Dr. Babasaheb Ambedkar Technological University, Lonere

(Established as a University of Technology in the State of Maharashtra)
(Under Maharashtra Act No. XXIX of 2014)
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Draft Copy of Curriculum for Undergraduate Degree Programme

B. Tech. in Civil and Environmental Engineering

With effect from (Second Year) AY 2022-23

Teaching & Evaluation Scheme for S.Y. B. Tech. Civil and Environmental Engg.

Semester- III

Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
BSC 5	BTBS301	Mathematics – III	3	1	-	20	20	60	100	4
ESC 8	BTCECS302/ BTCVES302	Mechanics of Solids	3	1	-	20	20	60	100	4
PCC 1	BTCEC303	Water Supply Engineering	2	1	-	20	20	60	100	3
PCC 2	BTCEC304	Hydraulics Engg.	3	1	-	20	20	60	100	4
PCC 3	BTCEC305/ BTCVC305	Surveying	2	1	-	20	20	60	100	3
HSSMC2	BTHM306	Soft Skill Development	2	-	-	50	-	-	50	Audit
LC 1	BTCEL 307 / BTCVL 307	Mechanics of Solids Lab.	-	-	2	20	-	30	50	1
LC 2	BTCEL 308/ BTCVL 308	Hydraulics Engg. Lab.	-	-	2	20	-	30	50	1
LC 3	BTCEL 309/ BTCVL 309	Surveying Laboratory	-	-	2	20	-	30	50	1
Internship	BTES210P	Field Training / Internship/Industrial Training (minimum of 4 weeks) – I Evaluation (From Sem II). *Direct admitted students should undergo Field Training / Internship/Industrial Training after III Semester.	-	-	-	-	-	50	50	Audit
		Total	**15**	**05**	**06**	**210**	**100**	**440**	**750**	**21**

Semester- IV

Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC 4	BTCEC401/BTCVC401	Building Planning, Drawing & Construction	2	-	-	20	20	60	100	2
PCC 5	BTCEC402	Environmental Chemistry and Microbiology	2	-	-	20	20	60	100	2
PCC 6	BTCEC403/BTCVC403	Structural Mechanics	2	1	-	20	20	60	100	3
PCC 7	BTCEC404/ BTCVC404	Water Resources Engineering	3	-	-	20	20	60	100	3
PCC 8	BTCEC405	Waste Water Engineering	2	1	-	20	20	60	100	3
PCC 9	BTCEC406/ BTCVC406	Engineering Geology	2	1	-	20	20	60	100	3
LC 4	BTCEL407	Environmental Chemistry and Microbiology Lab	-	-	2	20	-	30	50	1
LC 5	BTCEL408/ BTCVL408	Water and Waste Water Engg. Lab	-	-	2	20	-	30	50	1
LC 6	BTCEL409/ BTCIL409	Building Planning, Drawing & Construction Lab	-	-	2	20	-	30	50	1
Internship	BTCEP410 / BTCVP410	Field Training / Internship/Industrial Training (minimum of 4 weeks training in Summer Vacation after Semester IV and appear at examination in Semester V)	-	-	-	-	-	-	-	To be evaluated in V Sem.
		Total	**13**	**03**	**06**	**180**	**120**	**450**	**750**	**19**

Detailed Syllabus

BTBS 301 Mathematics – III

Teaching Scheme: (3 Lectures +1 Tutorial) hours/week

Course Contents

Module 1: Laplace Transform **(Lectures 09)**

Definition – conditions for existence ; Transforms of elementary functions ; Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, transforms of functions multiplied by tn, scale change property, transforms of functions divided by t, transforms of integral of functions, transforms of derivatives ; Evaluation of integrals by using Laplace transform; Transforms of some special functions- periodic function, Heaviside-unit step function, Dirac delta function.

Module 2: Inverse Laplace Transform **(Lectures 09)**

Introductory remarks; Inverse transforms of some elementary functions; General methods of finding inverse transforms; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms; Applications to find solutions of linear differential equations and simultaneous linear differential equations with constant coefficients.

Module 3: Fourier Transform **(Lectures 09)**

Definitions – integral transforms; Fourier integral theorem (without proof); Fourier sine and cosine integrals; Complex form of Fourier integrals; Fourier sine and cosine transforms; Properties of Fourier transforms; Parseval's identity for Fourier Transforms.

Module 4: Partial Differential Equations and Their Applications (Lectures 09)

Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations); Method of separation of variables – applications to find solutions of one-dimensional heat flow equation, and two-dimensional heat flow equation

Module 5: Functions of Complex Variables **(Lectures 09)**

Limit and continuity of f(z); Derivative of f(z); Analytic functions; Cauchy- Riemann equations in Cartesian and polar forms; Harmonic functions in Cartesian form; Mapping: Translation, magnification and rotation, inversion and reflection, bilinear transformation; Conformal mapping. Cauchy's integral theorem; Cauchy's integral formula; Residues; Cauchy's residue theorem (All theorems without proofs).

Text Books

1) Grewal B. S., "Higher Engineering Mathematics" Khanna Publishers, New Delhi.
2) Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, New York.
3) Das H. K. and Er. Verma Rajnish, "Higher Engineering Mathematics", S. Chand & Co. Pvt. Ltd., New Delhi.
4) Dr. Singh B. B., "A course in Engineering Mathematics (Vol III)", Synergy Knowledgeware, Mumbai.
5) Wartikar J.N. and Wartikar P.N., "Engineering Mathematics Vol. I & II", Pune Vidyarthi Griha Prakashan, Pune, 1992
6) Ramana B. V., "Higher Engineering Mathematics", Tata McGraw-Hill Publications, New Delhi.

Reference Books

1) Peter O' Neil, "A Text Book of Engineering Mathematics" Thomson Asia Pte Ltd., Singapore.
2) Wylie C. R. & Barrett L. C., "Advanced Engineering Mathematics", Tata Mcgraw-Hill Publishing Co. Ltd., N. Delhi.
3) Dr. Singh B. B., "Integral Transforms and their Engineering Applications", Synergy Knowledgeware, Mumbai.
4) Sneddon I. N., "Integral Transforms", Tata McGraw-Hill, New York.

Course Outcomes: On completion of the course, student will be able to formulate and solve mathematical model of civil engineering phenomena in field of structures, survey, fluid mechanics and soil mechanics.

