applied to real life problems
3. The students will learn to understand the theoretical and practical aspects of Design of Steel Structure along with the planning and design aspects

BOOKS/ REFERENCES:

1. Varshney RS; Concrete Technology; Oxford & IBH publishing co.
2. Gambhir ML; Concrete Technology – TMH
3. Sinha SN; Reinforced Concrete Technology; TMH
4. New Building Materials Published by B.M.T.P.C., New Delhi
5. Hand books on Materials & Technology - Published by BMTPC & HUDCO
6. Mohan Rai & M.P. Jai Singh; Advances in Building Materials & Construction
7. Jackson N; Civil engineering materials.
8. Properties of Concrete - A.M. Neville - Pearson Education.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Civil Engineering) Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
CE	Qty. Surveying & Costing	**CEP602**

Course Objective:

To provide the student with the ability to estimate the quantities of item of works involved in buildings, water supply and sanitary works, road works and irrigation works, and also to equip the student with the ability to do rate analysis, valuation of properties and preparation of reports for estimation of various items

Module-I

Introduction: Purpose and importance of estimates, principles ofestimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

Module-II

Rate Analysis: Task for average artisan, various factors involvedin the rate of an item,material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)

Module-III

Detailed Estimates: Preparing detailed estimates of various types of buildings, R.C.C.works, earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.

Module-IV

Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentagesfor different services in building. Preparation of DPR.

Module-V

Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dualrate interest, methods of valuation, rent fixation of buildings

Course Outcome:-

The student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents. Student shall be able to prepare value estimates

BOOKS/ REFERENCES:

1. T.P. Kanetkar, Surveying & Levelling, Vol. I & II.
2. Duggal; Surveying vol I and II; TMH
3. Basak; Surveying and Leveling; TMH
4. R.E.Devis, Surveying theory & Practice, Mc.Graw Hill, New York
5. David Clark & J Clendinning, Plane & Geodetic surveying Vol. I & II, constable & Co. London.
6. S.K. Roy, Fundamentals of surveying, prentice - Hall of India New Delhi
7. B.C. Punmia, Surveying Vol. I, II, III, Laxmi Publications New Delhi 8. K.R. Arora, Surveyhing Vol. I& II, standard book House, New Delhi

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Civil Engineering) Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
CE	**Surveying and Geomatics**	**CEPE607**

Course Objectives: The object of the course student should have the capability to:

1. Know the principle and methods of surveying.
2. Measure horizontal and vertical- distances and angles
3. Recording of observation accurately
4. Perform calculations based on the observation
5. Identification of source of errors and rectification methods
6. Apply surveying principles to determine areas and volumes and setting out curves
7. Use modern surveying equipment's for accurate results

Module-I

Traversing by theodolite, Field work checks, traverse computations, latitude and departures, adjustments, computations of co-ordinates, plotting & adjusting or traverse, Omitted measurements, Measurement EDM, Trigonometrically leveling.

Module-II

Tachometry: Tachometric systems and principles, stadia system, uses of anallatic lens, tangential system, sublense system, instrument constant, field work reduction, direct-reading tacheometers, use of tacheometry for traversing and contouring

Module-III

Curves: Classification and use; elements of circular curves, calculations, setting out curves by offsets and by theodolites, compound curves, reverse curves, transition curves, cubic spiral and lemniscate, vertical curves, setting out.

Module-IV

Control Surveys: Providing frame work of control points, triangulation principle, co naissance, selection and marking of stations, angle measurements and corrections, baseline measurement and corrections, computation of sides, precise traversing.

Module-V

Hydrographic Surveying: Soundings, methods of observations, computations and plotting. Principles of photographic surveying: aerial photography, tilt and height distortions, Remote sensing, simple equipment, elements of image interpretation, image-processing systems.

Course Outcomes: Course will enable the student to:

1. Apply the knowledge to calculate angles, distances and levels
2. Identify data collection methods and prepare field notes
3. Understand the working principles of survey instruments, measurement errors and corrective measures
4. Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies

BOOKS/REFERENCES:

1. T.P. Kanetkar, Surveying & Levelling, Vol. I & II.
2. Duggal; Surveying vol I and II; TMH
3. Basak; Surveying and Leveling; TMH
5. R.E.Devis, Surveying theory & Practice, Mc.Graw Hill, New York
6. David Clark & J Clendinning, Plane & Geodetic surveying Vol. I & II, constable & Co. London.
7. S.K. Roy, Fundamentals of surveying, prentice - Hall of India New Delhi
8. B.C. Punmia, Surveying Vol. I, II, III, Laxmi Publications New Delhi 8. K.R. Arora, Surveyhing Vol. I & II, standard book House, New Delhi

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Civil Engineering) Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.TECH CE	AIR POLLUTION AND CONTROL	**CEPE604**

Course Objectives:

1. To provide general understanding of quality of air and impact on local and global effects of air pollution on human, materials, properties and vegetation.
2. To study the fate and transport of air pollutants and its measurement techniques.
3. To discuss the various types of air pollution control equipment and their design principles and limitation

Module-I

Introduction to air pollution and pollutants Sources of ambient and indoor air pollution; types of air pollutants, fate of air pollutants,effects of air pollution in regional and global scale.

Module-II

Sampling and Monitoring of Air Pollutants Objectives, ambient air sampling methodsand devices, stack monitoring, and interpretation of air pollution data, air pollution standards and indices.

Module-III

Factors affecting dispersion of air pollutants Temperature lapse rates and atmospheric stability, inversions, wind profiles, wind velocity and turbulence, plume behaviour, estimation of plume rise, dispersion equations, box model, gaussian plume model.

Module-IV

Control technologies for control of air pollution Control methods for air pollution, factors affecting selection of control equipment, working principle, design, operational considerations, process control and monitoring of particulate matter and gaseous pollutant control equipment, legislations, policies and guidelines for air pollution control.

Module-V

Control of vehicular emissions Internal combustion engines, technological improvements of engines for reduction of vehicular emissions, after exhaust treatments, alternative transportation fuels, emission measurement and testing, regulation to control vehicular emission.

Course Outcome: At the end of the course student will be able

1. Classify and identify the sources of air pollutants and predict the effects of air pollutant on human health and environment.
2. Apply and relate the significance of various air pollution dispersion models.
3. Analyze the air quality and relate with air pollution regulation
4. Design various air pollution control equipment and evaluate its use.

BOOKS/ REFERENCES:

1. Punmia, B.C., Jain, A.K., Jain, A.K. "Surveying" – Vol. 1 and
2. Laxmi Publications (P) Ltd.
3. Kanetkar, T.P., Kulkarni S.V. "Surveying and Levelling." – Part 1 and 2, Pune Vidyarthi Griha Prakashan.
4. Duggal, S.K. "Surveying" – Vol. 1 and 2, The McGraw-Hill Companies, New Delhi.
5. Arora, K.R. "Surveying" – Vol. 1 and 2, Standard Book House, New Delhi.

List of Experiments (Expandable)

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators, lintels andarches stairs foundations etc.
3. One drawing sheet each for services and interiors of buildings.
4. One drawing sheet containing detailed planning of one/two bed room residential building (common to allstudent)
5. One drawing sheet each of residential and institutional building (Each student perform different drawing).

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content

Branch	Subject Title	Subject Code
B.Tech CE	**Environmental Engineering-II**	**CEP603**

Course Objectives:

1. Solve Environmental Engineering problems and pursue higher studies using solid foundation in mathematics, science & technology.
2. Design and operate various environmental systems in industries as well as other related fields through participative education.
3. Develop skills to communicate effectively and work in a team in multidisciplinary areas.
4. Respond to the challenges of environmental issues through research and development

Module-I: ***Sewage Treatment***-

Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage-Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water-Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes.

