Syllabus and Scheme

B.Tech. in Civil Engineering

(For students admitted in 2017)

SEMESTER-I & II

RAJASTHAN TECHNICAL UNIVERSITY

Scheme & Syllabus of Teaching & Examination for I year B. Tech. I Semester Effective from the session: 2017-18

S.N	Subject Code	Course Title	L	T	P	IA	External	Total
		Theory Papers						
1.	MA-101	Engineering Mathematics-I	3	1	0	20	80	100
2.	HU-101/ HU-103	Communication Skills / Human Values	3	0	0	20	80	100
3.	PY-101/ CY-101	Engineering Physics/ Engineering Chemistry	3	1	0	20	80	100
4.	CS-101	Computer Programming-I	3	0	0	20	80	100
5.	CE-101	Environmental Engineering and Disaster Management	3	0	0	20	80	100
		Total	15	2	0	100	400	500
		Practical						
6.	HU-102/ HU-104	Communication Skills Lab./ Human Values: Activities	0	0	2	45	30	75
7.	PY-102/ CY-102	Engineering Physics Lab/ Engineering Chemistry Lab	0	0	2	45	30	75
8.	CS-102	Computer Programming-I Lab.	0	0	2	60	40	100
9.	CE-102	Computer Aided Engineering Graphics	0	0	3	60	40	100
10.	ME-101	Mechanical Workshop Practice	0	0	2	60	40	100
11.		Discipline & Extra Curricular Activity	0	0	0	50	0	50
		Total	0	0	11	320	180	500
		Grand Total	**15**	**2**	**11**	**420**	**580**	**1000**

(Total **28** periods per week)

L = Lecture, **T** = Tutorial, **P** = Practical, **IA**=Internal Assessment

Scheme & Syllabus of Teaching & Examination for I year B. Tech. II Semester Effective from the session: 2017-18

S.N	Subject Code	Course Title	L	T	P	IA	External	Total
		Theory Papers						
1.	MA-102	Engineering Mathematics-II	3	1	0	20	80	100
2.	HU-103/ HU-101/	Human Values/ Communication Skills	3	0	0	20	80	100
3.	CY-101/ PY-101	Engineering Chemistry/ Engineering Physics	3	1	0	20	80	100
4.	CS-103	Computer Programming-II	3	0	0	20	80	100
		Elective (any two)*						
5.	EE-101	Basic Electrical and Electronics Engineering						
6.	CE-103	Basic Civil Engineering	3	0	0	20	80	100
7.	ME-102	Basic Mechanical Engineering	3	0	0	20	80	100
8.	OE-101	Engineering Mechanics						
		Total	18	2	0	120	480	600
		Practical						
9.	HU-104/ HU-102	Human Values: Activities Communication Skills Lab.	0	0	2	45	30	75
10.	CY-102/ PY-102	Engineering Chemistry Lab/ Engineering Physics Lab	0	0	2	45	30	75
11.	CS-104	Computer Programming-II Lab	0	0	2	60	40	100
12.	ME-104	Computer Aided Machine Drawing	0	0	3	60	40	100
13.		Discipline & Extra Curricular Activity	0	0	0	50	0	50
		Total	0	0	9	260	140	400
		Grand Total	**18**	**2**	**9**	**380**	**620**	**1000**

(Total **29** periods per week)
L = Lecture, **T** = Tutorial, **P** = Practical, **IA**=Internal Assessment

*Elective: The student of a particular branch will not be allowed to opt for his own branch subject.

1. For Internal Assessment (IA) of the theory papers: Two Mid-Term Tests of 20 Marks.

2. Institute can arrange a third Mid-Term Test as per the convenience of the students.

3. Syllabus shall be prepared without units.

4. The question paper shall contain seven (07) questions of 16 marks each. The first question shall cover the entire syllabus and it shall be compulsory, it shall contain eight parts of 2 marks each, and answer to be given in about 25 words. From remaining six questions, student shall attempt any four questions.

5. Passing Rules for B.Tech. (4 Yr. Course)

The result of a candidate will be worked out at the end of each Semester Examination.

For a Pass, candidate must obtain marks for each theory.

(A)	Theory Paper	Passing%	(B)	Practical/Sessionals	Passing%
(i)	Internal Assessment	Nil	(i)	Sessional (60% component)	40%
(ii)	End Semester (B.Tech.) University Exam	35%	(ii)	Practical (40% component) University Exam	40%
(iii)	Total of (i) & (ii)	40%	(iii)	Total of (i) & (ii)	50%

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MA-101 ENGINEERING MATHEMATICS-I

Course Code: MA-101   Course Name: Engineering Mathematics-I
L-T-P: 3-1-0   Maximum Marks: 80

Differential Calculus:
Asymptotes (Cartesian coordinates only), concavity, convexity and point of inflection, Curve tracing (Cartesian and standard Polar curves- Cardioids, Lemniscates of Bernoulli, Limacon, Equiangular Spiral only).
Limit, continuity and differentiability of functions of two variables, Partial differentiation, Euler's theorem on homogeneous functions, change of variables, chain rule, Gradient, Directional derivative, Tangent planes and Normals.
Taylor's theorem (two variables), approximate calculations, Jacobian, maxima & minima of two and more independent variables, Lagrange's method of multipliers.

Integral Calculus:
Double integral, change of order of integration, Double integral by changing into Polar form, Applications of Double integrals for evaluating areas & volumes, triple integral; Beta function and Gamma function (simple properties).

Vector Calculus:
Scalar and vector field, differentiation & integration of vector functions: Gradient, Divergence, Curl and Differential Operator; Line, Surface and Volume integrals; Green's theorem in a plane, Gauss's and Stoke's theorem (without proof) and their applications.

Suggested Readings:

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

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HU-101 COMMUNICATION SKILLS

Course Code: HU-101   Course Name: Communication Skills
L-T-P: 3-0-0   Maximum Marks: 80

Communication: Meaning, Importance and Cycle of Communication, Media and Types of Communication, Formal and Informal Channels of Communication, Barriers to Communication, Division of Human Communication and Methods to Improve Interpersonal Communication, Qualities of Good Communication.

Grammar: Passive Voice, Indirect Speech, Conditional Sentences, Modal Verbs, Linking Words.

Composition: Curriculum Vitae Writing, Business Letter Writing, Job Application Writing, Paragraph Writing, Report Writing.

Short Stories: 'The Luncheon' by Somerset Maugham, 'How much Land does a Man Need?' by Leo Tolstoy, 'The Night Train at Deoli' by Ruskin Bond.

Poems: 'No Men are Foreign' by James Kirkup, 'If' by Rudyard Kipling, 'Where the Mind is without Fear' by Rabindranath Tagore.

Suggested Readings:

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

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HU-103 HUMAN VALUES

Course Code: HU-103   Course Name: Human Values
L-T-P: 3-0-0   Maximum Marks: 80

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, content and process for Value Education

Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration

Continuous Happiness and Prosperity- A look at basic Human Aspirations

Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority

Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

Method to fulfill the above human aspirations: understanding and living in harmony at various levels

Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' and the material 'Body'

Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha

Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail

Programs to ensure Sanyam and Swasthya

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction

Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti;

Trust (Vishwas) and Respect (Samman) as the foundational values of relationship

Understanding the meaning of Vishwas; Difference between intention and competence

Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship

Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals

Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family!

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

Understanding the harmony in the Nature

Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature

Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space

Holistic perception of harmony at all levels of existence

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values
Definitiveness of Ethical Human Conduct
Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
Competence in Professional Ethics:
a) Ability to utilize the professional competence for augmenting universal human order,
b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models
Case studies of typical holistic technologies, management models and production systems
Strategy for transition from the present state to Universal Human Order:
a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

Suggested Readings:

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

PY-101 ENGINEERING PHYSICS

Course Code: PY-101   Course Name: Engineering Physics
L-T-P: 3-1-0   Maximum Marks: 80

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

Diffraction and Polarization of light: Fraunhofer Diffraction at Single Slit. Diffraction grating: Construction, theory and spectrum; Determination of wavelength of light. Resolving power: Raleigh criterion; Resolving power of diffraction grating and telescope. Plane, circularly and elliptically polarized light on the basis of electric (light) vector: Malus law; Double Refraction; Phase retardation plates and their use in production and detection of circularly and elliptically polarized light; Optical activity and laws of optical rotation; specific rotation and its measurement using half-shade device.

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

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

Coherence and Optical Fibers: Spatial and temporal coherence; Coherence length; Coherence time and 'Q' factor for light; Visibility as a measure of Coherence and spectral purity; Optical fiber as optical wave guide; Numerical aperture; Maximum angle of acceptance and applications of optical fiber.

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

Suggested Readings:

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

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CY-101 ENGINEERING CHEMISTRY

Course Code: CY-101   Course Name: Engineering Chemistry
L-T-P: 3-1-0   Maximum Marks: 80

Water:
Common natural impurities, hardness, determination of hardness by complexometric (EDTA method), degree of hardness. Municipal water supply, requisite of drinking water, purification of water, sedimentation, filtration, sterilization, breakpoint chlorination. Water for steam making and boiler troubles, formation of solids (Scale and Sludge formation), carryover (Foaming and Priming), boiler corrosion and caustic embrittlement, Methods of boiler water treatment(water softening) preliminary treatments, preheating, Lime-Soda process, Zeolite (Permutit) process, Deionization (Demineralization) process.
Numerical problems based on hardness, Lime-Soda and zeolite process.

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

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

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

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

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

Suggested Readings:

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

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CS-101 COMPUTER PROGRAMMING-I

Course Code: CS-101
L-T-P: 3-0-0

Course Name: Computer Programming-I
Maximum Marks: 80

Computer Fundamentals: Flow chart, pseudocode. binary, octal and hexadecimal number system. ASCII, EBCDIC and UNICODE. boolean operations, primary and secondary memory. Difference among low-level & high-level languages.

C Programming: Structure of a 'C' program, Datatypes, enumerated, assignment statements, input output statements, If statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement. Datatype conversion. Functions & program structure (function call and return), scope of variables, parameter passing methods, recursion v/s iteration.

Suggested Readings:

1. Fundamental of Computers By R. Thareja**,** Oxford University Press.
2. Programming in ANSI C by E Balagurusamy, Tata McGraw-Hill Education.
3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI.
4. C:The Complete Reference by Herbert Schildt, McGraw-Hill Education.
5. Let us C by Yashavant P. Kanetkar, bpb publications.

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CE-101 ENVIRONMENTAL ENGINEERING AND DISASTER MANAGEMENT

Course Code: CE-101   Course Name: Environmental Engineering and
                                                              Disaster Management
L-T-P: 3-0-0   Maximum Marks: 80

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

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

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

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

Natural Disasters: Hydro-meteorological Based Disasters like Flood, Flash Flood, Cloud Burst, Drought, Cyclone, Forest Fires; Geological Based Disasters like Earthquake, Tsunami, Landslides, Volcanic Eruptions. Man made Disasters: Chemical Industrial Hazards, Major Power Break Downs, Traffic Accidents, Fire Hazards, Nuclear Accidents. Disaster profile of Indian continent. Study of recent major disasters. Disaster Management Cycle and its components.