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BTCECS302/BTCVES302 Mechanics of Solids

Teaching Scheme:(3 Lectures +1 Tutorial) hours/week

Course Contents

Module 1: Stress and Strain (Lectures 10

Simple stress -Analysis of internal forces, simple stress, shearing stress, bearing stress, diaphragm or skin stresses in thin walled vessels, statically indeterminate members and thermal stresses

Simple strains -Stress strain diagram for different engineering materials and its importance for elastic and plastic analysis, Hooke's law: axial and shearing deformations, Poisson's ratio: biaxial and tri-axial deformations, variation of stress with inclination of element, relationship between modulus of rigidity and modulus of elasticity, variation of stress at a point: analytical derivation, introduction to strain measurement devices, Sensors: working principle

Module 2: Axial Force, Shear Force and Moment in Beam (Lectures 10)

Axial force, shear force and moment in beams – concept of unbalanced forces at a transverse section, axial forces, shear forces and moment – interaction of these, relations among load shear and moment, introduction to moving loads

Module 3: Stresses in beams (Lectures 10)

Theory of cylindrical bending, Relationship between intensity of loading, shear force and bending moment over elemental length, Derivation of flexural formula, economic sections, analysis of flexural action, derivation of formula for shearing stress, concept of shear flow, shear lag and shear center

Torsion -Assumptions, derivation of torsion formulae, torsion of circular shafts, power transmission, stresses and deformation in determinate solid/hollow homogeneous shafts

Module 4: Columns and Struts (Lectures 10)

Concept of short and long columns, formulae by Euler and Rankin, Euler's Crippling load for different end conditions, limitation of Euler's formula, equivalent length, eccentrically loaded short compression members, Kern of a section; load applied off the axes of symmetry, introduction to combined axial and flexural loads,

Module 5: Combined Stresses (Lectures 8)

State of simple shear, Analytical and graphical representation of state of combined stress at a point, absolute maximum shearing stress, application of Mohr's circle to combined loading, principal stresses and strains

Theories of Failure- maximum principal stress theory, maximum principal strain theory, maximum strain energy theory, maximum shear stress theory, maximum shear strain theory.

Text Books:

- Singer F.L. and Pytle, 2011, "Strength of Materials", Harper Collins Publishers, Fourth Edition
- Junnarkar S.B. (2014), "Mechanics of Structures", Charotor Publishers, Anand, 31st edition,
- Khurmi R.S., 2018, "Strength of Material", S. Chand and Co., Edition revised 1968, New Delhi
- Sadhu Singh, 1978, "Strength of Materials", Khanna Publishers, N. Dehli, ISBN No. 978-81-7409-048-7
- Prasad I.B, 1988, "A text book of Strength of Materials", Khanna Publishers, N. Dehli, ISBN NO:978-81-7409-069-X
- Timoshenko S.P. and Young D.H., 2002, "Elements of Strength of Materials", East West Press, 4th edition 1962, New Delhi
- Prasad I.B, 1988, "A text book of Strength of Materials", ISBN: 978-81-7409-069-X
- Dr. Sadhu Singh, 1978, "Strength of Materials", ISBN: 978-81-7409-048-7
- Ramamrutham S., 2011, "Strength of Materials", Dhanpat rai and Sons, Delhi

Reference Books:

- Beer F P., Jhonston E. R., John. T. D E wolf, 2017, "Mechanics of Materials" TMH, 7th edition
- Popov E.P.,2015, "Introduction to Mechanics of Solids", Prentice-Hall, Second Edition 2005
- Crandall S.H., Dahl N.C., & Lardner T.J., 1955, "An Introduction to Mechanics of Solids", Tata McGraw Hill, 2nd Edi, 1978
- Nash W., 2005, "Strength of Materials Schaum's outline series", McGraw Hill, fourth edition
- Punmia B. C., 2018, "Mechanics of Materials" Laxmi Publications, revised edition, 2016
- Subramanian R., 2016, "Strength of Materials" Oxford University Press, 2nd edition, New Delhi
- Dr. Sadhu Singh, 1978, "Theory and Solved Problems in Adv. Strength of Materials", ISBN: 978-81-7409-212-7

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

CO1: Perform the stress-strain analysis.
CO2: Draw force distribution diagrams for members and determinate beams.
CO3: Visualize force deformation behavior of bodies.
CO4: Perform failure analysis

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BTCEC303 WATER SUPPLY ENGINEERING

Teaching Scheme: (2 Lectures + 1 Tutorials) hours/week

Course Contents

Module 1: Introduction, quantity and quality of Water (8 Lectures)

Environment and its components, importance of water, role of environmental engineer, sources of water, water demand: Design flow, design period, design population, factors affecting water consumption, variation in demand, and design capacity for water supply components, quality of water: Physical, chemical, biological characteristics, Indian standard for quality of potable water

Module 2: Collection and conveyance of water (5 Lectures)

Conveyance of raw water: Canals and pipelines, hydraulics of conduits, laying and jointing of pipelines, testing of pipe lines, designing of rising main, type of valves, types of pumps, intake structure, types of intake structures

Module 3: Treatment of water (10 Lectures)

Necessity of water treatment processes Types of Treatments:

Aeration: Necessity, methods, removal of taste and odour, design of aeration fountain

Sedimentation: Suspended Solids, settling velocity, types of sedimentation tanks, surface loading, detention time, inlet and outlet arrangements

Coagulation: Necessity, coagulant dosage, choice of coagulants, optimum pH

Rapid Mixing: Necessity, gravitational, mechanical, pneumatic devices

Slow Mixing and Flocculation: Design of flocculation chamber, mean velocity gradient, design of clari-flocculator, plate settler and tube settler

Filtration: Theory of filtration, filter materials, types of filters, components, working and cleaning of filters

Module 4 (7 Lectures)

Disinfection: Theory of disinfection, factors affecting, efficiency of disinfection, types of disinfectants, break point chlorination, bleaching powder estimation

Water softening methods: Lime-soda, ion exchange method, demineralization

Module 5: System of Water Supply (6 Lectures)

Gravitational, pumping and combined schemes, materials of water supply pipes, houseconnection from mains, different valves, meters and hydrants, storage reservoirs, balancing reservoir, detection and prevention of leaks in the distribution systems, maintenance of distribution systems**.**

References:

- Garg S. K., "Water Supply Engineering", Khanna Publishers, New Delhi
- Birdi J. S. and Birdi G. S., "Water Supply & Sanitary Engineering", Dhanpat Rai Pub. Company, 8th edition, New Delhi
- Peavy and Rowe, "Environmental Engineering", McGraw Hill Publications
- Government Of India Publication, "Water Supply and Treatment Manual"

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

CO1: Understand the different sources of water.
CO2: Study different types of water treatment operations.
CO3: Study various parameters of water.