Module-II: ***Solid waste management***

Municipal solid waste, Composition and various chemical and physical parameters of MSW, MSW management: Collection, transport, treatment and disposal of MSW. Special MSW: waste from commercial establishments and other urban areas, solid waste from construction activities, biomedical wastes, Effects of solid waste on environment: effects on air, soil, water surface and ground health hazards. Disposal of solid waste-segregation, reduction at source, recovery and recycle. Disposal methods- Integrated solid waste management. Hazardous waste: Types and nature of hazardous waste as per the HW Schedules of regulating authorities.

Module-III: Government authorities and their roles in water supply, sewerage disposal. Solid waste management and monitoring/control of environmental pollution.

Environmental Engineering graduates will be able to: 1. Apply the knowledge of mathematics, Science and Engineering fundamentals for solution of problems of Environmental Engineering. 2. Identify, formulate, review research literature and analyze complex Environmental Engineering problems using fundamentals of mathematics, sciences and engineering. 3. Develop solutions for Environmental Engineering problems and design system components and processes to meet the specified needs with appropriate consideration for the public health and safety. 4. Make use of their knowledge to interpret the data by experimental analysis to provide valid conclusions 5. Select and apply various engineering & IT tools and models to solve Environmental Engineering problems 6. Assess societal, health, safety and legal issues by applying Environmental Engineering knowledge

Course Outcome: Environmental Engineering graduates will be able to:

1. Apply the knowledge of mathematics, Science and Engineering fundamentals for solution of problems of Environmental Engineering.
2. Identify, formulate, review research literature and analyze complex Environmental Engineering problems using fundamentals of mathematics, sciences and engineering.
3. Develop solutions for Environmental Engineering problems and design system components and processes to meet the specified needs with appropriate consideration for the public health and safety.
5. Make use of their knowledge to interpret the data by experimental analysis to provide valid conclusions
6. Select and apply various engineering & IT tools and models to solve Environmental Engineering problems
7. Assess societal, health, safety and legal issues by applying Environmental Engineering knowledge

Practical Work: List of Experiments

1. Physical Characterization of water: Turbidity, Electrical Conductivity, pH
2. Analysis of solids content of water: Dissolved, Settleable, suspended, total, volatile, inorganic etc.
3. Alkalinity and acidity, Hardness: total hardness, calcium and magnesium hardness
4. Analysis of ions: copper, chloride and sulfate
5. Optimum coagulant dose

6. Chemical Oxygen Demand (COD)
7. Dissolved Oxygen (D.O) and Biochemical Oxygen Demand (BOD)
8. Break point Chlorination
9. Bacteriological quality measurement: MPN,
10. Ambient Air quality monitoring (TSP, RSPM, SOx, NOx)
11. Ambient noise measurement

Text/ Reference Books:

1. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
2. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
3. Peavy, H.s, Rowe, D.R, Tchobanoglous, G. *Environmental Engineering*, Mc-Graw Hill International Editions, New York 1985.
4. MetCalf and Eddy. *Wastewater Engineering, Treatment, Disposal and Reuse*, Tata McGraw-Hill, New Delhi.
5. Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi.
6. Plumbing Engineering. Theory, Design and Practice, S.M. Patil, 1999
7. Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication.

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
CE	Traffic Engineering	CEPE606

Course Objectives:

1. To introduce the students with the principles and practice of transportation engineering which focuses on Traffic and Transportation Engineering and Highway Engineering.
2. To enable the students to have a strong analytical and practical knowledge of Planning, Designing and solving the transportation problems.
3. To introduce the recent advancements in the field of Sustainable Urban Development, Traffic Engineering and Management, Systems Dynamics Approach to Transport Planning, Highway Design and Construction, Economic and Environment Evaluation of Transport Projects.
4. To strength the students' knowledge and technical know how to be efficient Transport Engineers.

Module-I

Traffic Characteristics: (i) Road user's characteristics - general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory.

(ii) Vehicular characteristics: Characteristics affecting road design-width, height, length and other dimensions. Weight, power, speed and braking capacity of a vehicle.

Module-II

Traffic Studies: (i) Spot Speed Studies and Volume Studies. (ii) Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies. (iii) Origin and Destination Studies (O & D) : Various methods, collection and interpretation of data, planning and sampling. (iv) Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service. (v) Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

Module-III

Traffic Operations and Control : 1. Traffic regulations and various means of control. 2. One way streets- advantages and limitations. 3. Traffic signals- isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems.

Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal.

Module-IV

Street Lighting : 1. Methods of light distribution. 2. Design of street lighting system. 3.Definitions- Luminaire, foot candle, Lumen, utilization and maintenance factors. 4.

Different types of light sources used for street lighting. (v) Fundamental factors of night vision.

Module-V

Accident Studies & Mass Transportation: 1. Accident Studies: Causes of accidents, accident studies and records, condition and collision diagram, preventive measures. 2. Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

Course Outcome:

1. The students after completion of this course will have an indepth knowledge in Traffic Engineering, Transport Planning, Highway Design and Construction, Sustainable Urban and Transport Development and will be efficient enough to take up projects in the field.
2. As the students have an hands on experience in working with the Software , live projects, field visits to various organizations and training sessions during the course of study, they will be full-fledged Transport and Highway Planner.

Text/Reference Books:

1. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
2. Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
3. Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning,
4. Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – VI

New Scheme Based On AICTE Flexible Curriculam

(Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	**Soft Computing**	**CSEOE610**

Course Objectives: The main objective of the course is to expose the students to soft computing, various types of soft computing techniques, and applications of soft computing. .Upon completion of this course, the student should be able to get an idea on:

1. Artificial Intelligence, Various types of production systems, characteristics of production systems.
2. Neural Networks, architecture, functions and various algorithms involved.
3. Fuzzy Logic, Various fuzzy systems and their functions.
4. Genetic algorithms, its applications and advances

Module-I

FUZZY SET THEORY Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology– Settheoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning –Fuzzy Inference Systems – Input Space Partitioning and Fuzzy Modeling.

Module-II

OPTIMIZATION Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

Module-III

NEURAL NETWORKS Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

Module-IV

NEURO FUZZY MODELING AND OTHER TECHNIQUES Adaptive Neuro-Fuzzy Inference Systems – Architecture – Support Vector Machines – Independent Component Analysis.

Module-V

APPLICATIONS OF COMPUTATIONAL INTELLIGENCE Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

Course Outcomes: At the end of the course the student should be able to

1. Learn about soft computing techniques and their applications
2. Analyze various neural network architectures
3. Understand perceptrons and counter propagation networks.
5. Define the fuzzy systems
6. Analyze the genetic algorithms and their applications

TEXT BOOK/ References: :

1. J.S.R. Jang, C.T.Sun and E. Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.

2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.

3. Davis E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.

4. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.

5. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.Tech CE	REMOTE SENSING & GIS	**CEPE605**

COURSE OBJECTIVES:

1. Apply the concepts of Photogrametry and its applications such as determination of heights of objects on terrain.
2. Understand the basic concept of Remote Sensing and know about different types of satellite and sensors.
3. Understand different components of GIS and Learning about map projection and coordinate system
4. Develop knowledge on conversion of data from analogue to digital and working with GIS software.

Module-I

Remote Sensing: Definition and Development; Platforms and Types;Photogrammetry.

Module-II

Satellite Remote Sensing: Principles, EMR Interaction with Atmosphere and EarthSurface; Satellites (Landsat and IRS); Sensors

Module-III

Geographical Information System (GIS): Definition and Components.

Module-IV

Global Positioning System (GPS) – Principles and Uses; DGPS.

Module-V

GIS Data Structures: Types (spatial and Non-spatial), Raster and Vector DataStructure.

COURSE OUTCOMES: After completing this course the student will have acquired the ability on the following.