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

Suggested Readings:
1. Towards Basics of Natural Disaster Reduction by Prof. D.K. Sinha. Researchco Book Center,Delhi.
2. Understanding Earthquake Disasters by Amita Sinvhal. Tata McGraw Hill, New Delhi.
3. Selected Resources available on www.nidmindia.nic.in
4. Basic Environmental Engineering by Prof. R.C. Gaur, New Age International Publication.

HU-102 COMMUNICATION SKILLS LAB

Course Code: HU-102   Course Name: Communication Skills Lab.
L-T-P: 0-0-2   Maximum Marks: 75

1. Phonetic Symbols and Transcriptions
2. Extempore
3. Group Discussion
4. Dialogue Writing
5. Listening Comprehension
6. Word Formation
7. Synonyms and Antonyms
8. Affixes

(Note: Wherever appropriate, Language Lab Software is to be used to improve listening comprehension and speaking skills.)

Suggested Readings:

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

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PY-102 ENGINEERING PHYSICS LAB

Course Code: HU-102   Course Name: Engineering Physics Lab
L-T-P: 0-0-2   Maximum Marks: 75

1. To determine the wave length of monochromatic light with the help of Michelson's interferometer.
2. To determine the wave length of sodium light by Newton's Ring.
3. To determine the specific rotation of glucose (sugar) solution using polarimeter.
4. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
5. To study the variation of a semiconductor resistance with temperature and hence determine the band gap of the semi conductor in the form of reverse baised P-N junction diode.
6. To determine the height of water tank with the help of sextant.
7. To determine the dispersive power of material of a prim for violet and yellow colour's of mercury light with the help of spectrometer.
8. To study the charge and discharge of a condenser and hence determine the same constant (both current and voltage graphs are to be plotted.
9. To verify the expression for the resolving power of a Telescope.
10. To determine the coherence length and coherence time of laser using He – Ne laser.
11. To determine the specific resistance of the material of a wire by Carey Froster's bridge.

CY-102 ENGINEERING CHEMISTRY LAB

Course Code: HU-102   Course Name: Engineering Chemistry Lab
L-T-P: 0-0-2   Maximum Marks: 75

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

CS-102 COMPUTER PROGRAMMING-I LAB

Course Code: CS-102   Course Name: Computer Programming-I Lab
L-T-P: 0-0-2   Maximum Marks: 100

The programs shall be developed in C language related with the following concepts:

1. Eight programs using input output statements, if statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement, datatype conversion etc.
2. Check a number- palindrome, prime, etc.
3. Eight programs using functions.
4. Two programs using recursion and Iteration.

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CE-102 COMPUTER AIDED ENGINEERING GRAPHICS

Course Code: CE-102   Course Name: Computer Aided Engineering Graphics
L-T-P: 0-0-3   Maximum Marks: 100

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

Projections of planes: Positions of planes, Terms used in projections of planes, plane parallel to RP, plane inclined to one RP and perpendicular to the other RP, plane perpendicular to Both the RPs, plane Inclined to Both RPs, True shape of the plane, Distance of a point from plane, Angle between two planes (no drawing sheet required, only assignment in sketch book)

Projection of solids: Basic solids, Frustums and truncated solids, Positions of the solids, solid with Axis perpendicular to an RP, solid with axis inclined to one RP and parallel to the other solid with axis Inclined to Both the RPs Solid with Axis parallel to Both the RPs (One drawing sheet, one assignment in sketch book)

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

Development of surfaces: Methods of development, parallel line developments, Radial line Development, Anti- Development (One drawing sheet, one assignment in sketch book)

Isometric Projection: Principle of Isometric Projection Isometric scale, Isometric projections and Isometric Views, Isometric Views of standard shapes, Isometric views of standard solids (One drawing sheet, one assignment in sketch book)

Computer Aided Drafting: Introduction to CAD, Advantages of CAD software's, Auto CAD, Auto CAD Commands and tool bars, Creating the Drawing, Charging properties, Dimensioning other object, Text editing, Isometric drawing (Four assignments on the computer)

Suggested Readings:

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

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ME-101 MECHANICAL WORKSHOP PRACTICE

Course Code: ME-101 Course Name: Mechanical Workshop Practice
L-T-P: 0-0-2 Maximum Marks: 100

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

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

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

Machine Shop Practice:
1. Demonstration of various machine tools such as Lathe, Shaper, Milling, Grinding and Drilling

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

Sheet Metal Shop
Making of Funnel using sheet metal

Suggested Readings:

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

RAJASTHAN TECHNICAL UNIVERSITY

MA-102 ENGINEERING MATHEMATICS-II

Course Code: MA-102   Course Name: Engineering Mathematics-II
L-T-P: 3-1-0   Maximum Marks: 80

Linear Algebra:
Rank of a matrix, Normal forms, consistency of systems of linear simultaneous equations and its solutions, Linear dependence and independence of vectors, Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof), orthogonal matrices, diagonalization of matrix.

Fourier Series:
Orthogonal functions, periodic functions, Fourier series of periodic functions, Euler formula, change of intervals, Even and Odd functions, half range Fourier sine and cosine series; Harmonic analysis.

Differential Equations:
Linear differential equations of first order, Reducible to linear form, Exact differential equations, reducible to exact form; Linear Differential Equations of Higher order with constant coefficients, Simultaneous linear differential equations.
Second order linear ODE with variables coefficients, Homogenous and exact forms, Change of dependent and independent variables; Variation of parameters, Method of Undetermined coefficients, Euler-Cauchy equations.
Partial Differential Equations: Order and Degree, Formation; Linear partial differential equations of first order: Lagrange's form, Standard forms, Charpit's method.
Solutions of PDE of Second order using separation of variable method.

Suggested Readings:

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

RAJASTHAN TECHNICAL UNIVERSITY

CS-103 COMPUTER PROGRAMMING-II

Course Code: CS-103   Course Name: Computer Programming-II
L-T-P: 3-0-0   Maximum Marks: 80

Computer System Fundamentals: System software, firmware, freeware/open-source, loader, compiler, peripherals.

Computer Programming: one-dimensional arrays, multi-dimensional arrays, character arrays and strings, Pointers ,Pointers arithmetic, Dynamic memory allocation: functions like malloc, calloc, free. Preprocessor, command line arguments, difference between macro and inline function. Structure & Union, typedef. File operations and multi-file handling, sscanf()/sprintf(). Graphics using C.

Suggested Readings:

1. Programming in ANSI C by E Baluguamsamy, TaTa McGraw-Hill Education
2. Programming in C by Thareja, Oxford University Press.
3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI.
4. C: The Complete Reference by Herbert Schildt, McGraw-Hill Education.
5. Graphics Under C by Yashavant P. Kanetkar, bpb publications.

EE-101 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code: EE-101   Course Name: Basic Electrical and Electronics Engineering
L-T-P: 3-0-0   Maximum Marks: 80

Basic Concepts of Electrical Engineering: Electric Current, Electromotive force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction, Lenz's Law, Kirchhoff's laws, Network Sources, Resistive Networks, Series-Parallel Circuits, Node Voltage Method, Mesh Current Method, Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems.

Transformers: Construction, EMF equation, ratings, phasor diagram on no load and full load, equivalent circuit, regulation and efficiency calculations, open and short circuit tests, auto-transformers.

Alternating Quantities: Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, Single Phase RLC Circuits, Introduction to 3-Phase AC System.

Rotating Electrical Machines; DC Machines: Principle of Operation of DC Machine, EMF Equation, Applications of DC Machines. AC Machines: Principle of Operation of 3-Phase Induction Motor, 3-Phase Synchronous Motor and 3- Phase Synchronous Generator (Alternator), Applications of AC Machines.

Basic Electronics: Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behavior of PN Junction, PN Junction Diode, Zener Diode, Photovoltaic Cell, Rectifiers, Bipolar Junction Transistor, Field Effect Transistor, Transistor as an Amplifier.

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

Electrical Measuring Instruments: PMMC instruments, shunt and series multipliers, multimeters, Moving iron ammeters and voltmeters, dynamometer, wattmeter, AC watthour meter, extension of instrument ranges.

Suggested Readings:

1. Basic Electrical and Electronics Engineering by Sukhija and Nagsarkar, Oxford Publication
2. Basic Electrical & Electronics Engineering by Kothari, Nagrath, TMH
3. Basic Electrical & Electronics Engineering by V. Jagathesan, K. Vinod Kumar & R. Saravan Kumar, Wiley India.
4. Basic Electrical & Electronics Engineering by Prasad/Sivanagraju, Cengage learning Indian Edition
5. Basic Electrical and Electronics Engineering by Muthusubrmaniam, TMH
6. Fundamentals of Electrical and Electronics Engineering by Ghosh, Smarajit, PHI India
7. Basic Electrical & Electronics Engineering by Ravish Singh, TMH
8. Electrical and Electronic Technology by Edward Hughes et al, Pearson Publication

9. Basic Electrical Engineering by A.E.Fitzgerald, TMH
10. Fundamental of Electrical Engineering by Leonard S.Bobrow, Oxford

CE-103 BASIC CIVIL ENGINEERING

Course Code: CE-103   Course Name: Basic Civil Engineering
L-T-P: 3-0-0   Maximum Marks: 80

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

Surveying: Object & principles of Surveying, plans and maps, Scales, Unit of measurement.

Linear measurements: Direct measurements- Tape & Chain, Ranging out survey lines, taking measurements of sloping ground.
Tape correction, conventional symbols. Introduction to Compass Surveying & Leveling. Introduction to total station.

Building & Building materials:
Construction materials: Stone, Brick, Cement, Mortar, Concrete, Steel – their properties & uses.
Selection of site for Buildings, types of buildings, plinth area, carpet area, floor space index, Introduction to building byelaws, concept of sun light and ventilation.
Components of Buildings & their functions, Basic concept of R.C.C., Introduction to types of foundation.

Transportation, Traffic and Road Safety: Types and characteristics of various modes of transportation, various road traffic signs, causes of accidents and road safety measures.

Suggested Readings:

1. Palancharmy, Basic Civil Engineering, McGraw Hill publishers.
2. Satheesh Gopi, Basic Civil Engineering, Pearson Publishers.
3. Ketki Ranwala Dalal, Essentials of Civil Engineering, Charotar Publishing House.

RAJASTHAN TECHNICAL UNIVERSITY

ME-102 BASIC MECHANICAL ENGINEERING

Course Code: ME-102   Course Name: Basic Mechanical Engineering
L-T-P: 3-0-0   Maximum Marks: 80

Fundamentals:

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

Steam Boilers, Steam Turbines and Power Plants:
Introduction, classification and types of steam boilers and steam turbines. Discuss working of steam boilers and steam turbines.
Introduction and Classification of power plants.

Pumps and IC Engines:
Applications and working of Reciprocating and Centrifugal pumps.
Introduction, Classification of IC Engines, Main Components of IC Engines, Working of IC Engines and its components.

Refrigeration and Air Conditioning:
Introduction, classification and types of refrigeration systems and air-conditioning. Applications of refrigeration and Air-conditioning.