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BTCEC 304 Hydraulics Engineering

Teaching Scheme: (3 Lectures +1 Tutorial) hours/week

Course Contents

Module 1: Fluid Statics **(Lectures 10)**

Definition of fluids, fluid properties-density, specific weight, specific volume, specific gravity, viscosity, compressibility, surface tension, capillarity, vapor pressure, types of fluids - Newtonian and Non-Newtonian fluid, continuum, fluid pressure and its measurement, hydrostatic forces on surfaces, concept of buoyancy and flotation.

Module 2: Fluid Dynamics **(Lectures 10)**

Kinematics - Types of flow, basic principles of fluid flow, continuity equation, circulation and vorticity, velocity potential, stream function, streamlines, flow net.

Kinetics - Forces acting on fluid in motion, Euler's equation of motion, Bernoulli's energy equation and its applications – venturimeter, Orificemeter and pitot tube, impulse momentum equation, momentum correction factor Flow through pipes - Equation for Head Loss in Pipes Due to Friction—Darcy-Weisbach Equation, Equations for minor losses, Pipes in Series and pipes in parallel, equivalent pipe Siphon, Water Hammerin Pipes.

Module 3: Flow through Open Channel **(Lectures 08)**

Introduction, types of flows in channels, geometrical properties & most economical section of channel, uniform flow in channels, specific energy and depth relationships, applications of specific energy & discharge diagrams to channel transitions, non -uniform flow in channels-GVF, classification of channel bottom slopes, surface profiles, concept of hydraulic jump, surges in open channels.

Module 4: **(Lectures 10)**

Pumps: Classification, component parts, working of centrifugal pump, performance characteristics, pump selection, common troubles & remedies, introduction to different types of pumps: reciprocating, multi-stage, jet, air lift, submersible pump.

Turbines: Importance of hydro-power, classification of turbines, description, typical dimensions and working principle of Pelton, Francis & Kaplan turbine (detailed design need not to be dealt with), Module quantities, specific speed, performance characteristics, selection of type of turbine, description & function of draft tube, Thomas's cavitation number.

Module 5: Dimensional Analysis and Similitude **(Lectures 10)**

Introduction, dimensional homogeneity, methods dimensional analysis, Buckingham method, number of dimensionless groups in complete set of variables, use of dimensional analysis in presenting experimental data, model investigation, similitude – types of similarities, force ratios – dimensionless numbers, similarity laws or model laws, types of models, merits and limitations of distorted models, scale effect in models, application of dynamic similarity to specific model investigations.

Text Books

- Fox. R. W. And Mc-Donald. A. T., 2011, "Introduction to Fluid Mechanics", John Wiley and Sons, Fifth Edition
- Modi and Seth, 2017, "Fluid Mechanics and Hydraulic Machinery", Standard Book House, Tenth Edition , 1991
- Kumar K. L., 2010, "Fluid Mechanics", S. Chand publication
- Bansal R. K., 1989, "Fluid Mechanics", Laxmi publication Delhi
- Jain A.K, 1998, "Fluid Mechanics including Hydraulic Machines" ISBN: 978-81-7409-194-7

Reference Books

- Streeter V. L., Bedford K. W. and Wylie E. B., 1998, "Fluid Dynamics", New York, McGraw-Hill, Ninth Edition.
- Som S. K. & Biswas G., 2017, "Introduction to Fluid Mechanics & Fluid Machines", Tata McGraw-Hill.

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

CO1: Calibrate the various flow measuring devices.
CO2: Determine the properties of fluid and pressure and their measurement.
CO3: Understand fundamentals of pipe flow, losses in pipe and analysis of pipe network.
CO4: Visualize fluid flow phenomena observed in Civil Engineering systems.

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BTCEC305 / BTCVC 305 Surveying

Teaching Scheme: (2 Lectures +1 Tutorial) hours/week

Course Contents

Module 1: Chain Surveying **(Lectures 06)**

Definition, principles, classification, fields and office work, scales, conventional signs, survey instruments, their care and adjustment, ranging and chaining, reciprocal ranging, setting perpendiculars, well-conditioned triangles, traversing, plotting, enlarging and reducing figures

Module 2: Compass & Plane Table Surveying **(Lectures06)**

Prismatic compass, surveyor's compass, bearing systems and conversions, local attraction, magnetic declination, dip traversing, adjustment of errors.

Plane table instruments and accessories, merits and demerits, methods: radiation, intersection, resection, traversing

Module 3: Leveling and Applications **(Lectures08)**

Level line - Horizontal line - Levels and Staves, Sprit level – Sensitiveness, Bench marks - Temporary and permanent adjustments, Fly and Check leveling, Booking, reduction, Curvature and Refraction – reciprocal leveling - Longitudinal and cross sections - Plotting - Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs. Planimeter-Types, Theory, concept of zero circle, Study of Digital Planimeter, Computation of Areas and Volumes

Module 4: Theodolite Surveying **(Lectures 08)**

Theodolite - Vernier and micro-optic - Description and uses - temporary and permanent adjustments of vernier transit – Angles: Horizontal - Vertical - Heights and Distances - Traversing - Closing error and distribution - Gales's table - Omitted measurements

Module 5: Engineering Surveys **(Lectures 08)**

Reconnaissance, Preliminary and location surveys for engineering projects, Layout, Setting out works, Route Surveys for highways, railways and waterways, introduction to curve ranging, Mine Surveying - Instruments – Tunnels: correlation of underground and surface surveys, shafts

Text Books

- Kanetkar T.P. and Kulkarni S. V., 2014, "Surveying and Leveling", Vols. I, II and III, Vidyarthi Gruh Prakashan, Pune
- Punmia B.C., 1967, “Surveying”, Vols. I, II and III, Laxmi Publications, 16th edition, 2016

Reference Books

- Clark D., 1944, “Plane and Geodetic Surveying", Vol. I & II, C.B.S. Pub. & Distri., N. Delhi, 6th edi.
- Anderson J. M. and Mikhail E. M., 1986, “Introduction to Surveying”, McGraw Hill Book Company
- Bannister A. and Raymond S., 1959, “Surveying", ELBS, Sixth Edition, 1992
- Kahmen Heribert and Faig Wolfgang, 2017, “Surveying”, Walter de Gruyter, 1995

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

CO1: Perform measurements in linear/angular methods.

CO2: Perform plane table surveying in general terrain.

CO3: Know the basics of leveling and Theodolite survey in elevation and angular measurements.