1. Understand the concepts of Photogrametry and compute the heights of objects
2. Understand the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies .
3. Understand the basic concept of GIS and its applications, know different types of data representation in GIS
4. Understand and Develop models for GIS spatial Analysis and will be able to know what the questions that GIS can answer are
5. Apply knowledge of GIS software and able to work with GIS software in various application fields

Books/ Reference

1. Bhatta , B. (2008) Remote Sensing and GIS, Oxford University Press, New Delhi.
2. Campbell J. B., 2007: Introduction to Remote Sensing, Guildford Press
3. Jensen, J. R. (2005) Introductory Digital Image Processing: A Remote Sensing.
4. Bhatta, B. (2010) Analysis of Urban Growth and Sprawl from Remote Sensing, Springer, Berlin

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – VI

New Scheme Based On AICTE Flexible Curriculam

(Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	**PLC AND SCADA**	**EEEOE609**

COURSE OBJECTIVES:

1. Course Objective: The course aims:-
2. To understand the generic architecture and constituent components of a Programmable Logic Controller.
3. To develop architecture of SCADA explaining each unit in detail.
4. To develop a software program using modern engineering tools and technique for PLC and SCADA.
5. To apply knowledge gained about PLCs and SCADA systems to real-life industrial applications.

Module-I

Programmable Logic Controllers: Introduction, Parts of a PLC, Principles of Operation, Modifying the Operation, PLCs versus Computers, PLC Size and Application. PLC Hardware Components: The I/O Section, Discrete I/O Modules, Analog I/O Modules, Special I/O Modules, I/O Specifications, The Central Processing Unit (CPU), Memory Design, Memory Types, Programming Terminal Devices, Recording and Retrieving Data, Human Machine Interfaces (HMIs). Basics of PLC Programming: Processor Memory Organization, Program Scan, PLC Programming Languages, Relay-Type Instructions, Instruction Addressing, Branch Instructions, Internal Relay Instructions, Programming Examine If Closed and Examine If Open Instructions, Entering the Ladder Diagram, Modes of operation

Module-II

Developing Fundamental PLC Wiring Diagrams and Ladder Logic Programs: Electromagnetic Control Relays, Contactors, Motor Starters, Manually Operated Switches, Mechanically Operated Switches, Sensors, Output Control Devices, Seal-in Circuits, Latching Relays, Converting Relay Schematics into PLC Ladder Programs, Writing a Ladder Logic Program Directly from a

Narrative Description. Programming Timers: Mechanical Timing Relays, Timer Instructions, On-Delay Timer Instruction, Off-Delay Timer Instruction, Retentive Timer, Cascading Timers.

Module-III

SCADA Fundamentals: Introduction, Open system: Need and advantages, Building blocks of SCADA systems, Remote terminal unit (RTU): Evolution of RTUs, Components of RTU, Communication subsystem, Logic subsystem, Termination subsystem,

Module-IV

Human-Machine Interface (HMI): HMI components, HMI software functionalities, Situational awareness, Intelligent alarm filtering: Need and technique, Alarm suppression techniques, Operator needs and requirements,

Module-V

SCADA Systems: Building the SCADA systems, legacy, hybrid, and new systems, Classification of SCADA systems, SCADA implementation: A laboratory model: The SCADA laboratory, System hardware, System software, SCADA lab field design

Course Outcome: Upon successful completion of this course, the students will be able to :-

1. Develop block diagram of PLC and explain the working.
2. Classify input and output interfacing devices with PLC.
3. Develop architecture of SCADA and explain the importance of SCADA in critical infrastructure.
4. Execute, debug and test the programs developed for digital and analog operations.
5. Describe various SCADA protocols along with their architecture.
6. Observe development of various industrial applications using PLC and SCADA

Text Books:/ References

1. Programmable Logic Controllers Frank D Petruzella McGraw Hill 4th Edition, 2011
2. Power System SCADA and Smart Grids Mini S. Thomas CRC Press 3rd Edition,2015

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	Renewable Energy Engineering	MEOE608

COURSE OBJECTIVES:

1. Graduates will be known for their skill set in the field of research in renewable energy sectors. •
2. Graduates will be enriched with blended interdisciplinary knowledge required to establish as an entrepreneur and industry centric in renewable energy.
3. Graduates will be manifested for their adherence to professional, social and ethical responsibilities in implementing sustainable energy solutions.

Module-I

Introduction, Importance of Energy Consumption as Measure of Prosperity, Per Capita Energy Consumption, Needs of renewable energy, Classification of Energy Resources, Conventional Energy Resources - Availability and their limitations; Non-Conventional Energy Resources – Classification, Advantages, Limitations, Comparison of Conventional and Non-Conventional Energy Resources, World Energy Scenario, Indian Energy Scenario.

Module –II

Introduction, Solar Radiation, Solar Constant, Basic Sun-Earth Angles, Solar Radiation Geometry and its relation, Measurement of Solar Radiation, Principle of Conversion of Solar Radiation into Heat, Collectors(Flat Plate and Concentrating Collectors), Solar Water Heaters , Solar Cookers , Solar driers, Solar Still, Solar Furnaces, Solar Green Houses. Solar Photovoltaic, Solar Cell fundamentals, characteristics, classification, construction of module, panel and array. Solar PV Systems (stand-alone and grid connected), Solar PV Applications.

Module – III

Introduction, Wind and its Properties, History of Wind Energy, Wind Energy Scenario –World and India. Basics of lift and drag, Basic principles of Wind Energy Conversion Systems (WECS), Classification of WECS, Parts of WECS, Derivation for Power in the wind, Electrical Power Output and Capacity Factor of WECS, Wind site selection consideration, wind farm, Advantages and Disadvantages of WECS.

Module – IV

Introduction, Photosynthesis process, Biomass fuels, Biomass conversion technologies, Urban waste to Energy Conversion, Biomass Gasification, Biomass to Ethanol Production, Biogas production from waste biomass, factors affecting biogas generation, types of biogas plants, energy plantation, Biomass program in India.

Module –V

Tidal Energy, Principle of Tidal Power, Components of Tidal Power Plant, Classification of Tidal Power Plants. Ocean Thermal Energy Conversion (OTEC), Principle of OTEC system, Methods of OTEC power generation – Open Cycle (Claude cycle), Closed Cycle (Anderson cycle). Geothermal Energy, Resources of geothermal energy, Hydrogen and Storage, Fuel Cell Systems, Hybrid Systems.

COURSE OUTCOMES

1. An ability to independently carry out research /investigation and development work to solve practical problems
2. An ability to write and present a substantial technical report/document
3. Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program
4. Ability to design, implement and perform analysis using cutting edge technologies for harnessing renewable energy in multi-disciplinary applications
5. Ability to work in contemporary and futuristic renewable energy research towards industry and society for sustainable energy solutions

Text Books/References:

1. Godfrey Boyle, “Renewable Energy, Power for a Sustainable Future”, Oxford University Press,U.K., 1996. 2. Rai. G.D., “Non-Conventional Energy Sources”, Khanna Publishers, New Delhi, 2011. 3. Twidell, J.W. & Weir, A., “Renewable Energy Sources”, EFN Spon Ltd., UK, 2006. Reference books: 1. Sukhatme. S.P., “Solar Energy”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997. 2. Tiwari. G.N., Solar Energy – “Fundamentals Design, Modelling& Applications”, NarosaPublishing House, New Delhi, 2002. 3. Freris. L.L., “Wind Energy Conversion Systems”, Prentice Hall, UK, 1990. 4. Chetan Singh Solanki, Solar Photovoltaics, “Fundamentals, Technologies and Applications”, PHILearning Private Limited, New Delhi, 2009.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	Project Management	CEH611

COURSE OBJECTIVES:

To facilitate the understanding of project management principles and processes

Contents:

Module- I

Introduction: Introduction to Project Management, definitions, History of Project Management, project identifications, establishing a project, Project Life Cycle.