Transmission of Power:
Introduction and types of Belt and Rope Drives.
Introduction to Gears and Gear Trains.

Primary Manufacturing Processes:
Metal Casting Process: Introduction to Casting Process, Patterns, Molding, Furnaces.
Metal Forming Processes: Introduction to Forging, Rolling, Extrusion, Drawing.
Metal Joining Processes: Introduction to various types of Welding, Gas Cutting, Brazing, and Soldering.
Metal Removal or Machining Processes: Introduction to machining process and various machine tools.

Engineering Materials and Heat Treatment of Steel:
Introduction to various engineering materials and their properties.
Introduction to Heat Treatment and types of Heat Treatment Processes.

Introduction to CAD, CAM, FMS, MEMS and CIM:
Introduction to modern manufacturing systems and their applications.

Suggested Readings:

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

OE-101 ENGINEERING MECHANICS

Course Code: OE-101	Course Name: Engineering Mechanics
L-T-P: 3-0-0	Maximum Marks: 80

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

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

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

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

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

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

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

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

Suggested Readings:
1. Engineering Mechanics, Sharma, Pearson Education.
2. Engineering Mechanics, Beer and Johnston, Tata McGraw-Hill.
3. Engineering Mechanics, Basudeb Bhattacharya, Oxford University Press
4. Engineering Mechanics, Hibbeler, Pearson Education.
5. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
6. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
7. Engineering Mechanics, Shames, Pearson Education.

RAJASTHAN TECHNICAL UNIVERSITY

CS-104 COMPUTER PROGRAMMING-II LAB

Course Code: CS-104
L-T-P: 0-0-2

Course Name: Computer Programming-II Lab
Maximum Marks: 100

The programs shall be developed in C language related with the following concepts:

1. Input roll numbers of your friends in an array & print in reverse order.
2. Input names of your friends in an array & print in reverse order.
3. Input two matrices and output third matrix after performing add/subtract the corresponding elements.
4. Four programs using malloc, calloc, free & sscanf()/sprintf() functions.
5. Two programs using macro and online functions.
6. Two programs using structure & union.
7. Two programs using pointers.
8. Three programs belonging to file operations and multi-file handling.
9. Three programs belonging to graphics using C.

RAJASTHAN TECHNICAL UNIVERSITY

ME-104 COMPUTERS AIDED MACHINE DRAWING

Course Code: ME-104   Course Name: Computer Aided Machine Drawing
L-T-P: 0-0-3   Maximum Marks: 100

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

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

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

Fasteners: (1 drawing sheet) Temporary and permanent fasteners, thread nomenclature and forms, thread series, designation, representation of threads, bolted joints, locking arrangement of nuts, screws, washers, foundation bolts etc., keys, types of keys, cotter and knuckle joints. Riveted joints, rivets and riveting, types of rivets, types of riveted joints etc.

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

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

Bearing: Ball, roller, needle, foot step bearing.

Coupling: Protected type, flange, and pin type flexible coupling.

Other components: Welded joints, belts and pulleys, pipes and pipe joints, valves etc.

Computer aided drafting: Concepts of computer aided 2D drafting using any drafting software like AutoCAD/ Solid works/Creo/Catia etc., basic drawing and modify commands, making 2D drawings of simple machine parts.

Suggested Readings:

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

RAJASTHAN TECHNICAL UNIVERSITY

HU-104 HUMAN VALUES: ACTIVITIES

Course Code: HU-104   Course Name: Human Values: Activities
L-T-P: 0-0-2   Maximum Marks: 75

PS 1:

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

PS 2:

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

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

PS 3:

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

Explore the following:

   (i)   What is Naturally Acceptable' to you in relationship the feeling of respect or disrespect for yourself and for others?
   (ii) What is 'naturally Acceptable' to you - to nurture or to exploit others?

   Is your living in accordance with your natural acceptance or different from it?

2. Out of the three basic requirements for fulfillment of your aspirations - right understanding, relationship and physical facilities - observe how the problems in your family are related to each. Also observe how much time & effort you devote for each in your daily routine.

PS 4:

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

PS 5:

1. a. Observe that any physical facility you use, follows the given sequence with time:

Necessary and tasteful - unnecessary but still tasteful - unnecessary and tasteless - intolerable

   b. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If not acceptable, you want it continuously and if not acceptable, you do not want it any moment!

2. List down all your important activities. Observe whether the activity is of 'I' or of Body or with the participation of both or with the participation of both 'I' and Body.

3. Observe the activities within 'i'. Identify the object of your attention for different moments (over a period of sy 5 to 10 minutes) and draw a line diagram connecting these points. Try observe the link between any two nodes.

PS 6:

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

PS 7:

Form small groups in the class and make them carry out a dialogue focusing on the following eight questions related to 'TRUST';

1a. Do I want to make myself happy?

2a. Do I want to make the other happy?

3a. Does the other want to make himself/herself happy?

4a. Does the other want to make me happy?

What is the answer?

Intention (Natural Acceptance)

1b. Am I able to always make myself happy?

2b. Am I able to always make the other happy?

3b. Is the other able to always make himself/herself happy?

What is the answer?

Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate yourself and others on the basis of intention/competence.

PS 8:

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

PS 9:

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

PS 10:

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

PS 11:

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

PS 12:

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

PS 13:

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

PS 14:

The course is going to be over now. It is time to evaluate what difference in your thinking it has made. Summarize the core massage of this course grasped by you. How has this affected you in terms of;

a. Thought
b. Behavior
c. Work and
d. Relization

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

Project:

Every student required to take-up a social project e.g. educating children in needy/weaker section, services in hospitals, NGO's and other such work

SEMESTER-III to VIII

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme
B.Tech. : Civil Engineering
2nd Year - III Semester

SN	Category	Course Code	Course Title	L	T	P	Exm Hrs	IA	ETE	Total	Cr
THEORY											
1	BSC	3CE2-01	Advance Engineering Mathematics -I	3	0	0	3	30	120	**150**	**3**
2	HSMC	3CE1-02/ 3CE1-03	Technical Communication /Managerial Economics & Financial Accounting	2	0	0	2	20	80	**100**	**2**
3	ESC	3CE3-04	Engineering Mechanics	2	0	0	2	20	80	**100**	**2**
4	PCC	3CE4-05	Surveying	3	0	0	3	30	120	**150**	**3**
5		3CE4-06	Fluid Mechanics	2	0	0	2	20	80	**100**	**2**
6		3CE4-07	Building Materials and Construction	3	0	0	3	30	120	**150**	**3**
7		3CE4-08	Engineering Geology	2	0	0	2	20	80	**100**	**2**
			Sub Total	17	0	0		170	680	**850**	**17**
PRACTICAL & SESSIONAL											
8	PCC	3CE4-21	Surveying Lab	0	0	3		45	30	**75**	**1.5**
9		3CE4-22	Fluid Mechanics Lab	0	0	2		30	20	**50**	**1**
10		3CE4-23	Computer Aided Civil Engineering Drawing	0	0	3		45	30	**75**	**1.5**
11		3CE4-24	Civil Engineering Maretials Lab	0	0	2		30	20	**50**	**1**
12		3CE4-25	Geolgy Lab	0	0	2		30	20	**50**	**1**
13	PSIT	3CE7-30	Industrial Training	0	0	1		30	20	**50**	**1**
14	SODE CA	3CE8-00	Social Outreach, Discipline & Extra Curricular Activities	0	0	0		0	25	**25**	**0.5**
			Sub- Total	0	0	13		210	165	**375**	**7.5**
			TOTAL OF III SEMESTER	17	0	13		380	845	**1225**	**24.5**

L: *Lecture,* *T:* *Tutorial,* *P:* *Practical,* *Cr:* *Credits*

ETE: *End Term Exam,* *IA:* *Internal Assessment*

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme
B.Tech. : Civil Engineering
2nd Year - IV Semester

SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	
THEORY											
1	BSC	4CE2-01	Advance Engineering Mathematics -II	2	0	0	2	20	80	**100**	**2**
2	HSMC	4CE1-03/ 4CE1-02	Managerial Economics & Financial Accounting/ Technical Communication	2	0	0	2	20	80	**100**	**2**
3	ESC	4CE3-04	Basic Electronics for Civil Engineering Applications	2	0	0	2	20	80	**100**	**2**
4	PCC	4CE4-05	Strength of Materials	3	0	0	3	30	120	**150**	**3**
5		4CE4-06	Hydraulics Engineering	3	0	0	3	30	120	**150**	**3**
6		4CE4-07	Building Planning	2	0	0	2	20	80	**100**	**2**
7		4CE4-08	Concrete Technology	3	0	0	3	30	120	**150**	**3**
			Sub Total	17	0	0		170	680	**850**	**17**
PRACTICAL & SESSIONAL											
8	PCC	4CE4-21	Material Testing Lab	0	0	2		30	20	**50**	**1**
9		4CE4-22	Hydraulics Engineering Lab	0	0	2		30	20	**50**	**1**
10		4CE4-23	Building Drawing	0	0	3		45	30	**75**	**1.5**
11		4CE4-24	Advanced Surveying Lab	0	0	2		30	20	**50**	**1**
12		4CE4-25	Concrete Lab	0	0	3		45	30	**75**	**1.5**
13	SODE CA	4CE8-60	Social Outreach, Discipline & Extra Curricular Activities	0	0	0		0	25	**25**	**0.5**
			Sub- Total	0	0	12		180	145	**325**	**6.5**
			TOTAL OF IV SEMEESTER	17	0	12		350	825	**1175**	**23.5**

L: Lecture, T: Tutorial, P: Practical, Cr: Credits

ETE: End Term Exam, IA: Internal Assessment

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme
B.Tech. : Civil Engineering
3rd Year –V Semester

SN	Category	Course		Contact hrs/week			Marks				Cr
		Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	
THEORY											
1	ESC	5CE3-01	Construction Technology & Equipments	2	0	0	2	20	80	**100**	**2**
2	PCC/ PEC	5CE4-02	Structural Analysis-I	2	0	0	2	20	80	**100**	**2**
3		5CE4-03	Design of Concrete Structures	3	0	0	3	30	120	**150**	**3**
4		5CE4-04	Geotechnical Engineering	3	0	0	3	30	120	**150**	**3**
5		5CE4-05	Water Resource Engineering	2	0	0	2	20	80	**100**	**2**
6		Departmental Elective-I:		2	0	0	2	20	80	**100**	**2**
		5CE5-11	Air & Noise Pollution and Control								
		5CE5-12	Disaster Management								
		5CE5-13	Town Planning								
7		Departmental Elective-II:		2	0	0	2	20	80	**100**	**2**
		5CE5-14	Repair and Rehabilitation of Structures								
		5CE5-15	Ground Improvement Techniques								
		5CE5-16	Energy Science & Engineering								
			Sub Total	**16**	**0**	**0**		**160**	**640**	**800**	**16**
PRACTICAL & SESSIONAL											
8	PCC	5CE4-21	Concrete Structures Design	0	0	3	3	45	30	**75**	**1.5**
9		5CE4-22	Geotechnical Engineering Lab	0	0	3	3	45	30	**75**	**1.5**
10		5CE4-23	Water Resource Engineering Design	0	0	2	2	30	20	**50**	**1**
11	PSIT	5CE7-30	Industrial Training	0	0	1		75	50	**125**	**2.5**
12	SODE CA	5CE8-00	Social Outreach, Discipline & Extra Curricular Activities	0	0	0		0	25	**25**	**0.5**
			Sub- Total	**0**	**0**	**9**		**195**	**155**	**350**	**7**
			TOTAL OF V SEMESTER	**16**	**0**	**9**		**355**	**795**	**1150**	**23**