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BTHM 306 Soft Skill Development

Teaching Scheme: (2 Lectures) hours/week

Module 1: Development of Proficiency in English **(Lectures 05)**

Speaking skills, Feedback & questioning technique, Objectivity in argument (Both one on one and in groups), 5 Ws & 1 H & 7 Cs for effective Communication, Imbibing Etiquettes and manners, Study of different pictorial expressions of non-verbal communication and their analysis.

Module 2: Self-Management **(Lectures 05)**

Self-Evaluation, Self-discipline, Self-criticism, Recognition of one's own limits and deficiencies, dependency, etc., Self-Awareness, Self-Management, identifying one's strengths and weaknesses, Planning & Goal setting, Managing self-emotions, ego, pride, Leadership & Team Dynamics.

Module 3: Time Management Techniques **(Lectures 04)**

Practice by game playing and other learning strategies to achieve the set targets Time Management Concept, Attendance, Discipline & Punctuality, Acting in time, Quality /Productive time

Module 4: Motivation/ Inspiration **(Lectures 04)**

Ability to shape and direct working methods according to self-defined criteria, Ability to think for oneself, Apply oneself to a task independently with self-motivation

Motivation techniques: Motivation techniques based on needs and field situations

Module 5: Interpersonal & Computing Skills **(Lectures 06)**

Positive Relationship, Positive Attitude sand Empathies: comprehending others' opinions, points of views, and face them with understanding Mutuality, Trust, Emotional Bonding, Handling Situations (Interview), Importance of interpersonal skills

Designing an effective Presentation, Contents, appearance, themes in a presentation, -Tone and Language in a presentation, Role and Importance of different tools for effective presentation

Reference Books

1) Mitra, Barun, "Personality Development and Soft Skills", Oxford University Press, 2016

2) Ramesh, Gopalswamy, "The Ace of Soft Skills: Attitude, Communication & Etiquette for Success", Pearson Education, 2013

3) Covey, Stephen R., "Seven Habits of Highly Effective People: Powerful Lessons in Personal Change"

4) Rosenberg Marshall B., "Nonviolent Communication: A Language of Life"

Program Educational Outcomes

1) Learners will acquire interpersonal communication skills.

2) Learners will develop the ability to work independently.

3) Learners will develop the qualities like self-discipline, self-criticism and self-management.

4) Learners will have the qualities of time management and discipline.

5) Learners would be able to present themselves as an inspiration for others.

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BTCEL307/ BTCVL307 Solid Mechanics Laboratory

Practical: 2 hours / week
Practical Work consists of performance of at least seven experiments from the list below (excluding the eleventh study) experiment: Detailed report is expected.

List of Experiments

1. Tension test on ferrous and non-ferrous alloys (mild steel / cast iron /aluminum etc.)
2. Compression test on mild steel, aluminum, concrete, and wood.
3. Shear test on mild steel and aluminum (single and double shear tests).
4. Torsion test on mild steel and cast-iron solid bars and pipes.
5. Flexure test on timber and cast-iron beams.
6. Deflection test on mild steel and wooden beam specimens.
7. Graphical solution method for principal stress problems.
8. Impact test on mild steel, brass, Aluminum, and cast-iron specimens.
9. Experimental on thermal stresses.
10. Strain measurement involving strain gauges / rosettes.

Assignment involving computer programming for simple problems of stress, strain computations.

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

CO1: Evaluate Young Modulus, torsional strength, hardness and tensile strength of given specimens.

CO2: Determine the strength of coarse aggregates.
CO3: Find the compressive strength of concrete cubes and bricks.

CO4: Determine physical properties of given coarse aggregates, fine aggregates and cement samples.

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BTCEL 308/ BTCVL 308 Hydraulics Engg. Laboratory

Practical Work consists of at least eight performances from list below and detailed reporting in form of journal. Practical examination shall be based on above.

1) Measurement of Viscosity of various fluids
2) Demonstration of working of different types of valves and pipe fittings
3) Measurement of pressure Piezometer, manometers, Pressure gauges
4) Measurement of discharge - Calibration of measuring tank, Use of hook or point gauge.
5) Verification of Bernoulli's Theorem
6) Determination of metacentric height.
7) Calibration of an orifice / mouthpiece / venturimeter / orifice meter
8) Study of factors affecting coefficient of friction for pipe flow (for two different materials and two different diameters)
9) Determination of loss of head due to Pipe Fittings
10) Impact of Jet
11) Calibration of V notch / Rectangular Notch
12) Study of Hydraulic Jump - a) Verification of sequent depths.
    b) Determination of loss in jump.
    c) Study of parameters with respect to Fraud Number
        i) Y2 / Y1; ii) Length; iii) Energy Loss

Use of computer programs such as MS Excel is desirable for post-processing of results.

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

CO1: Analyze the properties of fluids and their verification.
CO2: Predict empirical behavior of fluids.
CO3: Apply principles of hydraulics while working in field.

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BTCEL309 / BTCVL309 Surveying Laboratory

Practical: 2 hours / week

Practical Work consists of performances among the list below and detailed reporting in form of field book, journal and drawing sheets.

Perform each of the following practical work

1) Use of Dumpy Level, Auto Level and Tilting Level.
2) Sensitivity of Bubble Tube using Dumpy Level.
3) Evaluation of constant of Planimeter, and use of Digital Planimeter for measurement of areas.
4) Study of Theodolite.
5) Methods of Plane Table Survey
6) Study and use of Total Station

Among following any two shall be performed

1) Reciprocal Levelling.
2) Illustration of Permanent adjustment of Dumpy Level
3) Measurement of Horizontal Angle by Various Methods
4) Measurement of Magnetic Bearing and Vertical Angle by Theodolite
5) Two Point and Three Point Problems

Among following two shall be performed

1) Road survey, 2) Radial Contouring, 3) Block Contouring, 4) Theodolite Traversing

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

CO1: Use the theodolite along with chain/tape, compass on the field.
CO2: Apply geometric and trigonometric principles of basic surveying calculations.
CO3: Plan a survey, taking accurate measurements, field booking, and adjustment of errors.
CO4: Apply field procedures in basic types of surveys, as part of a surveying team.
CO5: Employ drawing techniques in the development of a topographic map.

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BTES210P Internship Evaluation I (from semester II)

Student shall undergo field training / industrial training / internship during summer vacation after Semester II. This training is at elementary level expecting exposure to field practices. A brief report shall be submitted. Evaluation shall be based on report and power point presentation.