Module- II

Project Analysis: Facets of Project Analysis, Resource Allocation, Market Analysis, Technical Analysis, Economic and Ecological Analysis.

Module- III

Financial Analysis: Financial Estimates and Projections, Investment Criteria, Financing of Projects.

Module- IV

Network Methods in PM: Origin of Network Techniques, AON and AOA differentiation, CPM network, PERT network, Other network models.

Module- V

Optimisation in PM: Time and Cost trade-off in CPM, Crashing procedure, Scheduling when resources are limited.

Module- VI

Project Risk Management: Risk analysis, Work Breakdown Structure, Earned Value Management.

COURSE OUTCOMES

1. Understand the current state of the project management profession
2. Apply project management tools and techniques
3. Explore the appropriate methods to initiate, plan, execute, control and close projects

Books:/ References

1. Prasanna Chandra, Project: A Planning Analysis, Tata McGraw Hill Book Company,New Delhi, 4th Edition, 2009.
2. Cleland, Gray and Laudon, Project Management, Tata McGraw Hill Book Company, New Delhi, 3rd Edition, 2007.
3. Jack R. Meredith., Samuel J. Jr. Mantel., Project Management - A Managerial Approach, John Wiley, 6th Edition, 2011.

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B.Tech (Civil Engineering) Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	**Operations Research**	CEH612

COURSE OBJECTIVES: Industrial/ business scenario involving limited resources and finding the optimal solution within constraints. The objective of this course is to enable the student to understand and analyses managerial and engineering problems to equip him to use the resources such as capitals, materials, productions, controlling, directing, staffing, and machines more effectively.

Module-I

Introduction: Scope and limitations of O.R., Linear Programming: Mathematical formulation of the problem. Graphical solution and Simplex Method

Module-II

Linear Programming: Big-M Method, Concept of duality, Dual simplex Method

Module-III

Transportation Model: Basic feasible solution by different methods, Finding optimal solutions, Degeneracy in transportation problems, Unbalanced transportation problems. Assignment Model: Balanced and unbalanced assignments, Assignment to given schedules.

Module-IV

Sequencing: Processing of 2 jobs through machines –graphical method, Processing of n jobs through two machines, processing n jobs through three machines.

Module-V

Games Theory: Two-persons zero sum games, Pure and mixed strategies, Rules of dominance, Solution methods without saddle point.

Module-VI

Queuing Model: Queuing systems and their characteristics, The M/M/1/FIFO/ system, Introduction to dynamic programming.

COURSE OUTCOMES

1. Solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained.
2. Determine optimal strategy for Minimization of Cost of shipping of products from source to Destination/ Maximization of profits of shipping products using various methods, Finding initial basic feasible and optimal solution of the Transportation problems
3. Optimize the allocation of resources to Demand points in the best possible way using various techniques and minimize the cost or time of completion of number of jobs by number of persons.

Text Books:

1. P. Rama Murthy , Operations Research, New Age, New Delhi
2. P.K. Gupta & D. S. Hira , Operations Research, S.Chand & Company Ltd, New Delhi.

References Books:

1. Hamdy A Taha, 1999. Introduction to Operations Research, PHI Limited, New Delhi.
2. Sharma, J.K., 1989. Mathematical Models in Operations Research, Tata McGraw Hill publishing Company Ltd., New Delhi.
3. Beer, Stafford, 1966. Decision and Control, John Wiley & Sons, Inc., New York.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	**Managerial Economics**	CEH613

Course Objectives This course enables the students:

1. To explain the basics of economics and describe its application in managerial problems.
2. To demonstrate the effect of demand and cost on business decisions and make a relation between cost and production.
3. To analyse different types of market and explain pricing decisions in the markets.
4. To familiarize the concept of investment criteria. .
5. To explain the concept of national income and analyse for managerial decisions.

Module-I

Introduction: Nature and scope, Definitions, Importance, Application to Business Decisions, Profit Maximization as Business Objectives, Sales and Revenue Maximization Objective of Business Firms.

Module-II

Demand and Supply Introduction, Determinants of Demand and Supply, Demand Function, Demand and Supply Curves, Law of Demand, Elasticity of Demand, Demand Forecasting,

Module-III

Production Analysis and Cost Classification of Cost, Cost-Output Relationship, Economies of Scale, Break-even Analysis Production Process and Function-One Variable and Two Variable Inputs, Iso-quant and Iso-cost, Optimal Factor Combination.

Module-IV

Market Introduction, Market Types- Perfect Competition, Imperfect Competition, Monopoly and Oligopoly- Price Leadership Model, Collusive Oligopoly and Kinked Demand Curve Model, Equilibrium of a Firm under Perfect Competition, Price Determination under Different Markets.

Module-V

Capital Budgeting & National Income Introduction, Meaning and Significance of Capital Budgeting, Methods of Investment Appraisal, Concept of National Income, Measurement of National Income- Methods and Problems.

Course Outcomes After the completion of this course, students will be:

1. Analyse economic problems and can corelate scarcity with the requirements.
2. Evaluate demand and can analyse cost in order to optimise cost-production combination.
3. Recognise the existing market and can take appropriate decisions.
4. Evaluate the investment criteria and can frame appropriate plan.
6. Analyse national income components for effective economic decisions.

Text Books /REFERENCES

1. Managerial Economics, Atmanand, Excel Books 2. Managerial Economics, H. Craig Petersen & W. Cris Lewis, Pearson Education

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – VI

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	**Introduction to Soft Skills**	CEH654

Course Objectives:

1. To encourage the all-round development of students by focusing on soft skills.
2. To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
3. To develop and nurture the soft skills of the students through individual and group activities.
4. To expose students to right attitudinal and behavioral aspects and to build the same through activities

Soft skill development

Module-I: Speaking skill

Module-II: Introduction to Group discussion

Module-III: Process of Group Discussion

Module-IV: Leadership skill

Module-V: Instant public speaking

Course Outcomes: On completion of the course, student will be able to–

Effectively communicate through verbal/oral communication and improve the listening skills

Write precise briefs or reports and technical documents .

Actively participate in group discussion / meetings / interviews and prepare & deliver presentations

Books/References

1. Contemporary English Grammar Structures and Composition; David Green, Macmillan

2. English Grammar and composition; R. C. Jain, Macmillan 3. Effective Technical Communication; M. Ashraf Rizvi, Tata McGraw Hill Companies 4. Developing Communication Skills; Krushna Mohan, Meera Baneji, Macmillan

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – VII

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Semester-VII

SL. No.	Category	Subject Code	Subject Name	Periods			Credits	Marks Distribution				
				L	T	P		Internal	External		Total	
								Max	Max	Min	Max	Min
1	**Professional Core Course**	CEP701	Construction Planning & Management	3	0	0	**3**	30	70	21	100	35
2	**Professional Core Course**	CEP702	Advanced StructuralDesign	3	0	0	**3**	30	70	21	100	35
3	**Professional Core Course**	CEP 703	Advanced Geo-technical Engineering	3	0	0	**3**	30	70	21	100	35
4	**Professional Core Course**	CEP 704	Solid and Hazardous Waste Management	3	0	0	**3**	30	70	21	100	35
5	**Professional Elective Course**		Professional Elective- IV	3	0	0	**3**	30	70	21	100	35
6	**Open Elective Course**		Open Elective-III	3	0	0	**3**	30	70	21	100	35
7	**PROJ**	CED 754	Project-I	0	0	6	**3**					
8	**SEM**	SEM 755	Seminar	0	0	0	**1**					
Total							**22**					

Professional Elective (PEC)-V (Any one)

S. No	Category	Code	Subject
1	Professional Elective Course	CEPE 705	Industrial Waste Treatment
2	Professional Elective Course	CEPE706	Auto CAD
3	Professional Elective Course	CEPE707	Urban Transportation System
4	Professional Elective Course	CEPE708	Port and Harbours Engineering
5	Professional Elective Course	CEPE 709	Design of Hydraulic Structure

Open Elective (OEC)-III (Any one)			
S. No	**Category**	**Code**	**Subject**
1	Open Elective Course	MEOE 710	Refrigeration & Air Conditioning
2	Open Elective Course	EEEOE711	Wind & Solar Energy System
3	Open Elective Course	CSEOE 712	IoT (Internet of Things)

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – VII

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.TECHCE	Construction Planning & Management	CEP701

Course Objectives:

1) Impart and enrich knowledge of effective and quality construction management practices leading to savings in time and cost of construction projects.
2) Apply latest methods, procedures, modern tools and techniques to optimise resources for achieving project objectives in construction projects.
3) Communicate effectively, demonstrates leadership qualities, work in team environment and exhibit professional ethics.
4) Engage in lifelong learning for career enhancement as per the needs of practicing engineers and academician and adapt to changing societal.