*L: Lecture, **T**: Tutorial, **P**: Practical, **Cr**: Credits*
*ETE: End Term Exam, **IA**: Internal Assessment*

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme
B. Tech.: Civil Engineering
3rd Year – VI Semester

		Course		Contact hrs/week			Marks				Cr
SN	Category	Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	

THEORY

SN	Category	Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	Cr
1	ESC	6CE3-01	Wind & Seismic Analysis	2	0	0	2	20	80	**100**	**2**
2	PCC/ PEC	6CE4-02	Structural Analysis-II	3	0	0	3	30	120	**150**	**3**
3		6CE4-03	Environmental Engineering	3	0	0	3	30	120	**150**	**3**
4		6CE4-04	Design of Steel Structures	3	0	0	3	30	120	**150**	**3**
5		6CE4-05	Estimating & Costing	2	0	0	2	20	80	**100**	**2**
6		Departmental Elective-III:		2	0	0	2	20	80	**100**	**2**
		6CE5-11	Pre-stressed Concrete								
		6CE5-12	Solid and Hazardous Waste Management								
		6CE5-13	Traffic Engineering and Management								
7		Departmental Elective-IV:		2	0	0	2	20	80	**100**	**2**
		6CE5-14	1. Bridge Engineering								
		6CE5-15	2. Rock Engineering								
		6CE5-16	3. Geographic Information System & Remote Sensing								
			Sub Total	**17**	**0**	**0**		**170**	**680**	**850**	**17**

PRACTICAL & SESSIONAL

SN	Category	Code	Title	L	T	P	Exm Hrs	IA	ETE	Total	Cr
8	PCC	6CE4-21	Environmental Engineering Design and Lab	0	0	3	3	45	30	**75**	**1.5**
9		6CE4-22	Steel Structure Design	0	0	3	3	45	30	**75**	**1.5**
10		6CE4-23	Quantity Surveying and Valuation	0	0	2	2	30	20	**50**	**1**
11		6CE4-24	Water and Earth Retaining Structures Design	0	0	2	2	30	20	**50**	**1**
12		6CE4-25	Foundation Design	0	0	2	2	30	20	**50**	**1**
13	SODE CA	6CE8-00	Social Outreach, Discipline & Extra Curricular Activities						25	**25**	**0.5**
			Sub- Total	**0**	**0**	**12**		**180**	**145**	**325**	**6.5**
			TOTAL OF VI SEMESTER	**17**	**0**	**12**		**350**	**825**	**1175**	**23.5**

L: Lecture, T: Tutorial, P: Practical, Cr: Credits

ETE: End Term Exam, IA: Internal Assessment

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

Teaching & Examination Scheme
B.Tech.: Civil Engineering
4th Year - VII Semester

SN	Category	Course Code	Course Title	Hours Per Week			Marks				Cr
				L	T	P	Exm Hrs	IA	ETE	Total	
			THEORY								
1	PCC	7CE4-01	Transportation Engineering	3	0	0	3	30	120	**150**	**3**
2	OE		Open Elective-I	3	0	0	3	30	120	**150**	**3**
			Sub Total	**6**	**0**	**0**		**60**	**240**	**300**	**6**
			PRACTICAL & SESSIONAL								
3	PCC	7CE4-21	Road Material Testing Lab	0	0	2		30	20	**50**	**1**
4		7CE4-22	Professional Practices & Field Engineering Lab	0	0	2		30	20	**50**	**1**
5		7CE4-23	Soft Skills Lab	0	0	2		30	20	**50**	**1**
6		7CE4-24	Environmental Monitoring and Design Lab	0	0	2		30	20	**50**	**1**
7	PSIT	7CE7-30	Practical Training	1	0	0		75	50	**125**	**2.5**
8		7CE7-40	Seminar	2	0	0		60	40	**100**	**2**
9	SODECA	7CE8-00	SODECA	0	0	0		0	25	**25**	**0.5**
			Sub- Total	**3**	**0**	**8**		**255**	**195**	**450**	**9**
			TOTAL OF VII SEMESTER	**9**	**0**	**8**		**315**	**435**	**750**	**15**

*L: Lecture, **T:** Tutorial, **P:** Practical, **Cr:** Credits*
***ETE:** End Term Exam, **IA:** Internal Assessment*

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Teaching & Examination Scheme
B.Tech.: Civil Engineering
4th Year - VIII Semester

SN	Category	Course Code	Course Title	L	T	P	Exm Hrs	IA	ETE	Total	Cr
			THEORY								
1	PCC	8CE4-01	Project Planning and Construction Management	3	0	0	3	30	120	**150**	**3**
2	OE		Open Elective-II	3	0	0	3	30	120	**150**	**3**
			Sub Total	**6**	**0**	**0**		**60**	**240**	**300**	**6**
			PRACTICAL & SESSIONAL								
3	PCC	8CE4-21	Project Planning & Construction Management Lab	0	0	2		30	20	**50**	**1**
4		8CE4-22	Pavement Design	0	0	2		30	20	**50**	**1**
5	PSIT	8CE7-50	Project	3	0	0		210	140	**350**	**7**
6	SODECA	8CE8-00	Social Outreach, Discipline & Extra Curricular Activities	0	0	0		0	25	**25**	**0.5**
			Sub- Total	**0**	**0**	**4**		**270**	**205**	**475**	**9.5**
		TOTAL OF VIII SEMESTER		**9**	**0**	**4**		**330**	**445**	**775**	**15.5**

L: Lecture, T: Tutorial, P: Practical, Cr: Credits
ETE: End Term Exam, IA: Internal Assessment

Office of Dean Academic Affairs
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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

List of Open Electives for Civil Engineering

Subject Code	Title	Subject Code	Title
Open Elective - I		**Open Elective - II**	
7AG6-60.1	Human Engineering and Safety	8AG6-60.1	Energy Management
7AG6-60.2	Environmental Engineering and Disaster Management	8AG6-60.2	Waste and By-product Utilization
7AN6-60.1	Aircraft Avionic System	8AN6-60.1	Finite Element Methods
7AN6-60.2	Non-Destructive Testing	8AN6-60.2	Factor of Human Interactions
7CH6-60.1	Optimization Techniques	8CH6-60.1	Refinery Engineering Design
7CH6-60.2	Sustainable Engineering	8CH6-60.2	Fertilizer Technology
7CR6-60.1	Introduction to Ceramic Science & Technology	8CR6-60.1	Electrical and Electronic Ceramics
7CR6-60.2	Plant, Equipment and Furnace Design	8CR6-60.2	Biomaterials
7CS6-60.1	Quality Management/ISO 9000	8CS6-60.1	Big Data Analytics
7CS6-60.2	Cyber Security	8CS6-60.2	IPR, Copyright and Cyber Law of India
7EE6-60.1	Electrical Machines and Drives	8EE6-60.1	Energy Audit and Demand side Management
7EE6-60.2	Power Generation Sources.	8EE6-60.2	Soft Computing
7EC6-60.1	Principle of Electronic communication	8EC6-60.1	Industrial and Biomedical applications of RF Energy
7EC6-60.2	Micro and Smart System Technology	8EC6-60.2	Robotics and control
7ME6-60.1	Finite Element Analysis	8ME6-60.1	Operations Research
7ME6-60.2	Quality Management	8ME6-60.2	Simulation Modeling and Analysis
7MI6-60.1	Rock Engineering	8MI6-60.1	Experimental Stress Analysis
7MI6-60.2	Mineral Processing	8MI6-60.2	Maintenance Management
7PE6-60.1	Pipeline Engineering	8PE6-60.1	Unconventional Hydrocarbon Resources
7PE6-60.2	Water Pollution control Engineering	8PE6-60.2	Energy Management & Policy
7TT6-60.1	Technical Textiles	8TT6-60.1	Material and Human Resource Management
7TT6-60.2	Garment Manufacturing Technology	8TT6-60.2	Disaster Management

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3CE2-01: ADVANCE ENGINEERING MATHEMATICS-I

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

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

Office of Dean Academic Affairs
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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
SYLLABUS
II Year - III Semester: B.Tech. (Civil Engineering)

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

Credit: 2
2L+0T+0P

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

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

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

Credit: 2
2L+0T+0P

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

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

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

3CE3-04: ENGINEERING MECHANICS

Credit: 2
2L+0T+0P

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

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

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

3CE4-05: SURVEYING

Credit: 3
3L+0T+0P

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

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

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

3CE4-06: FLUID MECHANICS

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

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

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

3CE4-07: BUILDING MATERIALS AND CONSTRUCTION

Credit: 3
3L+0T+0P

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

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

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

Office of Dean Academic Affairs
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3CE4-08: ENGINEERING GEOLOGY

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

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

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

3CE4-21: SURVEYING LAB

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

List of Experiments

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

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

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

3CE4-22: FLUID MECHANICS LAB

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

List of Experiments

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

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3CE4-23: COMPUTER AIDED CIVIL ENGINEERING DRAWING

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

List of Assignments

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

1. Drawing of walls
   a. Brick and Stone masonry
   b. Cross section of external wall from foundation to parapet
   c. Partition wall, cavity wall and
2. Pointing, Arches, Lintels and Floors
3. Doors and Windows
4. Stairs, Cross section of Dog legged stairs
5. Roofs: Flat and Pitched roof (Steel truss)
6. Development of Front Elevation and Sectional Elevation from a given plan
7. Development of Plan, Front Elevation and Sectional Elevation from line diagram

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

3CE4-24: CIVIL ENGINEERING MATERIALS LAB

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

List of Experiments

1. To determine properties of following materials:

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

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

3. To Study the Different Aluminum and Steel Sections

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

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

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3CE4-25: GEOLOGY LAB

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

List of Experiments

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

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

4CE2-01: ADVANCE ENGINEERING MATHEMATICS-II

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

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

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

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

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

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

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

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

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

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

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

4CE3-04: BASIC ELECTRONICS FOR CIVIL ENGINEERING APPLICATIONS

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

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

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

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

4CE4-05: STRENGTH OF MATERIALS

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

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

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

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

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

4CE4-06: HYDRAULICS ENGINEERING

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

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

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

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

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

4CE4-07: BUILDING PLANNING

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

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

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

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

4CE4-08: CONCRETE TECHNOLOGY

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

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

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

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

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4CE21: MATERIAL TESTING LAB

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

0L+0T+2P

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

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SYLLABUS

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

4CE4-22: HYDRAULICS ENGINEERING LAB

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

0L+0T+2P

1. To determine the minor losses.

2. To determine the friction factor.

3. To determine Cd of Broad crested weir.

4. To verify the momentum equation.

5. To determine the discharge of venturimeter.

6. To determine Manning's & Chezy's coefficient of roughness for the bed of a given Channel.

7. To study and plot characteristics curve of hydraulic jump.

8. To study velocity distribution in open channel flow.

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4CE4-23: BUILDING DRAWING

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

0L+0T+3P

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

    (a) Site plan

    (b) Foundation plan

    (c) Plan

    (d) Two sectional elevations

    (e) Front elevation

    (f) Furniture plan

    (g) Water supply and sanitary plan

    (h) Electric fitting plan

2- To design and draw a Primary Health Center

3- To design and draw a Primary School

4- To design and draw a Rest House

5- To design and draw a Post Office

6- To design and draw a Bank

7- To design and draw a College Library

8- To design and draw a Cinema Theatre

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

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

4CE4-24: ADVANCED SURVEYING LAB

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

0L+0T+2P

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

4CE4-25: CONCRETE LAB

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

0L+0T+3P

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

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
Syllabus
3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE3-01: CONSTRUCTION TECHNOLOGY AND EQUIPMENT