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Detailed Syllabus

Semester IV

Semester- IV										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC 4	BTCEC401/ BTCVC401	Building Planning, Drawing & Construction	2	-	-	20	20	60	100	2
PCC 5	BTCEC402	Environmental Chemistry and Microbiology	2	-	-	20	20	60	100	2
PCC 6	BTCEC403/ BTCVC403	Structural Mechanics	2	1	-	20	20	60	100	3
PCC 7	BTCEC404/ BTCVC404	Water Resources Engineering	3	-	-	20	20	60	100	3
PCC 8	BTCEC405	Waste Water Engineering	2	1	-	20	20	60	100	3
PCC 9	BTCEC406/ BTCVC406	Engineering Geology	2	1	-	20	20	60	100	3
LC 4	BTCEL407	Environmental Chemistry and Microbiology Lab	-	-	2	20	-	30	50	1
LC 5	BTCEL408/ BTCVL408	Water and Waste Water Engg. Lab	-	-	2	20	-	30	50	1
LC 6	BTCEL409/ BTCVL409	Building Planning, Drawing & Construction Lab	-	-	2	20	-	30	50	1
Internship	BTCEP410 / BTCVP410	Field Training / Internship/Industrial Training (minimum of 4 weeks training in Summer Vacation after Semester IV and appear at examination in Semester V)	-	-	-	-	-	-	-	To be evaluated in V Sem.
		Total	**13**	**03**	**06**	**180**	**120**	**450**	**750**	**19**

BTCEC401/BTCVC401Building Planning, Drawing & Construction

Teaching Scheme: (2 Lectures) hours/week

Course Contents

Module 1: Principles of building planning **(Lectures 04)**

Principles of building planning, significance sun diagram, wind diagram, orientation, factors affecting, and criteria under Indian condition, concept of green building: aspect at planning level, construction stage and operational level.

Module 2: Building Bye-Laws & Planning Essentials **(Lectures 04)**

Building planning byelaws & regulations as per SP-7, National Building Code of India group 1 to 5, planning of residential building: bungalows, row bungalows, apartments and twin bungalows, procedure of building permission, significance of commencement, plinth completion or occupancy certificate

Module 3: Building Services **(Lectures 06)**

Plumbing: Various materials for system like stoneware, GI, AC, CI, PVC, HDPE and various types of traps, fittings, chambers, need of septic tank, concept of plumbing & drainage plan, introduction to rainwater harvesting, concept of rainwater gutters, rainwater outlet & down tank systems

Electrification: wiring types, requirements & location of various points, and concept of earthing

Fire resistance in building: Fire protection precautions, confining of fire, fire hazards, characteristics of fire resisting materials,

HVAC Systems: Principles & Materials in Ventilation, Air conditioning, Thermal Insulation

Module 4: Masonry Construction **(Lectures 04)**

Stone masonry: Random rubble, un-coursed rubble, coursed rubble & ashlar, brickwork & brick bonds - english, flemish, principles to be observed during construction composite masonry, various partition walls, brick, aluminum & timber, solid concrete blocks, hollow concrete blocks and light weight blocks (aerated autoclaved), soil stabilized blocks, fly ash blocks, cement concrete walls

Module 5: Building Components **(Lectures 06)**

Doors and windows-Doors - classification based on parameters such as material, geometry, fixtures and fastening Windows - classification based on parameters such as material, geometry, fixtures and fastening

Stairs: Terminology, requirements of a good stair, functional aspects, various types, uses and limitations

Elevators: Types and their Use

Flooring: Types, factors for selections of floorings, flooring in ground and upper floors, various types of tiled flooring: natural, composite, synthetic, and special purpose flooring, concrete flooring for industrial purpose: tremix flooring

Roof coverings: Terms used, roof and their selection, pitched roofs and their types, roof coverings and their selection. Natural, composite, synthetic, and special purpose roof coverings, timber trusses (King Post and Queen Post), steel trusses types and their suitability

Reference Books

- Shah, Kale, Pataki, "Building Drawing", Tata McGraw- Hill
- Sane Y. S.,"Building Design and Drawing", Allied Book Stall, Pune
- Jain V.K., "Automation Systems in Smart and Green Buildings", Khanna Publishers, N. Dehli ISBN No 978-81-7409-237-3
- Jain V.K., "Handbook of Designing and Installation of Services in High Rise Building Complexes", Khanna Publishers, N. Dehli, ISBN No. 978-81-7409-245-8
- Deodhar S.V., "Building Science and Planning", Khanna Publishers, N. Dehli, ISBN No. 978-81-7409-199-8
- Jain A.K., "The Idea of Green Building"Khanna Publishers, N. Dehli, ISBN No. 978-81-7409-256-4
- SP 7- National Building Code Group 1 to 5- B.I.S. New Delhi
- I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings

Course Outcomes: On completion of the course, the students will be;

CO1: To plan buildings considering various principles of planning and byelaw of governing body.
CO2: Comprehend various utility requirements in buildings
CO3: Understand various techniques for good acoustics.

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BTCEC402 Environmental Chemistry and Microbiology

Teaching Schemes: 2 Lects/week

Course Contents

Module 1: **(Lectures 04)**

Fundamentals of Chemistry for Environmental Engineering: Introduction, Basic Concepts from General Chemistry, Physical Chemistry, Equilibrium Chemistry, Organic, Biochemistry, Colloid Chemistry and Nuclear Chemistry.

Module 2: **(Lectures 06)**

Chemistry of Various Organic and Inorganic Compounds: Carcinogenic compounds and their effects. Hydrocarbons: Chemistry of hydrocarbon decay, environmental effects, effects on macro and microorganisms. Surfactants: Cationic, anionic and nonionic detergents, modified detergents. Pesticides: Classification, degradation, analysis, pollution due to pesticides and DDT problems.

Module 3: **(Lectures 04)**

Optical Methods: Principles of Optical Methods such as Absorption, Spectrophotometer, Flame photometry, Fluorometry. Principles of Chromatographic Methods such as Gas chromatography, High Performance Liquid Chromatography and Ion Chromatography.

Module 4: **(Lectures 04)**

Environmental Microbiology: Scope and Areas of Environmental Microbiology, Cell and its Structure, Introduction to Enzyme and Metabolic Reactions, Aerobic and anaerobic respiration, Classification.

Module 5: **(Lectures 06)**

Microscopy and Micrometry: Observations, Measurements and Isolation of Microorganism, Different Cultures, Media and Techniques of Staining and Enumeration of microorganism.

Applied Microbiology: of Soil, Air, Water and Biological Processes of Wastewater Treatments, Industrial Microbiology.