Module-I

Preliminary and detailed investigation methods: Methods of construction, form work and centering. Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.

Module-II

Construction equipments: Factors affecting selection, investment and operating cost, output of various equipments, brief study of equipments required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.

Module-III

Contracts: Different types of controls, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction.

Module-IV

Specifications & Public Works Accounts: Importance, types of specifications, specifications for various trades of engineering works. Various forms used in construction works, measurement

book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.

Module-V

Site Organization & Systems Approach to Planning: Accommodation of site staff, contractor's staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering. Problem of equipment management, assignment model, transportation model and waiting line modals with their applications, shovel truck performance with waiting line method.

Course Outcomes:

1. Apply knowledge of construction engineering to solve problems related to contemporary issues in construction Industry.
2. Analyze, design, conduct numerical experiments, and interpret data of complex construction technology management problems.
3. Use modern engineering tools, instrumentation and software in implementing construction projects.
4. Communicate effectively, demonstrate leadership skills, work in interdisciplinary engineering teams with social responsibility and ethical values.
5. Engage in lifelong learning and demonstrate awareness of contemporary issues to meet the challenges and demand of the society

Books /References

1. Varshney RS; Concrete Technology; Oxfored & IBH publishing co.
2. Gambhir ML; Concrete Technology – TMH
3. Sinha SN; Reinforced Concrete Technology; TMH
4. New Building Materials Published by B.M.T.P.C., New Delhi
5. Hand books on Materials & Technology - Published by BMTPC & HUDCO
6. Mohan Rai & M.P. Jai Singh; Advances in Building Materials & Construction
7. Jackson N; Civil engineering materials.

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – VII

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
CE	Advanced Structural Design	CEP702

Course Objectives: To understand the concepts of designing reinforced cement concrete structures.

Module-I

Design of Multistory Buildings – Sway and nonsway buildings, Shear walls and other bracing elements

Module-II

Earth Retaining Structures: Cantilever and counter fort type'sretaining walls.

Module-III

Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular,circular & intze tanks.

Module-IV

T-beam & Slab bridges- for highway loading (IRC Loads). Prestressing concepts materials, systems of prestressing & lossesIntroduction to working & limit State Design

Module-V

T-beam & Slab bridges- for highway loading (IRC Loads). Prestressing concepts materials, systems ofprestressing & losses Introduction to working & limit State Design.

Course Outcomes:

1. Identify various reinforced concrete structural members, its behavior and its purposes.
2. Analyze the structural member and apply the knowledge in designing.
3. Utilize of the knowledge of analysis and design and apply it in practical life
4. Discuss the behavior and failure modes of different reinforced concrete members.
5. Test the serviceability criteria of various reinforced concrete members.
6. Utilize the relevant software in the analysis and design of reinforced concrete members. mbers.

Text Books / References:

1. Design of Reinforced Concrete Structures 1st Edition by N. Subramanian
2. Design of Reinforced Concrete Structures (IS:456-2000) 3rd Edition by N. Krishna Raju
3. Design Of Reinforced Concrete Structures by Ramamrutham
4. Limit State Design of Reinforced Concrete, 2nd Edition by P. C. Varghese
5. Practical Design of Reinforced Concrete Structures 1st Edition by Ghosh

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Semester – VII

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
CE	Design of Hydraulic Structure	CEPE709

Course Objectives: This course is aimed to introduce the students the basic design criteria applicable for hydraulic structures such as diversion tunnels, bottom outlets, spillways, energy dissipaters, and intake structures.

Module-I

Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dams.

Module-II

Earth Dams: Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition. Rock fill dams: Types, merits and demerits, conditions favorable for their adoption.

Module-III

Spillways: Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways.

Module-IV

Energy dissipations and gates: Principles of energy dissipation Energy dissipaters based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles and details. Design of canal regulating structures, Detaild design of Sarda Falls, design of cross drainage works, sphypon aquaduct.

Module-V

Hydropower Plants: Introduction of Hydropower development, assessment of power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft

tubes, surge tanks, penstocks, power house dimensions, developmentof micro hydel stations, tidal plants, pumped storage plants and their details.

Course Outcomes: Upon successful completion of this course, a student specifically will be able to:

1. Classify types and parts of hydraulic structures and their importance in hydraulic engineering
2. Select the optimum design discharge in designing hydraulic structures
3. .Apply design principles for diversion structures, bottom outlets, spillway structures, energy dissipator and inlet structures

Reference

1. Fluid Mechanics - Modi & Seth - Standard Book house, Delhi
2. Open Channel Flow by Rangaraju - Tata Mc Graw - Hill Publishing Comp. Ltd., New Delhi
3. Fluid Mechanics - A.K. Jain - Khanna Publishers, Delhi
4. Fluid Mechanics, Hydraulics & Hydraulic Machanics - K.R. Arora - Standard Publishers Distributors 1705- B, Nai Sarak,Delhi.
5. Hyd. of open channels By Bakhmetiff B.A. (McGraw Hill, New York)
6. Open Channel Hyd. By Chow V.T. (McGraw Hill, New York)
7. Engineering Hydraulics By H. Rouse
8. Centrifugal & Axial Flow Pump By Stempanoff A.J. New York
9. Relevant IS codes

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Civil Engineering) Semester – VII

New Scheme Based On AICTE Flexible Curriculam

(Course Content)

Branch	Subject Title	Subject Code
B.TECH.CE	Auto CAD	**CEPE707**

Course Objectives: The objective of this lab is to teach the student usage of Auto cad and basic drawing fundamentals in various civil engineering applications, especially in building drawing.

Module-I

Introduction Principle of drafting, Terminology, & fundamentals. Size & shape descriptions. Geometric Construction. Views Plan views, Auxiliary views, Section .

Module-II

Projection , Method of Projection. Multi-view Orthographic Projection. Projection Techniques.

Module-III

Introduction of CADD (Computer Aided Drafting & Designing). Function keys, Shortcut keys, Different sizes of paper. Application of CADD – Automatic Drafting , Geometric Modeling Geometric Modeling – Wire frame Modeling, Surface Modeling, and Solid Modeling. CADD Application & it's feature Introduction to Standard based 2D drafting (Based on International standard for representation & conformation)

Practical Competencies

- Practice on Drawing basics
- Geometrical Drawing Practice
- Making plan of Projection.
- Creation Multi-view Orthographic projection.
- Drafting views in First angle & Third angle Projection.
- Creating Auxiliary views & Sections. • Freehand Sketching.
- Representing Standard base 2D drafting.
- Drawing Elementary CADD command – Line, Polyline, Polygon, Circle, Polyline, arc, ellipse, Text Single Text, Multi text, D text.

- Modifying Elementary Commands – Erase, Move, Copy , Mirror, Offset, Scale, Stretch, Chamfer, fillet & explode. • Making layers, line type &Lineweight.
- Different menus of Auto-Cad, Function keys, Shortcut keys, Paper size.
- Making Title Block, Writing it & inserting it in any drawing file with scale, angle & explode options.
- Creating a new template file (.Dwt file) & applying it to every drawing file.
- Drafting of building plan , Elevation , Section Views.