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

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Engineering Economy** Principle of Engineering Economy, Minimum cost point analysis, Breakeven point analysis, Depreciation and depletion	6
3	**Safety in construction** Causes, classification, cost and measurement of an accident, safety programme for construction, protective equipment, accident report, safety measure: (a) For storage and handling of building materials. (b) Construction of elements of a building (c) In demolition of buildings; Safety lacuna in Indian scenario. Fire safety provisions as per NBC.	8
4	**Construction Planning** Need of construction planning, Constructional Resources, construction team, stages in construction, preparation of construction schedule, Job layout, inspection and quality control; **Materials Management:** Objective and functions of material management	7
5	**Construction Equipment and Management** Earth Moving Equipment-Bull dozers tractor pulled scrapers Power shovels Draglines clamshells; cranes; Hoes, Trenching machine types Hauling Equipment; Drilling, Blasting and Tunnelling Equipment; Pile Driving Equipment	6
	TOTAL	28

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
Syllabus
3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE4-02: STRUCTURE ANALYSIS-I

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

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

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Introduction to Indeterminate structures, Degrees of freedom per node, Static and Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc.), Releases in structures, Maxwell's reciprocal theorem and Betti's theorem. Analysis of prop cantilever structures, Analysis of Indeterminate Structure (fixed and continues beams) using Area moment method, Conjugate beam method, Three moments Theorem.	11
3	Analysis of Statically Indeterminate Structures using Slope deflection method and Moment distribution method applied to continuous beams and portal frames with and without inclined members	11
4	**Vibrations:** Elementary concepts of structural vibration, Mathematical models, basic elements of vibratory system. Degree of freedom. Equivalent Spring stiffness of springs in parallel and in series. **Simple Harmonic Motion**: vector representation, characteristic, addition of harmonic motions, Angular oscillation. **Undamped free vibration of SDOF system**: Newton's law of motion, D Almbert's principle, deriving equation of motions, solution of differential equation of motion, frequency & period of vibration, amplitude of motion; Introduction to damped and forced vibration.	5
	TOTAL	**28**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
Syllabus
3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE4-03: DESIGN OF CONCRETE STRUCTURES

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

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Fundamental concepts of design of RC members, assumptions. Types and function of reinforcement. Introduction to various related IS codes, Characteristic load and characteristic strength. **Working Stress Method:** Working stress design philosophy. Analysis and Design of singly reinforced rectangular beam section for flexure.	5
3	**Limit State Design:** Limit state design philosophy. Assumptions, Analysis and design of singly reinforced, doubly reinforced rectangular beams and flanged beams for flexure using codal provisions for simply supported, cantilever, fixed and continuous beams.	10
4	**Limit state of serviceability for deflection**: control of deflection as per codal provisions of empirical coefficients. **Limit state of collapse in shear**: Types of shear reinforcement and its detailing, analysis and design of shear reinforcement for prismatic sections. **Limit state of collapse in bond**: concept of bond stress, anchorage length and development length. Detailing and curtailment of reinforcement as per codal provisions.	6
5	**Slabs:** Analysis and design of one way and two way slabs using LSM, Detailing of reinforcement. Check for shear and deflection.	6
6	**Columns:** Short and long columns, their structural behaviour. Analysis and design of axially loaded short columns, using LSM. Analysis of eccentrically loaded short columns. Introduction to Pu-Mu interaction curves and their use for eccentrically loaded columns.	5
	Footings: Analysis and design of Isolated column footing for axial load. Introduction to combined footing for two columns (without central beam) for axial loads using LSM.	4
7	**Torsion:** Analysis and Design of beams for torsion as per codal method.	3
	TOTAL	**40**

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5CE4-04: GEOTECHNICAL ENGINEERING

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

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

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights, density index etc. Inter-relationships of the above. Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, consistency limits, void ratio and density index. Mineral structures, structures of Illite Montmorillonites and kaolinite and their characteristics. Darcy's law of permeability of soil and its determination in laboratory. Stresses in soil mass: total, effective and neutral pressure, calculation of stresses, influence of water table on effective stress, quicksand phenomenon. Classification of soil for general engineering purposes : particle size and I.S. Classification systems.	8
3	Mohr's circle of stress, shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box. Tri-axial and unconfined compression test apparatuses. Principles of soil compaction, laboratory compaction tests; Proctor's test, Stresses in Soil under surface loading: Bossinesq's and Westergaard's analysis for vertical pressure and its distribution in a soil mass. Vertical stresses due to concentrated loads, Isobar diagram, Vertical stress distribution on a horizontal plane. Influence diagram, Vertical stresses at a point under circular and rectangular loaded area. Approximate methods of obtaining vertical pressure due to surface loading. Newmark's chart,	8

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4	Compressibility and Consolidation: Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy Terzaghis one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, co-efficient of consolidation. Pre-consolidation pressure and its determination. Normally, over and under consolidated soils. Methods of predicting Settlement and its rate. Total and differential Settlement.	8
5	Stability of Slopes: Classifications of slopes, Stability analysis of infinite slopes. Stability of finite slopes by Swedish and Friction circle method. Stability analysis by Taylor's stability number , Taylor's stability number curves. . Bishop's method of stability analysis. Earth Pressure: Active, passive and earth pressure at rest. Rankine's and Coulomb's theories. Rebhann's and Culman's graphical methods for active earth pressure for vertical and inclined back retaining walls, horizontal and inclined cohesion less back fill.	8
6	Bearing Capacity of Soils: Terminology related to bearing capacity, Common types of foundations. Terzaghi and Meyehoff's theory for bearing capacity. Rankine's method for minimum depth of foundation. Skempton's method. Effect of eccentricity and water table on bearing capacity. IS code method, Plate load and penetration tests for determining bearing capacity. Introduction to pile, Site Investigations: Methods of explorations. Planning of Investigations, Depth of exploration, Number of boreholes, Undisturbed and Disturbed samples. Types of samplers. Brief description of procedures of sampling, Transportation and Storage of samples.	2
	TOTAL	**42**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
Syllabus
3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE4-05: WATER RESOURCE ENGINEERING

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

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

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	**Introduction**: Definitions, functions and advantages of irrigation, present status of irrigation in India, classification for agriculture, soil moisture and crop water relations, Irrigation water quality. Consumptive use of water, principal Indian crop seasons and water requirements.	5
3	**Canal Irrigation:** Types of canals, design of channels, regime and semi theoretical approaches (Kennedy's Theory, Lacey's Theory) **Diversion Head works:** Design for surface and subsurface flows, Bligh's and Khosla's methods.	6
4	**Embankment Dams:** Suitable sites, causes of failures, stability and seepage analysis, flow net, principles of design of earth dams. **Gravity Dams:** Force acting on a gravity dam, stability requirements.	5
5	**Well Irrigation:** Open wells and tube wells, types of tube wells, duty of tube well water. **Cross-Drainage Structure**: Necessity of Cross-drainage structures, their types and selection, comparative merits and demerits.	5
6	**Hydrology:** Definition, Hydrologic cycle, measurement of rainfall, Flood hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination.	6
		28

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
Syllabus
3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE5-11: AIR & NOISE POLLUTION AND CONTROL

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

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	*Air Pollution:* Air pollutants, Sources, classification, Combustion Processes and pollutant emission, Effects on Health, vegetation, materials and atmosphere, Reactions of pollutants in the atmosphere and their effects-Smoke, smog and ozone layer disturbance, Greenhouse effect.	7
	Air sampling and pollution measurement methods, principles and instruments, Ambient air quality and emission standards, Air pollution indices, Air Act, legislation and regulations, control principles,	6
	Removal of gaseous pollutants by adsorption, absorption, reaction and other methods. Particulate emission control, settling chambers, cyclone separation, Wet collectors, fabric filters, electrostatic precipitators and other removal methods like absorption, adsorption, precipitation etc. Biological air pollution control technologies, Indoor air quality.	7
3	*Noise pollution:* Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psychoacoustics and noise criteria,	4
	Effects of noise on health, annoyance rating schemes; special noise environments: Infrasound, ultrasound, impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure. Noise indices. Noise control methods	3
	TOTAL	**28**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
Syllabus
3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE5-12: DISASTER MANAGEMENT

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

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	**Introduction:** Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Natural and Manmade Disasters, Disaster and Development, and Climate Change.	2
3	**Types of Disasters, their occurrence/ causes, impact and preventive measures:** **Geological Disasters**: earthquakes, landslides, tsunami, mining;	4
	Hydro-Meteorological Disasters: floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves.	3
	Biological Disasters: epidemics, pest attacks, forest fire.;	3
	Technological Disasters: chemical, industrial, radiological, nuclear.	3
	Manmade Disasters: building collapse, rural and urban fire, road and rail accidents.	2
	Disaster profile of Indian continent, Mega Disasters of India and Lessons Learnt. Risk mapping.	3
4	**Disaster Management Cycle**: Disaster Management Cycle and its components: Pre disaster and post disaster, Paradigm Shift in Disaster Management. Safety tips for various types of disasters.	3
5	**Disaster management system in India:** Disaster Management Act 2005, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter-Governmental Agencies.	4
	TOTAL	28

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA
Syllabus
3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE5-13: TOWN PLANNING

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

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

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Introduction: Definition of town planning, Evolution of towns, Objects of town planning, Economic Justification for town planning, Principles of town planning, Necessity of town planning, Origin, Growth and patterns of town development, distribution of land use, site for ideal town, powers required to enforce T.P. scheme	6
3	Civic Surveys: Definition, Necessity, collection of data, Types of surveys, methods adopted to collect data, Drawings, reports.	3
4	Zoning: Definition, Use of land, Objects of zoning, Principles of zoning, Aspects, Advantages & Importance zoning, Transition zone, Zoning powers, Maps for zoning	3
5	Importance and Demand of housing, Classification, requirements and design of residential building, Housing agencies, Housing problems in India.	3
6	Slums: Causes, characteristics and effects of slums, Slum clearance.	2
7	Industries: Classification of industry, Concentration of industry, requirements of the industry, Industrial townships.	3
8	Public Buildings: Location, classification principle of design, town center, grouping of public buildings. Town Planning, CL-SPP/CL-DDU/Nadiad, Gujarat, INDIA 4	3
9	Re-planning of existing towns: Objects of re-planning, defects of existing town, data required for re- planning, Urban Renewal projects, De-centralization and Re-centralized, Garden city concept overview.	5
	TOTAL	**28**