References

- C.N. Sawyer, P.L. McCarty and G. F. Parkin, Chemistry for Environmental Engineering and Science, Tata McGraw-Hill, Fifth edition, New Delhi, 2003.
- G.W. Vanloon and S.J. Duffy 'Environmental chemistry – a global perspective, Oxford University press, New York., 2000.
- Tortora. G.J, B.R. Furke, and C.L. Case, "Microbiology-An Introduction" (4th Ed.), Benjamin/Cummings Publ. Co., Inc., California, 1992.
- Pelczar, M. J.Chan E.C.S. and Krieg, N. R. Microbiology, Tata McGraw Hill, New Delhi,1993.
- Benefield L. D., Judkins J.F. and Weaned R.L., Process Chemistry for Water and Wastewater Treatment, Prentice Hall, Inc. London, 1987.
- R.E. McKinney, "Microbiology for Sanitary Engineers", McGraw Hill Book Company, 1962.
- W.G. Walter and R.H. McBee, "General Microbiology", East West Edition, 1969.
- Botkin, "Environmental Science" 8th ed.—Wiley, India.

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

CO1: learn basic chemical contents in the context of environmental studies.
CO2: understand the theory behind the analytical technique
CO3: learn the conceptual skills required for environmental chemistry research.

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BTCEC403/BTCVC403Structural Mechanics

Teaching Scheme: (2 Lectures +1 Tutorial) hours/week

Course Contents

Module 1: **(Lectures 06)**

Beam Deflections - Concept of deflected shapes, calculations of deflection for determinate beams by geometric methods such as double integration, Macaulay's method, moment area method, conjugate beam method.

Thin cylinders - thin cylinders subjected to internal fluid pressure, wire wound thin cylinders, thin cylindrical shells, circumferential and hoop stresses, longitudinal stresses, maximum shear stress, concept of stresses in thick cylinders.

Module 2: **(Lectures 06)**

Methods of Consistent Deformation - Different structural systems, concept of analysis, basic assumptions, indeterminacy of structures – Static and kinematic Indeterminacy, analysis of simple cable and arch structures, strain energy in structural members for different types of loading axial load, bending, shearing, torsion. energy relations in structural theory, Bett's and maxwell's laws of reciprocal deflections Castigliano's theorem

Indeterminate Beams - Analysis of indeterminate beams: Propped cantilever and fixed beams - fixed end moments and reactions for standard cases of loading – slopes and deflections in fixed beams

Module 3: **(Lectures 08)**

Slope Deflection Method - Introduction, sign convention**,** development of slope deflection equations, analysis of continuous beams propped cantilevers, analysis of portal frames without sway.

Moment Distribution Method - Introduction of moment distribution method – Absolute & relative stiffness of members, carry over factor, distribution factor, development of method, analysis of two span continuous beams, analysis of rigid frames without sway, settlement effects.

Module 4: Moving Loads and Influence Lines **(Lectures 10)**

Introduction to moving loads, concept of equivalent UDL, absolute maximum bending moment and shear force, concept of influence lines, influence lines for reaction, shear force, bending and deflection of determinate beams, influence line diagram (ILD) for forces in determinate frames and trusses, analysis for different types of moving loads, single concentrated load, several concentrated loads, uniformly distributed load shorter and longer than span, application of Muller Breslau principle for determinate structures to construct ILD.

Module 5: Introduction to Matrix Methods **(Lectures 06)**

Basic concepts of matrix methods of structural analysis, concept of nodes and element, degrees of freedom, global and local coordinate system for forces and displacements, generation of stiffness matrix and flexibility matrix for simply supported beam, cantilever beam and propped cantilever with two actions.

Text Books

- Reddy C. S., "Basic Structural Analysis", Tata McGraw Hill,3rd edition 2010
- Wang C. K., "Statically Indeterminate Structures", McGraw Hill
- Vazirani V. N., Ratwani M.M and Duggal S.K., "Analysis of Structures - Vol. I", ISBN NO: 978-81-7409-140-8
- Khurmi R.S., "Theory of Structures", S Chand, Delhi
- Punmia B.C., "Structural Analysis", Laxmi Publications

Reference Books

- Timoshenko and Young, "Theory of structures", McGraw Hill
- Norris C. H. and Wilbur J. B., "Elementary Structural Analysis", McGraw Hill
- Kinney J. S., "Indeterminate Structural Analysis", Oxford and IBH
- Hibbler R. C., "Structural Analysis", Pearson Publications, 9th Edition
- Schodek, "Structures", Pearson Education, 7th edition
- Ramamrutham S. and Narayanan R., "Theory of Structures" Dhanpat Rai Publishers, Delhi

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

CO1: Describe the concept of structural analysis, degree of indeterminacy.

CO2: Calculate slopes and deflection at various locations for different types of beams.

CO3: Identify determinate and indeterminate trusses and calculate forces in the members of trusses Perform the distribution of the moments the in continuous beam and frame

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BTCEC404/ BTCVC404 Water Resources Engineering

Teaching Scheme: (3 Lectures) hours/week

Course Contents

Module 1: Introduction **(Lectures 10)**

Introduction, definition, scope, necessity, ill-effects of irrigation, advantages, types of irrigation systems, methods of distribution of water, development of irrigation in India. Water requirement of crops, base, delta and duty, methods of improving duty, types of soil, types of soil water, soil moisture,consumptive use, irrigation frequency, irrigation methods, crops season, crop pattern

Hydrology

Introduction to hydrology: hydrologic cycle, rain, surface and ground water
measurement of rainfall, peak flow, base flow, precipitation and its measurement, average depth of precipitation, water losses, flood frequency, catchment area formulae, flood hydrograph, rainfall analysis, infiltration, run off, estimation of runoff, unit hydrograph and its determination, s- hydrograph

Module 2: Reservoirs **(Lecturers 06)**

Planning of Reservoirs: Classification of Reservoir, Selection of site for Reservoir, Investigation works for Reservoir, Yield and Capacity of Reservoir, Mass Curve and Demand Curve, Storage Calculations, Control Levels, Useful Life of Reservoir, Silting of Reservoirs, Losses in Reservoirs

Module 3 Dams and Hydraulic structures **(Lectures 08)**

Difference between weir, barrage and dam, Gravity Dams – Estimation of Loading, Design Criteria, Causes of Failure of Gravity Dam, Precaution against Failure, Theoretical and Practical Profile, Stability Calculations, Galleries, Joints, and Earth Dams: Components and their Functions, Design Criterion, Inverted Filters, Downstream Drainage, Causes of Failure of Earthen Dam. Arch Dams – Types, Forces on Arch Dam, Introduction and types of Spillway.