Course Outcomes: At the end of the course, the student will be able to:

1. Use the Autocad commands for drawing 2D & 3D building drawings required for different Civil Engg. applications.
2. Plan and draw Civil Engineering Buildings as per aspect and orientation.
3. Presenting drawings as per user requirements and preparation of technical report

Book/ References:

1. Computer Aided Design Laboratory by M. N. Sesha Praksh & Dr. G. S. Servesh –Laxmi Publications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech. (Civil Engineering) Semester – VII

New Scheme Based On AICTE Flexible Curriculam

(Course Content)

Branch	Subject Title	Subject Code
B.TECH.CE	Advanced Geotechnical Engineering	**CEPE703**

Course Objectives:

1. This course will enable the students to apply the knowledge to various foundations and stability problems of soil structures.
2. Introduction to the advanced topic such as application of geosynthetics for different site conditions have been also covered**.**

Module-I

Module I. Site Investigation and subsoil exploration: Methods of soil exploration; Planning a subsoil exploration: Number of boreholes and depths of exploration for various types of works; Field Tests: Standardpenetration test; Dynamic and Static cone penetration tests; Vane shear test; Geophysical Exploration; Soil samplers & collection of soil samples

Module-II

Stress Distribution: Boussinesq's and Westergaard's equations, Pressure distribution diagram, Newmark's influence chart; Contact pressure below foundations –Steinbrenner's coefficients; Settlement of foundations : Elastic, Consolidation and Creep settlements; Total and Differential settlements; Rate of settlement, I. S. Code limitations for different structures Settlement calculation from consolidation characteristics and using N-values

Module-III

Plastic equilibrium in soil – active & passive cases. Active earth pressure –Rankine's Theory; Active & passive

earth pressure of cohesive & cohesion-less soil; Rankine's active thrust by trial wedge; Coulomb's wedge theory–Rebhann's construction & Culmann's construction

Module-IV

Stability analysis of finite & infinite slopes; Types of slope failures; Methods of analysis for slope stability – method of slices; Bishop's simplified method; Friction circle method; Stability Number; Stability of slopes ofEarth dams

Module-V

Introduction to Machine Foundations & Well Foundations Soil dynamics, Mass-spring system with & without damping; Machine Foundations: Types of Machines and Machine Foundations, Vibration isolation: Types and Methods of Isolation, Shapes and Types of wells or caissons, their advantages and disadvantages; componentsof a well foundation;

Course Outcomes : At the end of this course students will be able to

Compute stresses induced in soil due to different types of loading and apply the knowledge to settlements problems in the foundation engineering.

Determine the shearing strength of soils and apply it in different geotechnical solutions viz. foundation engineering, stability analysis of slopes and earth pressures computations.

Select most suitable type of foundation and evaluate load carrying capacity of shallow and deep foundations.

Understand the applications of geosynthetics in civil engineering projects.

Text Books /Reference:

1. Soil Mechanics by Craig R.F., Chapman & Hall
2. Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
3. An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ
4. Principles of Geotechnical Engineering, by Braja M. Das, Cengage Learning
5. Principles of Foundation Engineering, by Braja M. Das, Cengage Learning
6. Essentials of Soil Mechanics and Foundations: Basic Geotechnics by David F. McCarthy
7. Soil Mechanics in Engineering Practice by Karl Terzaghi, Ralph B. Peck, and Gholamreza Mesri.
8. Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering (Civil and Environmental Engineering) by V.N.S. Murthy

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – VII

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	Industrial Waste Treatment	CEPE705

Course Objective:-

This series of courses trains industrial wastewater treatment facility operators to safely and efficiently monitor industrial waste, operate and maintain treatment processes and equipment, and apply instrumentation and control in treatment strategies.

Module-I

Problem of Water Pollution: Effects of wastes on streams and sewage treatment plant. Natural purification of streams. oxygen sag curve. allowable organic load on streams classification of stream, stream standards and effluent standards.requirement of water for different purposes.

Module-II

Measurement of Waste Water Volume: Sampling of waste waters, grab and composite samples. analysis of waste water. biochemical oxygen demand. chemical oxygen demand and pH value of waste, toxicity of waste by bioassay method. Pretreatment of Wastes: Volume and strength reduction, salvage of materials, recovery of by products, reuse of waste water.

Module-III

Conventional Methods of Treatment of Waste Water: Removal of suspended solids, removal of inorganic and organic dissolved solids, studge disposal, advance methods of treatment, such as reverse osmosis, ion exchange, electrodialysis, algal harvesting etc. low cost treatment plants. common effluent treatment plant, design and operation.

Module-IV

Combined Treatment of Waste Water Sewage: Energy requirement optimization and bedget, municipal regulation, sewer rental charge, instrumentation in waste water treatment plants, collection of data, operation and maintenance of plants,water pollution control board.

Module-V

Brief study of industrial processes and treatment methods of waste water from common industries, such as textile, dairy, paper and pulp, tannery, distillery. Hazardous wastes- Impact handing and disposal.

COURSE OUTCOMES: After completing this course the student must demonstrate the knowledge and ability to:

1. Learn a firm foundation and knowledge of mathematics, science and engineering principles and the ability to apply the knowledge.
2. Define and reason about fundamental concepts of waste water treatment
3. Design and conduct experiments and the ability to analyse the data, interpret results and draw conclusions.
4. Design a component, system or process to meet desired needs and imposed constraints.
5. Think logically, critically and creatively.
6. Identify, formulate and solve civil engineering problems
7. Use appropriate modern techniques skills and tools including computer applications, necessary for engineering practice.

Book/ References:-

1. Punmia, B.C., Jain, A.K., Jain, A.K. “Surveying” – Vol. 1 and
2. Laxmi Publications (P) Ltd.
3. Kanetkar, T.P., Kulkarni S.V. “Surveying and Levelling.” – Part 1 and 2, Pune Vidyarthi Griha Prakashan.
4. Duggal, S.K. “Surveying” – Vol. 1 and 2, The McGraw-Hill Companies, New Delhi.
5. Arora, K.R. “Surveying” – Vol. 1 and 2, Standard Book House, New Delhi

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – VII

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	**Solid and Hazardous Waste Management**	**CEP704**

Course Objective

This course provides an in depth understanding of solid and hazardous waste characteristics and management. Some basics of radioactive waste characterization and handling are also provided.

Module-I Relevant Regulations

Municipal solid waste (management and handling) rules; hazardous waste (management and handling) rules; biomedical waste handling rules; flyash rules;recycled plastics usage rules; batteries (management and handling) rules

Module-II Municipal Solid Waste Management

Fundamentals Sources; composition; generation rates; collection of waste; separation, transfer and transport of waste; treatment and disposal options

Module-III Hazardous Waste Management

Fundamentals Characterization of waste; compatibility and flammability of chemicals; fate and transport of chemicals; health effect

Module-IV Radioactive Waste Management

Fundamentals Sources, measures and health effects; nuclear power plants and fuel production; waste generation from nuclear power plants; disposal options

Module-V Biological Treatment of Solid and Hazardous Waste

Composting; bioreactors; anaerobic decomposition of solid waste; principles of biodegradation of toxic waste; inhibition; co-metabolism; oxidative and reductive processes; slurry phase bioreactor; in-situ remediation

Module-VI Environmental Risk Assessment

Defining risk and environmental risk; methods of risk assessment; case studies

Course outcomes: On successful completion of the course, the student should be able to

1. State solid waste characteristics and its sources.
2. Identify and analyze different methods of treatment of solid waste.
3. Illustrate Industrial practices in solid waste management.
4. Discuss the significance of recycling reuse and reclamation of solid wastes.
5. Assess the relationships between environmental guidelines, human activities and quality of impacted soil, water and air.