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3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE5-14: REPAIR AND REHABILITATION OF STRUCTURES

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

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	**Deterioration of Concrete Structures:** Penetrability of concrete-permeability, sorptivity, diffusion. Physical processes- abrasion, erosion. Chemical- carbonation, chloride and sulfate attack. Alkali – Aggregate Reaction. Corrosion- mechanism. **Factors affecting and Preventive measures** :for all the above, including water – proofing techniques for various conditions, sacrificial anode, corrosion resistant steel, corrosion inhibitors, protective coatings etc.	8
3	**Cracks in Concrete and Masonry Structures-** Types, patterns, measurement and preventive measures	3
4	**Assessment of Risk/Damagein Structures:** *Preliminary investigation-* visual, history collection etc. *Detailed Investigation:* core cutting, rebar locator, corrosion meter, penetration resistance, pull out tests, half–cell potential, concrete resistivity etc. Interpretation of non destructive test data from all the above tests as well as rebound hammer number and ultra sonic pulse velocity. Destructive and chemical tests- on material samples from site.	5
5	**Materials for Repair:** polymers and resins, self curing compounds, FRP, ferro-cement- properties, selection criterion, cement based and polymer modified mortars etc	4
6	**Repair Techniques:** Grouting, Jacketing, External bonded plates-processes, limitations, design computations etc. including numerical problems. **Under Water Repair:** Processes	6
7	**Case Studies:** related to rehabilitation of bridge piers, heritage structures, masonry structures etc.	2
	TOTAL	28

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5CE5-15: GROUND IMPROVEMENT TECHNIQUES

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

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

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Introduction**: Formation of soil- Mechanical Weathering, Chemical weathering, types of soil-Residual soil, Transported soil, Regional soil Deposit in India, Difficult soils- Expansive soil, Collapsible soil, organic soil etc. Purpose and Principles of Ground Improvements.	03
3	**Densification by Compaction Near Surface**: Theory of compaction, Laboratory compaction tests; compaction in field, Effect of compaction on different soil properties, Factor affecting compaction in field, Measurement of density in field.	03
4	**Densification by Deep Compaction:** (a) Vibration methods- Vibro compaction, Vibro floatation, Vibratory probes method, Blasting. (b) Displacement methods- Sand compaction piles; Dynamic compaction.	04
5	**Modification Using Stone Columns:** **Introduction**- Failure mechanism, load carrying capacity, settlement analysis, installation technique, Geo-synthetic -encased stone columns, Mechanism of encasement, field control of stone columns **Pre-Compression and Vertical Drain**: Applicability and types of pre compression. Purpose and mechanism of pre-compression by pre loading. Design procedure of pre-compression by preloading.	04
	Pre-compression by preloading with vertical drains- Principles, Advantages, and disadvantages of Vertical drains, Type of Vertical drains, Installation, Monitoring and Instrumentation of Vertical drains.	03

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6	**Modification by Grouting**: Purpose, principles and classification of grouts and their properties. Desirable characteristics of grout, Grouting methods, Planning and operation of grouting, control of grouting operations and monitoring.	4
	Modification by Soil Reinforcement: Purpose of reinforced earth, Mechanism of reinforced soil, Failure mechanism of reinforced earth, Advantages of reinforced earth. Application of Reinforced Earth, Design methods of reinforced earth wall- (a) Check for External stability. Check for Internal stability.	4
7	**Miscellaneous Methods of Soil stabilization:** Lime stabilization, cement stabilization, bituminous stabilization, chemical stabilization.	02
	TOTAL	28

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5CE5-16: ENERGY SCIENCE AND ENGINEERING

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

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Introduction to Energy Science: Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues; Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment	5
3	Energy Sources: Overview of energy systems, sources, transformations, efficiency, and storage. Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems	6
4	Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability	5
5	Civil Engineering Projects connected with the Energy Sources: Coal mining technologies, Oil exploration offshore platforms, Underground and under-sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations above-ground and underground along with associated dams, tunnels, penstocks, etc.	7
6	Engineering for Energy conservation: Concept of Green Building and Green Architecture; Green building concepts; LEED ratings; Identification of energy related enterprises	4
	TOTAL	**28**

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5CE4-21 : CONCRETE STRUCTURES DESIGN

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

SN	Contents	Hours
1	Revision of Typical problems of BMD and SFD	3
2	Analysis and Design of singly reinforced rectangular beam section for flexure, based on Working stress design philosophy.	3
3	Analysis and Design of singly reinforced rectangular beam section for flexure, based on Limit State design philosophy	3
4	Analysis and Design of doubly reinforced rectangular beam section for flexure, based on Limit State design philosophy	3
5	Analysis and Design of flanged beam section for flexure, based on Limit State design philosophy	3
6	Problems on Limit state of serviceability for deflection as per codal provisions of empirical coefficients.	3
7	Analysis and design of prismatic sections for shear using LSD	3
8	Problems on limit state of collapse in bond	3
9	Analysis and design of one way slabs using LSM,	3
10	Analysis and design of two way slabs using LSM,	3
11	Analysis and design of short axially loaded columns	3
12	Analysis and design of footing	3
13	Analysis and Design of beams for torsion as per codal method..	3
	TOTAL	**39**

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5CE4-22 : GEOTECHNICAL ENGINEERDING LAB

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

1	Grain size distribution by sieve Analysis and Hydrometer
2	Determination of specific Gravity by Pycnometer.
3	Determination of liquid limit by Casagrande's apparatus and cone penetrometer.
4	Determination of plastic limit and shrinkage limit
5	Determination of field density by core-cutter and sand replacement method
6	Determination of compaction properties by standard Proctor Test Apparatus
7	Determination of C-Ø values by unconfined compression Test Apparatus, Direct Shear Test Apparatus and Triaxial Test.
8	To determine the differential free swell index of soil and swelling pressure of soil.
9	To determine the CBR of soil.
10	To determine the compressibility parameters of soil by consolidation test.
11	To determine the permeability of soil by constant and falling head methods. Design as per syllabus of theory.

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5CE4-23: WATER RESOURCES ENGINEERING DESIGN LAB

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

Design as per syllabus of theory.

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3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE3-01: WIND AND SEISMIC ANALYSIS

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Structural Systems:** Types of structures and Structure's forms, Symmetry and Asymmetry in building forms, Vertical and lateral loadresting elements, shear walls, framed tubes and various multi-storey configurations.	4
3	**Design Loads:** various types of loads and relevant codes. Design loads for different types of buildings. (IS-875 part 1 & 2) & Load Flow Concept	3
4	**Wind Loads Analysis:** Wind loads & calculation of wind load on flat roof, pitched roof and single sloped roof buildings (IS: 875-Part 3).	8
5	**Earthquake Load Analysis:** Earthquake loads & calculations of earthquake loads on framed structures. (IS: 1893 – Part 1).	6
6	**Earthquake Resistant Construction:** Typical seismic failure of masonry and RCC structures.Earthquake resistant construction of buildings, and various provisions as per IS codes; IS-4326,IS-13827, IS-13828, IS-13920, IS-13935.	6
	TOTAL	28

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6CE4-02: STRUCTURAL ANALYSIS-II

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	Unit load method & their applications: deflection of determinate beams and frames, analysis of determinate and redundant frames up to two degree of redundancy, lack of fit in redundant frames. Introduction to Energy Methods: Strain energy for gradually applied, suddenly applied and impact loads, Strain energy due to axial loads, bending, shear and torsion;. Castiglione's theorems & their applications in analysis of determinate and redundant frames up to two degree of redundancy and trussed beams; Stresses due to temperature & lack of fit in redundant frames; deflection of determinate beams, frames using energy methods	12
3	**Influence line diagram & Rolling load:** ILD for beams & frames, Muller-Breslau principle and its application for drawing ILD, Rolling load, maximum stress resultants in a member/section, absolute maximum stress resultant in a structure.	10
4	**Arches:** analysis of three hinged two hinged and fixed type parabolic arches with supports at the same level and at different levels.	7
5	**Unsymmetrical bending:** Definition, location of NA, computation of stresses and deflection, shear centre and its location,	6
6	**Approximate methods for lateral loads:** Analysis of multistory frames by portal method, cantilever method & factor method. Analysis of determinate space trusses by tension coefficient method.	6
	TOTAL	42

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6CE4-03: ENVIRONMENTAL ENGINEERING

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	*Water:* -Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices.	4
	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.	5
	Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.	6
3	*Sewage-* 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.	5
	Sewage characteristics: Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, Standards of disposal into natural watercourses and on land, Indian standards.	4
	Sewage and Sullage, Pollution due to improper disposal of sewage, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes.	7
	Wastewater Disposal and Refuse: Disposal of sewage by dilution, Self-purification of streams, sewage disposal by irrigation sewage farming, waste water reuse.	5
4	*Air* - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air quality standards, Control measures for Air pollution	3
5	*Noise-* Basic concept, measurement and various control methods.	2
	Total	42

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6CE-04: DESIGN OF STEEL STRUCTURES

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	Types of Steels and their broad specifications. Structural steel forms- hot rolled, tubular, light gauge etc and their applicability. Classification of cross sections as per IS 800-2007- Plastic, compact, semi compact and slender- characteristics	2
3	Plastic analysis of steel structures, fundamentals, shape factor, static and mechanism method of analysis, bending of beams of uniform cross sections (any shape)	3
4	Connections: Types of bolts, load transfer mechanism, prying action. Design of bolted and welded connections under axial and eccentric loadings with IS provisions	3
5	Tension Members: Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded members.	3
6	Compression Members: Types of buckling, Imperfection factor, Buckling curves for different cross sections as per IS. Design of compression members: Axially loaded members including made up of angle section: single and in pair; built up columns including design of lacings and battens as per IS.	6
7	Beams: Design of beams: simple and compound sections. Design of laterally supported and unsupported beams including for web buckling, web crippling, lateral torsional buckling.	6
8	Member design under combined forces: Compressive load and uniaxial moment. tension and uniaxial moment	3
9	Column Bases: Design of column bases for axial and eccentric compressive loads: Slab and gusseted base.	2

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10	Design of plate girder: Design of welded and bolted sections including web and flange splicing, horizontal, intermediate and bearing stiffeners. Shear strength determination by post critical and tension field action methods. End panel design options and procedure as per IS 800. Curtailment of flange plates. Connections for flange plate to flange angles and flange angles to web, etc. Design of welded connections	7
11	Design of gantry girder	2
12	Design of roof trusses members for combined forces, wind loading etc. Purlin design	2
13	Introduction to Pre Engineered Buildings , characteristics and their applications.	1
14	Introduction of truss girder bridges-its members including portal and sway bracings etc. Design aspects of foot over bridges.	1
	TOTAL	**42**

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6CE5-11: PRE-STRESSED CONCRETE