Module 4: Weirs and Canals **(Lectures 04)**

Weirs on Permeable Foundations: Theories of Seepage, Bligh's Creep Theory, Limitations of Bligh's Creep Theory, Khosla's Theory, Piping and Undercutting Canals: Types, Alignment, Kennedy's and Lacey's Silt Theories, Canal Losses, Typical Canal Sections, Canal Lining: Necessity and Types, Canal Structures: Cross Drainage Works and Canal Regulatory Works

Module 5: **(Lectures 08)**

Lift irrigation, wells and tube wells, introduction, classification of well, specific yield, deep and shallow wells, comparative advantage of well and canal irrigation, duty of well water, types of tube wells, types of strainers, boring methods. Darcy's law, permeability, safe yield of basin. Lift irrigation schemes: Various components and their design principles (Only concepts).

Water logging and drainage- Causes of water logging, preventive and curative measures, drainage of irrigation of lands, reclamation of water logged, alkaline and saline lands, Preventive and Curative Measures Water Conservation: Rain water Harvesting, Ground Water Recharge, small scale techniques of surface water detention such as: Soil embankments, field ponds, concrete bandhara.

Text Books

1. Varshney R. S., Gupta & Gupta, 1987, "Theory and Design of Irrigation Structures", Vol. I & II
2. Punamia B. C. Pandey B. B. and Lal, 1992, "Irrigation and Water Power Engineering", Standard Publishers, New Delhi
3. Garg S. K., 1976, "Irrigation Engineering & Hydraulic Structures",Khanna Publishers, N. Delhi,
4. Priyani, 1982, "Irrigation and Water Power", Charotar Publishing House, Anand
5. Bharat Singh,1979, "Irrigation", Nemchand Brothers, Roorkee
6. Subramanya K., 1984, "Engineering Hydrology", Tata Mc-Graw Hill Company Limited, N. Delhi

References Books

1. USBR, "Design of Small Dam", OXFORD & IBH, Publishing Company
2. Justinn, 1961, "Engineering for Dam" Vol. I, II, III, Creager and Hinds
3. Leliavsky, "Design of Hydraulic Structures" Vol. I & II,
4. C B I & P "River Behaviour, Management and Training"
5. Circular of Government of Maharashtra, 18 February 1995, "Design of Canals"

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

CO1: Understand need of Irrigation in India and water requirement as per farming practice in India.
CO2: Understand various irrigation structures and schemes

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BTCEC405 WASTEWATER ENGINEERING

Teaching Schemes: 3 Lects/week;

Course Contents

Module 1: Introduction, Quantity & Quality of Wastewater **(Lectures 08)**

Components of Wastewater Flows, Wastewater Sources & Flowrate, Variations in Flowrates & Strength, Characteristics of Wastewater, Quantity of Wastewater, Sewer Design Considerations- Minimum Size of Sewer, Limiting Velocities, Peak Factor Sewage Pumping, Location, Capacity, Pumping Station Design

Module 2: Primary and Secondary Treatment of Waste water **(Lectures 10)**

Physical Unit Operations- Screening, Grit Removal, Oil & Grease Removal, Primary Sedimentation, Secondary Treatment: Fundamentals of Biological Treatment, Microbial Metabolism, Bacterial Growth & Kinetics, Suspended & Attached Growth Processes, Activated Sludge Process & its Modifications, Trickling Filters, Aerated Lagoons, Oxidation Ditch

Module 3: Anaerobic Treatment of Wastewater **(Lectures 06)**

Anaerobic Suspended & Attached Growth Processes, Factors affecting Anaerobic Processes, Anaerobic Lagoons, UASB, Septic Tank

Module 4: Sludge Treatment **(Lectures 06)**

Solid Sources, Characteristics & Quantities, Sludge Pumping, Treatment-Thickening, Stabilization, Design of Sludge Digester, Conditioning, Dewatering, Drying, Ultimate Disposal of Sludge Solids

Module 5: Disposal of Wastewater **(Lectures 06)**

Need of Disinfection, Self-Purification, DO Sag Curve, Streeter Phelp's Model, Stream Classification, Effluent Standards for Discharge into Surface Water & on Land

References

- Peavey, H.S.Rowe, D.R., and Tchobanoglous, Environmental Engineering, McGraw-Hill Book Company.
- Viessman W. and Hammer M.J. Water supply and pollution Control, HarperCollins College publishers.
- Hammer M.J. Water and Waste water Technology, Prentice-Hall of India P.Ltd.
- Manual on sewerage and sewage Treatment systems – CPHEEO, Governmentof India in collaboration with JICA.
- Metcalf & Eddy, Waste Water Engg. Treatment & Disposal, Tata McGraw Hill

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

CO1: Apply the water treatment concept and methods.
CO2: Prepare basic process designs of water and wastewater treatment plants.CO3: Apply the wastewater treatment concept and methods.

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BTCEC406/ BTCVC406 Engineering Geology

Teaching Scheme: 3 hours/week

Course Contents

Module 1: Introduction and Physical Geology **(Lectures 06)**

Definition, Scope and subdivisions, applications of Geology in Civil Engineering, Major features of the Earth's structure, internal structure of earth, and Geological work of river: features of erosion, deposition and transportation, Civil Engineering Significance, Geological work of wind: Processes and features of erosion, deposition and transportation, Civil Engineering Significance. Volcano: Central and Fissure types, Products of volcano, Mountain: Origin and formation, types, examples.

Module 2: Mineralogy and Petrology **(Lectures 06)**

Mineralogy: Physical properties of mineral, Classification of minerals, Petrology: Definition, rock cycle, Igneous rocks: origin, textures and structures, classification, concordant and dis-concordant intrusions, civil engineering significance, Secondary rocks: formation, classification, residual deposits: soil, laterite and bauxite and their importance, Sedimentary deposits: formation, textures, classification and structures, civil engineering significance, chemical and organic deposits, Metamorphic rocks: agents and types of metamorphism, stress and anti-stress minerals, structures, products of metamorphism.

Module 3: Structural Geology, Building Stones and Ground Water (Lectures 08)
Outcrop, Strike and Dip, Unconformity-Types, Outliers and Inliers, Overlap Fold and Fault: Parameters, Classification, Causes, Civil Engineering significance Joint: Types, Civil engineering considerations.
Building Stones - Properties of rocks, Requirement of good building stone, various building stones in India.
Groundwater: Sources of groundwater, water table, zones of groundwater, porosity and permeability.

Module 4: Preliminary Geological Investigations (Lectures 08)
Preliminary geological survey, steps in geological investigations, consideration of structural features. Exploratory drilling: observations, preservation of cores, core logging, core recovery, graphical representation of core log, limitation of exploratory drilling method.