Book/ References:

1. John Pichtel Waste Management Practices CRC Press, Taylor and Francis Group 2005.
2. LaGrega, M.D.Buckingham,P.L. and Evans, J.C. Hazardous Waste Management, McGraw Hill International Editions, New York, 1994.
3. Richard J. Watts, Hazardous Wastes - Sources, Pathways, Receptors John Wiley and Sons, New York, 1

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – VII

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	Urban Transportation System	**CEPE707**

Course Objectives:

1. Impart the knowledge of urban transportation system.
2. Developing analytical and comprehensive approach to select appropriate mode of transportation.

Module-I Introduction to Water Transportation:

History, Scope, Merits, Developments of Water Transportation in India, Inland waterways, River, Canal, Inland water transportation, Harbor, Port, Dock, Development of Ports & Harbors, classification, Harbor site selection, Harbor dimensioning

Module-II Port Planning:

Characteristics of good seaport and principles of seaport planning, size of seaport, site selection criteria and layout of seaport, Dry ports, Bulk cargo, Transshipment ports, Port of call, Surveys to be carried out for seaport planning, regional and intercontinental transportation development, forecasting cargo & passenger demand, regional connectivity, cargo handling capacity of port.

Module-III Natural Phenomena:

Wind, Tides, Water waves, Wind rose and wave rose diagrams, wave diffraction, breaking, reflection, Littoral drift, sediment transport, Effects on Harbor and structure design

Module-IV Harbor Infrastructures:

Ship characteristics. Design of Harbor entrance, channel, turning basin, IS provisions, Breakwaters - function, types, general design principles, wharves, quays, jetties, piers, pier heads, dolphin, fenders, mooring accessories, IS provisions. Repair facilities, wet docks, lift docks, dry docks, gates for graving docks, floating docks, slipways, locks and gates

Module-V Port Amenities & Operations:

Ferry, Transfer bridges, floating landing stages, transit sheds, warehouses, cold storage, aprons, cargo handling equipment, purpose and general description: stack area, single point mooring, IS provisions

Module-VI Impact analysis:

Economic evaluation of port project, Environmental impacts of port activities.

Course Outcomes: After learning the course the students shall be able to:

1. Apply up-to-date information for planning and operation of urban transport.
2. Execute various transportation related surveys.
3. Evaluate relative importance of various modes and their capacities.
4. Solve travel demand forecasting problems.
5. Recommend most appropriate transport modes based on performance evaluation.

Book/Reference

1. R. Srinivasan and S. C. Rangwala, Harbour, Dock and Tunnel Engineering, 1995, Charotar Pub.House, Anand
2. S. P. Bindra, A Course in Docks and Harbour Engineering, 1992, Dhanpat Rai & Sons, NewDelhi
3. IS Codes: 4651 (Part I to V), 7314, 9527 (Part I, III, IV, VI), 10020 (Part IV).
4. Alonzo Def. Quinn, Design and Construction of Ports and Marine Structure, McGraw - Hill Book Company, New York.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – VII

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	Port and Harbours Engineering	**CEPE708**

Course Objectives:

1. Study basics of docks, harbour and airports.
2. Learn various marine structures and navigation aids at port.
3. Understand various ground and airside structures including terminal building.

Module-I .Introduction

Development plans, objectives and goals; level of planning; role of transportation at national, regional and urban level.

Module-II Urbanization

Definition of urban area; trends in urbanization; urban class groups; metropolitan city; transportation problems & identification.

Module-III Travel Demand

Concepts of travel demand; factors affecting demand and the demand functions; calibration methods; sequential, direct demand models; introduction to aggregate and disaggregate approaches

Module-IV Transportation Surveys

The transportation study area definition; division into traffic zones; network identification and coding; types of travel and characteristics of various surveys; home interview; roadside survey; goods, mass transit and intermediate public transport surveys; sampling and expansion factors; accuracy checks, screen line checks, consistency checks.

Module-V Travel Forecasting

Growth factor methods and urban transportation planning system; growth factors; average growth factor method and Furness method

Module-VI UTP System

Trip generation; zonal regression methods and category analysis; trip distribution method; gravity models and opportunity models; modal split methods; factors affecting modal split; trip end

models and trip distribution models; route assignment; factors affecting route choice; diversion curve; shortest paths; all or nothing assignment.

Module-VII Corridor Identification

Prediction issues and forecasting of the travel demand and future desires; corridor identification and corridor screen line analysis.

Module- VIII Mass Transit Systems

Bus and rail transit; characteristics, capacities, route planning

Module-IV Transportation Plan Preparation

Urban forms and structures; point, linear, radial, poly-nuclear developments and preparation of plan, comprehensive and traffic system management plans A.

Course Outcomes:

At the end of the course the student will be able to:

1. Explain the significance of ports and harbors as a mode of transport.
2. Demonstrate the fundamental principles of wave hydrodynamics and port cargo handling.
3. Demonstrate the basic design of port layout
4. Design, plan and integrate port and harbour infrastructure.
5. Explain the construction, maintenance and renovation aspects of ports and inland waterways

Text Books:/References

1. 1 Kadiyali, L.R., Traffic Engineering & Transport Planning, Khanna Publishers, New Delhi
2. Jotin Khisty, S.C. and Kent Lall, B., Transportation Engineering – An Introduction, Prentice-Hall, NJ
3. Salter, R J., Highway Traffic Analysis and Design, ELBS B. Reference Books:
4. Hutchison, B.G., Introduction to Transportation Engineering, & Planning, McGraw Hill Book Co.
5. John W. Dickey, Metropolitan Transportation Planning, Tata McGraw Hill Pub. Co.
6. Vukan R. Vuchic, Urban Public Transportation System & Technology, Prentice Hall, Inc.
7. Papacostas, C.S., Fundamentals of Transportation System Analysis, PHI
8. Jotin Khisty, C. and Kent Lall, B., Transportation Engineering – An Introduction,

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

R.K.D.F. UNIVERSITY, RANCHI

B.Tech (Civil Engineering) Semester – VII

New Scheme Based On AICTE Flexible Curriculam

(**Course Content**)

Branch	Subject Title	Subject Code
B.Tech. CE	**Artificial Intelligence**	**CSEOE712**

Course Objective:-

1. Gain a historical perspective of AI and its foundations.
2. Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
3. Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. Experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.
5. Experiment with a machine learning model for simulation and analysis.
6. Explore the current scope, potential, limitations, and implications of intelligent systems.

Module-I

Introduction: Overview of Artificial Intelligence- Problems of AI, AI Technique, Tic - Tac - Toe Problem. Intelligent Agents: Agents & Environment, Nature Of Environment, Structure Of Agents, Goal Based Agents, Utility Based Agents, Learning Agents. Problem Solving: Problems, Problem Space & Search: Defining The Problem As State Space Search, Production System, Problem Characteristics, Issues In The Design Of Search Programs.

Module - II

Search Techniques: Solving Problems By Searching, Problem Solving Agents, Searching For Solutions; Uniform Search Strategies: Breadth First Search, Depth First Search, Depth Limited Search, Bi-directional Search, Comparing Uniform Search Strategies. Heuristic Search Strategies: Greedy Best-First Search, A* Search, Memory Bounded Heuristic Search: Local Search Algorithms & Optimization Problems: Hill Climbing Search, Simulated Annealing Search, Local Beam Search, Genetic Algorithms; Constraint Satisfaction Problems, Local Search For Constraint Satisfaction Problems. Adversarial Search: Games, Optimal Decisions & Strategies in Games, The

Mini Max Search Procedure, Alpha-Beta Pruning, Additional Refinements, Iterative Deepening.