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

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Introduction:** Basic concepts of Pre-stressing and its advantages. Materials for pre-stressed concrete. Tensioning devices. Pre-tensioning and post tensioning systems.	4
3	**Analysis of Pre-stress and Bending Stresses:** Assumptions, Flexural analysis of pre-stressed rectangular and unsymmetrical T section. Concept of load balancing.	6
4	**Losses of Pre-stress:** Losses due to - elastic deformation of concrete, successive tensioning of curved cable, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip.	4
5	**Deflection of Pre-stressed Concrete Members:** Effect of tendon profileand associated factors incontinuous members.Computation of deflection in pre-stressed concrete members.	6
6	**Design of Pre-stressed Concrete Sections:** Flexural Shear and Torsional strengthusing simplified code procedure (IS-1343-2012). Design of simply supported Pre-stressed Concrete Sections forflexure.	7
	TOTAL	28

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6CE5-12: SOLID AND HAZARDOUS WASTE MANAGEMENT

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	**1**
2	**Introduction to SWM:** Definition of waste and solid waste, classification solid waste, sources of solid waste, its composition, factors affecting waste generation, traditional methods of waste collection and disposal	**4**
3	**Waste Collection:** Components of waste collection, waste collection containers, their characteristics, types, waste collection vehicles, collection frequency, collection route, transfer stations	**4**
4	**Solid Waste Characterization:** Physical characteristics, chemical characteristics and biological characteristics of solid wastes **Waste Processing**: Size reduction, factors affecting size reduction, size reducing equipment, volume reduction, equipment for volume reduction, waste minimization, waste hierarchy, 3 R principle	**5**
5	**Hazardous Waste:** Definition, sources, classification, collection, segregation, treatment and disposal methods **Radioactive Waste, E-Waste, Biomedical Waste:** Definition, sources, classification, segregation, management and disposal methods	**6**
6	**Treatment and Disposal of Solid Waste:** Composting, vermicomposting, biogas production, thermal treatment, incineration, pyrolysis, gasification, biological treatment, Sanitary land filling, land fill leachate and gas management	**5**
	Latest Advances and Rules related to SWM, Hazardous Waste, Plastic Waste and E-Waste Management	**3**
	TOTAL	**28**

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6CE5-13: TRAFFIC ENGINEERING AND MANAGEMENT

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	**1**
2	**Traffic Planning and Characteristics:** Road Characteristics – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow .	**4**
3	**Traffic Surveys**: Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey including nonmotorized transports – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Accident analyses -Methods, interpretation and presentation –Level of service – Concept, applications and significance.	**6**
4	**Traffic Design and Visual Aids:** Intersection Design – channelization, Rotary intersection design – Signal design – Coordination of signals — Grade separation – Traffic signs including VMS and road markings – Significant roles of traffic control personnel – Networking pedestrian facilities & cycle tracks.	**6**
5	**Traffic Safety and Environment**: Road accidents – Causes, effect, prevention, and cost – Street lighting – Traffic and environment hazards –	**4**
6	**Traffic Management:** Area Traffic Management System – Traffic System Management (TSM) with IRC standards –- Traffic Regulatory Measures-Travel Demand Management (TDM) – Direct and indirect methods – Congestion and parking pricing – All segregation methods-Coordination among different agencies – Intelligent Transport System for traffic management, enforcement and education.	**7**
	TOTAL	**28**

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6CE5-14: BRIDGE ENGINEERING

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Introduction:** Type of bridges & classification of road & railways bridges. IRC & Railwayloadings for bridges, wind load & Earthquake forces. : Expansion joints.	3
3	**Steel bridges**: Introduction to Design of through type &deck type steel bridges for IRC loading. Design of through type truss bridges forrailway loadings.	9
4	**Reinforced concrete culverts & bridges:** Reinforced concrete slab culvert, T-beam bridges-courbons & Hendry-Jaegar methods.	10
5	**Bearings**: Bearings for slab bridges and girder bridges. Elastomeric bearings, design concepts as per IRC 83 (Part II).	5
	TOTAL	28

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6CE5-15: ROCK ENGINEERING

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	**1**
2	**Engineering Classification of Rocks**: Objectives, Intact rock classification, Rock mass Classification. Terzaghi's, Rock load classification, Austrian classification, Deere's rock quality classification, rock structure rating concept, RMR classification, Q classification. Inter relation between Q and RMR.	**6**
3	**Engineering Properties and Laboratory Tests on Rocks:** Porosity, Density, Moisture content, Degree of saturation, Co-efficient of permeability, Durability, Compressive strength, Tensile strength, Shear strength, elasticity, Plasticity Deformability. Sampling and Samples Preparations, Uniaxial Compressive strength, Tensile Strength – Brazilian test, Shear strength test – Direct Shear test and Punch shear test, Triaxial Test, Flexural strength.	**7**
4	**In-situ Tests on Rocks**: Necessity of Insitu test, Plate load test for deformability, Field Shear test **Jointed Rocks:** Rocks Joint properties, Joint properties, Joint Roughness Co-efficient, Scale effects, Dilation, Orientation of Joints, Gouge, Joint Intensity, Uniaxial Compressive strength of Jointed Rocks.	**7**
5	**Strength of Rocks in Unconfined Condition**: Ramamurthy Strength Criteria, Singh and Rao Strength Criteria, Kulatilake Methodology, Barton Methodology. **Strength of Rocks in Confined Condition:** History of Hoek and Brown Failure Criterions, Parabolic Strength Criteria. **Bearing Capacity of Rocks:** Bearing capacity of intact rocks, jointed rocks,IS Code methodology, Singh and Rao Method and latest methodologies.	**7**
	TOTAL	**40**

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6CE5-16: GEOGRAPHIC INFORMATION SYSTEM & REMOTE SENSING

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

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

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	**1**
2	**Photogrammetry:** Definition of Photogrammetric Terms, Geometry of aerial and terrestrial photographs,Aerial camera and photo-theodolite, Scale of a Photograph, Tilt and Height displacements, Stereoscopicvision and stereoscopes, Height determination from parallax measurements, Flight planning, Maps andMap substitutes and their uses.	**7**
3	**Remote Sensing:** Introduction and definition of remote sensing terms, Remote Sensing System, Electromagnetic radiation and spectrum, Spectral signature, Atmospheric windows.	**4/6**
4	Different types of platforms, sensors and their characteristics, Orbital parameters of a satellite, Multiconcept in Remote Sensing.	**4/4**
5	**Image Interpretation:** Principles of interpretation of aerial and satellite images, equipments and aidsrequired for interpretation, ground truth – collection and verification, advantages of multidate andmultiband images. Digital Image Processing concept.	**6/5**
6	**Geographic Information System (GIS) :** Introduction & applications of GIS in map revision, Land use,Agriculture, Forestry, Archaeology, Municipal, Geology, water resources, Soil Erosion, Land suitabilityanalysis, change detection.	**6/5**
	TOTAL	**28**

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6CE4-21: Environmental Engineering Design and Lab

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

Design

1. Population forecasting and water demand
2. Water Quality parameters
3. Design of Sedimentation tanks, coagulation and flocculation tanks
4. Design of rapid and slow sand filters
5. Design of disinfection units and transmission systems
6. Design of Sewer lines and storm water systems
7. Design of aerobic and anaerobic treatment units
8. Design of suspended and attached growth systems

Lab.

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. Optimum coagulant dose
5. Chemical Oxygen Demand (COD)
6. Dissolved Oxygen (D.O) and Biochemical Oxygen Demand (BOD)
7. Break point Chlorination
8. Bacteriological quality measurement: MPN,

6CE4-22: Steel Structures Design

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

Analysis and design Problems as per different topics of syllabus of theory 6CE4-05, with latest version of IS 800 and other relevant IS codes. In addition to numerical problems, following exercises:

1. Case study of foot over bridges/truss- girder bridge in vicinity /home town of the students, preferably in groups of 8-10 students. A report including photographs marked with names and section details of different members in it (maximum limit of words :1000).
2. Case study of a structure using tubular sections or light gauge sections in vicinity /home town of the students, preferably in groups of 8-10 students. A report including photographs marked with names, size and section details of different members in it (maximum limit of words: 1000).

6CE4-23: QUANTITY SURVEYING AND VALUATION

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

Contents
1. Preliminary Estimate (Plinth Area and Cubic Content)
2. Detailed Estimate of buildings (Long wall-Short wall and Centre line method)
3. Rate Analysis of different Items of Works (Earthwork, Concrete Work, DPC, Stone masonry, Brickwork, RCC, Roofing, Flooring, and Finishing etc.)
4. Earthwork Calculation for Roads, Irrigation Canals and Channels (cutting and filling)
5. Valuation of Buildings and Properties

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6CE4-24: WATER AND EARTH RETAINING STRUCTURES DESIGN

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

	Assignments/ Exercises on the following topics:	
SN	**CONTENTS**	**Hours**
1	**Continuous Beams:** Analysis andDesign of continuous beams using coefficients (IS Code), concept of moment redistribution	4
2	**Curved Beams:** Analysis and design of beams curved in plan.	4
3	**Circular Domes:** Analysisand design of Circular domes with u.d.l. & concentrated load at crown.	4
4	**Water Tanks and Towers:** Water Tanks and Water Towers-design of rectangular, circular and Intze type tanks, column brace type staging.	10
5	**Retaining walls:** Analysis and design of Cantilever Retaining Walls: Introduction to counterfort and buttress type retaining walls, their structural behaviour and stability analysis.	6
	TOTAL	28

6CE4-25: FOUNDATION ENGINEERING

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

1. Design of isolated shallow footings, combined footings, raft foundations.

2. Design of pile foundations.

3. Design of wells and cassions.

4. Design of machine foundation.

5. Design of retaining structures etc

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Syllabus

IV Year- VII & VIII Semester: B. Tech. (Civil Engineering)

7CE4-01: Transportation Engineering

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

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course	1
2	**Highway planning and alignment:** Different modes of transportation – historical Development of road construction- Highway Development in India –Classification of roads- Road pattern – Highway planning in India- Highway alignment - Engineering Surveys for alignment – Highway Project- Important Transport/Highway related agencies in India. PMGSY project. Introduction about IRC, NRRDA	5
3	**Geometric Design of highways:** The highway crosses sectional elements- Camber-Sight Distance - Types of sight distances -Design of horizontal alignments - Super elevation, Widening of Pavements on horizontal curves- transition Curves- Design of Vertical alignments – Gradients- summit and Valley Curves- Recommendations of IRC Codes of Practice.	7
4	**Highway Materials:** Desirable Properties, Testing Procedures, Standards and standard values relating to Soil, Stone Aggregates, Bitumen and Tar, fly- ash/pond-ash. Role of filler in Bituminous mix, materials of filler. Specifications of DLC and PQC for rigid pavement	6
5	**Highway Construction and Equipments:** Methods of constructing different types of roads viz. Earth roads, Stabilized roads, WBM, WMM roads, earthen embankments, DLC and embankments with fly ash. Bituminous roads and Concrete roads. Berms and Shoulders, Features of rural roads including those in PMGSY. Hot mix plant for Bituminous roads-components, layout, control panel, quality assurance. Highway construction of rigid and flexible pavements including types of road rollers, specifications of compactionofdifferentlayersofbituminousroads, modernpavers for CC roads. Roller compacted concrete road construction	8
6	**Design of flexible and rigid pavements as per IRC:** IRC provisions including those of IRC 37, IRC 58	5
7	**Introduction of Railway Engineering:** Types and Selection of Gauges, Selection of Alignment, Ideal Permanent Ways and Cross-sections in different conditions, Drainage, Salient Features and types of Components viz. Rails, Sleepers, Ballast, Rail Fastenings.	3
8	**Introduction of Airports and Harbours: Airport Engineering: -** Introduction: Requirements to Airport Planning, Airport Classifications, Factors in Airport Site Selection, Airport Size. Planning of Airport: Requirements of Airport- Terminal Area, Runway Length etc. **Harbours:** history of water transportation, modern trends in water transportation, components of harbour, classification of harbours. Ports and docks.	5
	Total	40

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	Text / Reference Books:
1	Highway Engineering by Khanna SK & CG Justo, Nem Chand & Brothers, Roorkee.
2	Highway Engg. By LR Kadyali, Khanna Tech Publications, Delhi.
3	Specifications for Roads & Bridges by Ministry of Road Transport & Highways and Indian Road Congress.
4	Railway Engineering by Satish Chandra and MM Agarwal, Oxford University Press, Delhi.
5	Railway Engineering by Saxena SC and Arora SP, Dhanpat Rai Publishers, Delhi.
6	S C Rangwala, airport engineering, Charotar publication house.
7	Gautam H. Oza, Dock &Harbour Engineering, Charotar publication House.