Module 5: Geology of Dams, Reservoirs, Tunnels and Bridges (Lectures 08)
Dam, types of dams, Influence of geological conditions on location, alignment, design and types of a dam, geological considerations in site selection for dams, Site improvement techniques, dams on carbonate rocks, sedimentary rocks, folded strata and Deccan traps, favorable and unfavorable geological conditions for a reservoir site**.** Tunneling:- Types of tunnels, influence of geological conditions on tunneling, difficulties during tunneling, tunnel lining, tunneling in folded strata, sedimentary rocks and Deccan traps. Bridges: - Types of bridges, dependence of types of bridges on geological conditions.

Text Books
- Singh Prabin, 2009, "Engineering and General Geology", S. K. Katariya and sons, Delhi
- Mukerjee P. K., 2013, "A Text Book of Geology", World Press Pvt. Ltd., Calcutta
- Gokhale K.V.G.K. and Rao D. M., 1982, "Experiments in Engineering Geology", TMN, New-Delhi
- Gupte R. B., "A Text Book of Engineering Geology", Pune Vidyarthi Griha Prakashan, Pune
- Subinoy Gangopadhyay, 2013, "Engineering Geology", oxford university

Reference Books
- G. W. Tyrrell, 1926, "Principles of Petrology", B. I. Publication Pvt. Ltd., New Delhi
- A. Holmes, 1944, "Principles of Physical Geology", ELBS Chapman & Hall, London
- Billings M. P., 1942, "Structural Geology", Prentice Hall of India Private Ltd., New Delhi
- Legget R. F., 1983"Geology Hand book in Civil Engineering", McGraw-Hill, New York
- Krynine D. P. & Judd W. R., 2005, "Principles of Engineering Geology & Geo-technics", CBS Publishers &Distri., New Delhi
- Reddy Dr. D. V., 2017, "Engineering Geology for Civil Engineering", Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi
- Read H. H., 1962, "Rultey's Elements of Mineralogy", CBS Publishers & Distributors, Delhi

List of Assignments
It consists of study of relevant rock and mineral samples. Detailed report is expected.
- Megascopic study of Rock forming minerals
- Megascopic study of Ore forming minerals
- Megascopic study of Igneous rocks
- Megascopic study of Secondary rocks
- Megascopic study of Metamorphic rocks
- Cross-section Preparation and interpretation of geological maps
- Study of Structural Geological models
- Preparation of bore log /lithologs
- Interpretation of bore- hole data

Study Visit to the places of Engineering Geological importance.

Course Outcomes: On completion of the course, the students will be able to:
CO1: Recognize the different land forms which are formed by various geological agents.
CO2: Identify the origin, texture and structure of various rocks and physical properties of mineral.
CO3: Emphasize distinct geological structures which have influence on the civil engineering structure.
CO4: Understand how the various geological conditions affect the design parameters of structures.

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BTCEL407 Environmental Chemistry and Microbiology Laboratory

Practical: 2 hours / week

The lab. Practice will be based on completion of assignments / practical / reports of site visits, confined to the courses in that semester. The term work will consist of

Part A: Microbiological techniques.

1 Microscopy, staining techniques.

2.Isolation and growth of bacteria.

3.Microbiological quality of water - MPN and membrane filtration technique and E coli test.

Part B: Metal Analysis from Industrial wastewater using Atomic Adsorption Spectrophotometer

(1) Arsenic (2) Nickel (3) Chromium

Part C: Visits, Detailed Study, and report submission of any two of the following Industries with respect to Total water consumption, Sources of Wastewater generation its characteristics and Treatment methods- Dairy, Fertilizer, Distillery, Sugar, Pulp & Paper, Iron & Steel, Metal Plating, Oil Refinery

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

CO1: study the growth and control of microbes as well as different bacteriological techniques involved in microbiology

CO2: learn the conceptual skills required for environmental chemistry research.

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BTCEL408/BTCVL408 Water and Waste Water Engineering Laboratory

Practical: 2 hours / Week

Practical Work consists of performance of at least six experiments from the List (A) below:

- Study on Sampling and preservation of samples.
- Preparation of Standard Solutions.

(A) Determination of:

1) pH and Alkalinity
2) Hardness
3) Chlorides
4) Chlorine demand and residual chlorine
5) Turbidity and optimum dose of alum
6) MPN
7) Sulphates
8) Fluorides and Iron
9) Total Solids, Dissolved Solids & Suspended Solids
10) Sludge Volume Index (SVI)
11) Dissolved Oxygen
12) BOD and COD

B) Site Visit to Water and Waste Treatment Plant:

A report based on the visit to water treatment plant shall be submitted.

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

CO1: Quantify the pollutant concentration in water, wastewater and ambient air.

CO2: Recommend the degree of treatment required for the water and wastewater.

CO3: Analyze the survival conditions for the microorganism andits growth rate.

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BTCEL409/ BTCVL409 Building Planning Drawing & Construction Laboratory

Practical: 2 hours / week

Term work shall consist of detailed report of in form of set of drawings mentioned below. In practice sessions, free-hand sketching in drawing book shall be insisted.

1) Assignments in the form of free-hand proportioned sketches to be drawn in sketch book for Stone and Brick Masonry,

Doors & Windows.

2) Planning & design of a building (Minimum G+1): Full set of drawings for:
    1) Municipal Submission drawing as per local statutory body bye-laws such as Town Planning, Municipal Council or Corporation Authorities.
    2) Foundation / Center Line Drawing.
    3) Furniture layout plan.
    4) Electrification plan.
    5) Water supply & drainage plan.
    6) Project report giving details of Drainage System, Water Supply System, Water Tank, Septic Tank Design of terrace Drainage System.
    7) Rain water harvesting systems
3) Setting out of planned building actually on ground using conventional or modern surveying instruments

It is desirable to use drawings produced in this submission for carrying out structural design under BTCVL708 and / orBTCVL806 in next semesters. If this is implemented, student shall get extra 10% weightage limited to maximum limit.

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

Draw plan, elevation and section of load bearing and framed structures.

Draw plan, elevation and section of public structures.

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BTCIP410 / BTCVP410 Field Training/Internship/Industrial Training

Students are expected to undergo industrial training for at least four weeks at factory / construction site / design offices or in combination of these. Training session shall be guided and certified by qualified engineer / architect / contractor in civil engineering. A neat detailed report on activities carried out during training is expected. Students should undergo training in Summer Vacation after Semester IV and appear at examination in Semester V.

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