Module-III

Knowledge & Reasoning: Knowledge Representation Issues, Representation & Mapping, Approaches to Knowledge Representation, Issues in Knowledge Representation. Using Predicate Logic: Representing Simple Fact in Logic, Representing Instant & ISA Relationship, Computable Functions & Predicates, Resolution, and Natural Deduction. Representing Knowledge Using Rules: Procedural Verses Declarative Knowledge, Logic Programming, Forward Verses Backward Reasoning, Matching, Control Knowledge.

Module-IV

Probabilistic Reasoning: Representing Knowledge in an Domain, Bayesian Networks, Dempster-Shafer Theory. Planning: Overview, Components of A Planning System, Goal Stack Planning, Hierarchical Planning. Learning: Forms Of Learning, Inductive Learning, Explanation Based Learning, Neural Net Learning & Genetic Learning.

Module-V

Natural Language Processing: Brief introduction to Syntactic Processing, Semantic Analysis, Discourse & Pragmatic Processing. Robotics: Introduction, Robot hardware, robotic perception, planning to move, planning uncertain movements, robotic software architecture, application domains.

Course outcomes: Upon successful completion of this course, the student shall be able to:

1) Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
2) Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
3) Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4) Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.
5) Demonstrate proficiency in applying scientific method to models of machine learning.
6) Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications

Books/ Reference

Russel S. and Norvig P., Artificial Intelligence a Modern Approach, 3rd edition, Pearson Education. Rich E. & Knight K., Artificial Intelligence, 3rd edition, TMH, New Delhi. Patterson Dan W., Introduction to Artificial Intelligence and Expert Systems, PHI, NewDelhi, 2006. Rolston D.W., Principles of AI & Expert System Development, TMH, New Delhi.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (Civil Engineering) Semester – VII

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	**Wind and Solar Energy Systems**	**EEEOE711**

COURSE OBJECTIVES

1) Explain the concept of wind and solar energy systems
2) To provide the students a deep insight in to the integration of power electronics converters with PV and wind energy sources.
3) To expose students to study various maximum power point tracking (MPPT) techniques of wind and PV energy systems
4) Explains the need for hybrid energy systems and issues associated with it.

Module-I: Physics of Wind Power:

History of wind power, Indian and Global statistics, Wind physics, Betz limit, Tip speed ratio, stall and pitch control, Wind speed statistics-probability distributions, Wind speed and power-cumulative distribution functions.

Module-II: Wind generator topologies:

Review of modern wind turbine technologies, Fixed and Variable speed wind turbines, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent- Magnet Synchronous Generators, Power electronics converters. Generator-Converter configurations, Converter Control.

Module-III: The Solar Resource:

Introduction, solar radiation spectra, solar geometry, Earth Sun angles, observer Sun angles, solar day length, Estimation of solar energy availability.

Module-IV: Solar photovoltaic:

Technologies-Amorphous, monocrystalline, polycrystalline; V-I characteristics of a PV cell, PV module, array, Power Electronic Converters for Solar Systems, Maximum Power Point Tracking (MPPT) algorithms. Converter Control.

Module-V (Network Integration Issues)

Overview of grid code technical requirements. Fault ride-through for wind farms - real and reactive power regulation, voltage and frequency operating limits, solar PV and wind farm behavior during grid disturbances. Power quality issues. Power system interconnection experiences in the world. Hybrid and isolated operations of solar PV and wind systems. Technologies, Parabolic trough, central receivers, parabolic dish, Fresnel, solar pond, elementar

Course Outcomes: At the end of this course, students will demonstrate the ability to

1. Understand the energy scenario and the consequent growth of the power generation from renewable energy sources.
2. Understand the basic physics of wind and solar power generation.
3. Understand the power electronic interfaces for wind and solar generation.
4. Understand the issues related to the grid-integration of solar and wind energy systems.

Text Book / References:

1) T. Ackermann, "Wind Power in Power Systems", John Wiley and Sons Ltd., 2005.
2) G. M. Masters, "Renewable and Efficient Electric Power Systems", John Wiley and Sons, 2004.
3) S. P. Sukhatme, "Solar Energy: Principles of Thermal Collection and Storage", McGraw Hill, 1984.
4) H. Siegfried and R. Waddington, " Grid integration of wind energy conversion systems" John Wiley and Sons Ltd., 2006.
5) G. N. Tiwari and M. K. Ghosal, " Renewable Energy Applications" , Narosa Publications, 2004.
6) J. A. Duffie and W. A. Beckman, " Solar Engineering of Thermal Processes", John Wiley & Sons, 1991.

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B.Tech (Civil Engineering) Semester – VII

New Scheme Based On AICTE Flexible Curriculam

Course Content)

Branch	Subject Title	Subject Code
B.Tech. CE	Refrigeration and Air conditioning	**MEOE710**

Course Objectives: The objective of the course is to enable the student;

1. To understand the fundamentals of refrigeration and air conditioning.
2. To calculate the cooling/heating load for different applications.
3. To select the appropriate equipment for various RAC applications.
4. To design and implement refrigeration and air conditioning systems as per the recommended standards

Module -I

Introduction about Refrigeration- Definition of various terms, Method of refrigeration,Air refrigeration system, Bell-Coleman cycle, Introduction about Air craft Air- conditioning, Evaporative cooling system, Boot strap cooling system, Regenerative cooling system, Reduced ambient system

Module –II

Analysis of vapour compression cycle, Modifications to basic cycle, Multi pressuresystem, Multi-evaporator system and Cascade system, properties of refrigeration, Selection of refrigeration, Discussion of components of VC system, Servicing, Vacuumizing and charging of refrigerant, Electrical and electronics control of air conditioning system and its fault detection.

Module – III

Vapour Absorption Refrigeration system and its applications, Thermo-electric Refrigeration system, Steam jet Refrigeration system, magnetic refrigeration, vortex andpulse tube refrigeration system

Module - IV

Psychrometry- Definition for properties, Introduction to cooling load calculations, Comfort conditions, Effective temperature concept, properties of moist Air-Gibbs Dalton law, Specific

humidity, Relative humidity, Enthalpy, Psychometric of Airconditioning Process, Mixing of air stream.

Module –V

Air-conditioning system- Discuss about the central plant with direct evaporator and chiller applications, ice plant, Refrigerators, Food preservation, IQF technique freeze drying and Cold storage.

Course Outcomes: On successful completion of the course, the student will be able to,

1. Illustrate the basic concepts of refrigeration system and analyze the vapour compression cycle.
2. Understand VARS, aircraft refrigeration system and select proper refrigerant.
3. Use psychometric principles for air-conditioning systems.
4. Design various components of air-conditioning system

Book:/References

1. Arora, C.P., Refrigeration and Air Conditioning, 3 nd ed., Tata McGraw-Hill, 2010. Reference books: 1. Stoecker, W.F. and Jones J.W., “Refrigeration and Air Conditioning”, McGraw Hill, New Delhi,1986. 2. Dossat R.D., Principle of Refrigeration, 4 th ed., Prentice-Hall, 1997. 3. Manohar Prasad, Refrigeration and Air Conditioning, New Age International, 2004. 4. Jones W.P., “Air conditioning engineering.” 5 th edition, Elsevier ButterworthHeinemann, 2001.

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BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

B.Tech (CIVIL ENGINEERIG) Semester VIII

Semester – VIII

Course Content & Grade

S. No	Subject Code	Subject Name	Internal	External		Total Marks	
			Max. Marks	Max Marks	Min. Marks	Max Marks	Min. Marks
1	CE801	Research Project/Internship	30	70	21	100	35

RKDF UNIVERSITY RANCHI

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING (B.TECH. CE)

Choice Based Credit System

Branch:- Civil Engineering

VIIIth Semester

S.NO	Subject Code	Subject Name	Periods			Credit
			L	T	P	
1	CE801	Research Project/Internship	Not applicable			8
Total						8

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