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7CE4-21: Road Material Testing Lab

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

1. Aggregate ImpactTest

2. To determine the Angularity Number, Flakiness Index & Elongation Index of aggregates

3. Los Angeles AbrasionTest

4. Aggregate Crushing ValueTest

5. Standard Tar Viscometer Test for given bitumensample

6. Ductility Test for a given bitumensample

7. To determine the softening point for given sample ofbitumen.

8. Marshall StabilityTest

9. FloatTest

10.   Preparation of Dry lean concrete mix and testing of itsstrength

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Syllabus
IV Year- VII & VIII Semester: B. Tech. (Civil Engineering)

7CE4-22: Professional Practices and Field Engineering Lab

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

1. Different types ofKnots
2. Site plan, index plan, layout plan, plinth area, floor area ofbuildings
3. Foundation plan layout infield
4. Bar bendingschedule
5. Specifications- For different classes of building and Civil Engineeringworks
6. Specifications of buildingcomponents
7. Valuation of buildings andproperties
8. Work at heights – scaffolding and ladders use, type of scaffolds, safety requirements, design and load factors, defects and inspection norms, type of ladders, upkeep, defects and good maintenancetips

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

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

7CE4-23: Soft Skills Lab

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

SOFT SKILLS- Introduction to Soft Skills, Aspects of Soft Skills, Identifying your Soft Skills, Negotiation skills, Importance of Soft Skills, Concept of effective communication. SELF-DISCOVERY- Self-Assessment, Process, Identifying strengths and limitations, SWOT AnalysisGrid.

PREPARING CV/RESUME – Introduction, meaning, difference among bio-data, CV and resume, CV writing tips. Do's and don'ts of resume preparation, Vocabulary for resume, common resume mistakes, cover letters, tips for writing cover letters.

INTERVIEW SKILLS - Introduction. Types of interview, Types of question asked, Reasons for rejections, Post-interview etiquette, Telephonic interview, Dress code at interview, Mistakes during interview, Tips to crack on interview, Contextual questions in interview skills, Emotional crack an interview, Emotional intelligence and critical thinking during interview process.

DEVELOPING POSITIVE ATTITUDE – Introduction, Formation of attitude, Attitude in workplace, Power of positive attitude, Examples of positive attitudes, Negative attitudes, overcoming negative attitude and its consequences,

IMPROVING PERCEPTION- Introduction, Understanding perception, perception and its application inorganizations.

CAREER PLANNING – Introduction, Tips for successful career planning, Goal setting immediate, short term and long term, Strategies to achieve goals, Myths about choosing career.

TEAM BUILDING AND TEAM WORK - Introduction, Meaning, Characteristics of an effective team, Role of a Team Leader, Role of Team Members, inter group Collaboration Advantages, Difficulties faced, Group Exercises-Team Tasks and Role-Play, Importance of Group Dynamics.

TIME MANAGEMENT: The Time management matrix, apply the Pareto Principle (80/20 Rule) to time management issues, to prioritize using decision matrices, to beat the most common time wasters, how to plan ahead, how to handle interruptions , to maximize your personal effectiveness, how to say "no" to time wasters, develop your own individualized plan of action.

STRESS MANAGEMENT – Introduction, meaning, positive and negative stress, Sources of stress, Case studies, signs of stress, Stress management tips, Teenage stress.
Group discussion practice on current topics, Quantitative aptitude and reasoning preparation.

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

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

	Text / Reference Books:
1	Butterfield, Jeff, 'Soft Skills for Everyone', Cengage Learning, New Delhi, 2010.
2	G.S. Chauhan and Sangeeta Sharma, 'Soft Skills', Wiley, New Delhi, 2016.
3	Klaus, Peggy, Jane Rohman& Molly Hamaker, 'The Hard Truth About Soft Skills', Harper Collins E-books, London, 2007.
4	S.J. Petes, Francis, 'Soft Skills and Professional Communication', Tata McGraw Hill Education, New Delhi, 2011.
5	Dr. R. S. Aggarwal, Quantitave aptitude & reasoning, S Chand & company ltd.
6	Dr. R. S. Aggarwal, A modern approach to Verbal & Non-verbal reasoning, S Chand & company ltd.

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7CE4-24: Environmental Monitoring and Design Lab

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

Design:
1. Sewer design and estimation of Waste/Storm water bysoftware.
2. Design of Water Treatment Plant and Sewage TreatmentPlant
3. Design of Oxidation pond, stabilization pond and aeratedlagoons.
4. Design of aerobic and anaerobicdigester.

Lab:
1. Demonstration of air pollution monitoring instruments namely, High volume sampler
2. Determination of SPM, PM_{10} and $PM_{2.5}$.
3. Demonstration of noise pollution monitoring equipment namely, modular precision sound levelmeter.
4. Air quality monitoring for Traffic/Residential locality and its effect on the environment.
5. Noise quality monitoring for Traffic/Residential locality and its effect on the environment.
6. Latest technology for management of municipal solid waste, e-waste, bio-medical waste and their prevalent rules andregulations.

	Recommended Texts:
1	Manual on Sewerage and Sewage Treatment Systems – 2013, CPHEEO, New Delhi
2	Compendium of sewage treatment technologies Published by NRCD, MoEF, GOI, 2009
3	Storm Water Management Model (SWMM) and Manual, Published by US EPA
4	IS 5182-23 (2006) published by Bureau of Indian Standards
5	IS 4758: 1968 published by Bureau of Indian Standards
6	MoEF Guidelines and amendments as updated onhttp://moef.gov.in
7	CPCB Guidelines and amendments as updated onhttps://cpcb.nic.in

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

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

8CE4-01 Project Planning and Construction Management

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

SN	Course Content	Hours
1	**INTRODUCTION:** Objective, scope and outcome of the course	1
2	**FINANCIAL EVALUATION OF PROJECTS ANDPROJECT PLANNING:** Capital investment proposals, criterions to judge the worthwhile of capital projects viz. net present value, benefit cost ratio, internal rate of return, Risk cost management, main causes of project failure. Categories of construction projects, objectives, project development process, Functions of project management, Project management organization and staffing, Stages and steps involved in project planning, Plan development process, objectives ofconstruction project management.	7
3	**PROJECT SCHEDULING:** Importance of project scheduling, project work breakdown process – determining activities involved, work breakdown structure, assessing activity duration, duration estimate procedure, Project work scheduling, Sequence of construction activities, Project management techniques – CPM and PERT networks analysis, concept of precedence network analysis.	8
4	**PROJECT COST AND TIME CONTROL:** Monitoring the time progress and cost controlling measures in a construction project, Time cost trade-off process: direct and indirect project costs, cost slope, Process of crashing of activities, determination of the optimum duration of a project, updating of project networks, resources allocation.	8
5	**CONTRACT MANAGEMENT:** Elements of tender operation, Types of tenders and contracts, Contract document, Legal aspects of contracts, Contract negotiation & award of work, breach of contract, determination of a contract, arbitration.	8
6	**SAFETY AND OTHER ASPECTS OF CONSTRUCTION MANAGEMENT:** Safety measures to be followed in various construction works like excavation, demolition of structures, explosive handling, hot bitumen work. Project Management Information System – Concept, frame work, benefits of computerized information system. Environmental and social aspects ofvarious types of construction projects.	8
	Total	**40**

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	Recommended Texts:
1	Construction Planning & management By P S Gahlot& B M Dhir, New Age International Limited Publishers
2	Construction Project planning & Scheduling by Charles Patrick, Pearson, 2012
3	Construction Project Management Theory & practice --- Kumar Neeraj Jha, Pearson, 2012
4	Modern construction management--Harris, Wiley India.
5	Construction Management & Planning by Sengupta and Guha-Tata McGraw Hill publication.
6	Project Management – K Nagrajan – New age International Ltd.
7	Professional Construction Institute Edition.
8	Construction Project Management Planning, Scheduling and Controlling- Chitakara- Tata McGraw Hill, New Delhi
9	Construction Planning, Equipment and Methods by R. L. Peurify

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8CE4-21: Project Planning and Construction Management Lab
Credit 1   **Max. Marks: 50(IA:30, ETE:20)**
0L+0T+2P

1. Assignments on net present value, benefit cost ratio, internal rate ofreturn
2. Types of contracts – Tenders, tender form, submission and opening of tenders, measurement book, muster roll, piecework agreement and work order.
3. Drafting of tender documents, special terms andconditions
4. Drafting of tender notices for different types ofworks
5. Different models of PPP like BOT, BOOTetc.
6. Arbitration
7. Preparation of bardiagram
8. Network Analysis using PERT andCPM

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

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

8CE4-22: Pavement Design

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

1. **Pavement Mix Analysis**: Aggregate blending, bituminous mix design – Marshall Stability approach, concrete mix design for DLC and PQC with IS codeprovisions.

2. **Pavement Basics:** Types & comparison, vehicular loading pattern, factors affecting design and performance of pavements, sub graderequirements.

3. **Design of Flexible Pavements**: Analytical approach, flexible pavement layers, ESWL, repetitions of load, techniques of design methods, wheel load analysis, traffic analysis, stress distribution in subgrade soil, Burmister's theories, group index method, CBR approach, IRC 37 and otherguidelines.

4. **Design of Concrete Pavements**: Westergaard's approach, temperature & frictional stresses, design of expansion & longitudinal joints, design of dowel & tie bars, IRC 58 and otherguidelines.

5. **Specifications for rural roads:** Important aspects of IRC SP 020, Rural Road Manual. NRRDA publications

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