

# Dr. Babasaheb Ambedkar Technological University, Lonere

(Established as a University of Technology in the State of Maharashtra)

(Under Maharashtra Act No. XXIX of 2014)

P.O. Lonere, Dist. Raigad, Pin 402 103, Maharashtra

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## Curriculum for Undergraduate Degree Programme S.Y. B. Tech. in Civil Engineering

With effect from AY 2021-22



*S.M.P.*  
**Dr. Sachin M. Pore**

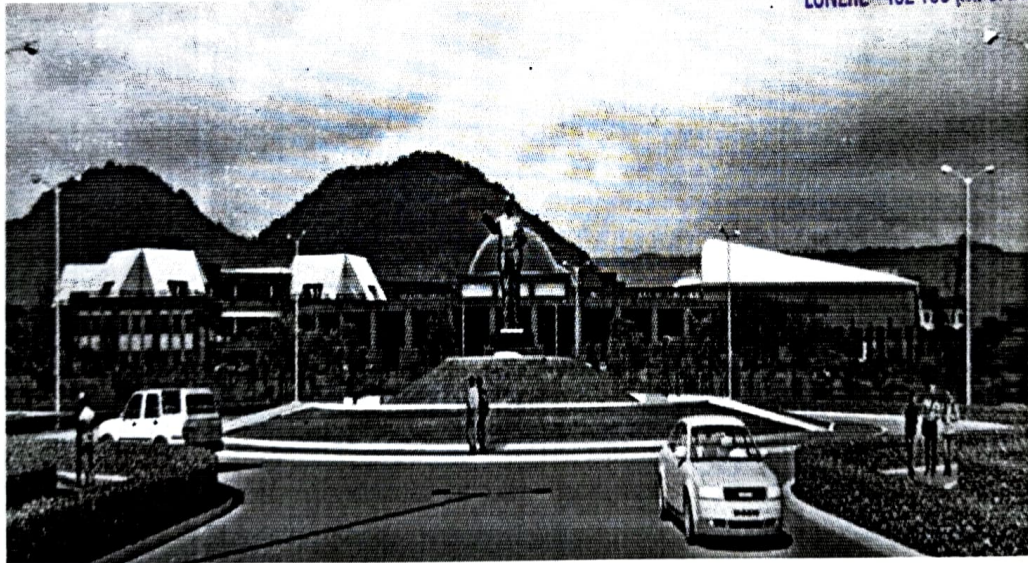
B.E. (Civil), M.E. (Structures)

Ph.D. (Structural Dynamics-Earthquake Engineering)

Head, Department of Civil Engineering

Babasaheb Ambedkar Technological University

LONERE-402 103 (M. S. INDIA)---



**Dr. Babasaheb Ambedkar Technological University  
Lonere 402 103, Dist- Raigad, Maharashtra, INDIA**

**Teaching & Evaluation Scheme for Second Year B. Tech. Civil 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	BTCVES302	Mechanics of Solids	3	1	-	20	20	60	100	4
PCC 1	BTCVC303	Building Construction & Drawing	2	1	-	20	20	60	100	3
PCC 2	BTCVC304	Hydraulics -I	3	1	-	20	20	60	100	4
PCC 3	BTCVC305	Surveying	2	1	-	20	20	60	100	3
HSSMC2	BTHM306	Soft Skill Development	2	-	-	50	-	-	50	Audit
LC 1	BTCVL 307	Solid Mechanics Laboratory	-	-	2	20	-	30	50	1
LC 2	BTCVL 308	Hydraulics-I Laboratory	-	-	2	20	-	30	50	1
LC 3	BTCVL 309	Surveying Laboratory	-	-	2	20	-	30	50	1
Internship	BTES210P	Internship –I Evaluation (From Sem II)	-	-	-	-	-	50	50	Audit
<b>Total</b>			<b>15</b>	<b>05</b>	<b>06</b>	<b>210</b>	<b>100</b>	<b>440</b>	<b>750</b>	<b>21</b>

Semester- IV										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC 4	BTCVC401	Building Planning and Drawing	2	-	-	20	20	60	100	2
PCC 5	BTCVC402	Environmental Engineering	2	-	-	20	20	60	100	2
PCC 6	BTCVC403	Structural Mechanics - I	2	1	-	20	20	60	100	3
PCC 7	BTCVC404	Water Resources Engineering	3	-	-	20	20	60	100	3
PCC 8	BTCVC405	Hydraulics - II	2	1	-	20	20	60	100	3
PCC 9	BTCVC406	Engineering Geology	2	1	-	20	20	60	100	3
LC 4	BTCVL407	Building Planning and CAD Lab.	-	-	2	20	-	30	50	1
LC 5	BTCVL408	Environmental Engg. Lab.	-	-	2	20	-	30	50	1
LC 6	BTCVL409	HE-II Lab.	-	-	2	20	-	30	50	1
Internship	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.
<b>Total</b>			<b>13</b>	<b>03</b>	<b>06</b>	<b>180</b>	<b>120</b>	<b>450</b>	<b>750</b>	<b>19</b>

# 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  $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ , 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 Knowledge, Mumbai.
- 5) Wartikar J.N. and Wartikar P.N., "Engineering Mathematics Vol. I & II", PVG 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", TMH Publishing Co. Ltd., N. Delhi.
- 3) Dr. Singh B. B., "Integral Transforms and their Engineering Applications", Synergy Knowledge, 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 civilengineering phenomena in field of structures, survey, fluid mechanics and soil mechanics.



# BTCVES302Mechanics 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", Charotar 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, 2<sup>nd</sup> 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



# BTCVC303 Building Construction & Drawing

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

## Course Contents

### Module 1: Masonry Construction

(Lectures 06)

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 2: Concrete for Construction

(Lectures 06)

Introduction and properties of ingredients, importance of admixture materials such as pozzolona, fly ash, specific purpose chemical admixtures, Properties of fresh and hardened concrete

### Module 3: Arches and Lintels

(Lectures 06)

Arches and their stability, technical terms in arches, types of arches, methods of construction; Lintel: Necessity, materials: wood, stone, brick, steel, R.C.C. and reinforced brick lintels, beams: types according to material, layout such as primary and secondary, continuous beams, formwork for RCC elements: function, requirements

### Module 4: Means of Lateral Communication

(Lectures 10)

**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

Use of composite materials for doors and window frames and shutters, laying out of passages

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

**Ramps:** Requirements and types, planning aspects for physically handicapped person

**Elevators:** Types and their Use

### Module 5: Flooring Roofs and Types

(Lectures 08)

**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

Precast and Pre-engineered Building Advantages and disadvantages.

## List of Drawing Assignments

- 1) Sketch Book consisting of free hand proportional scale sketches for items to be drawn on drawing sheets as mentioned below under (2)
- 2) Drawing to scale on a half imperial drawing sheet covering following aspects.
  - a) Lettering, Symbols, Types of lines and dimensioning as per IS 962.
  - b) Foundations: - Isolated, Combined Footings, Under Reamed Piles, Rafts.
  - c) Types of Stone Masonry: Elevation and Sectional Drawings.
  - d) Types of Brick masonry: Elevation and Sectional Drawings.
  - e) Types of Doors: Elevation and Sectional Drawings.
  - f) Types of Windows: Elevation and Sectional Drawings, Standard Aluminum Sections.
  - g) Types of Stairs: Plan and Sectional Drawings.
  - h) Trusses: Various types, various roof covering materials, sketches for sectional profiles
  - i) Typical plan for a single room and sectional views.
- 3) Site visit: To understand various building materials and their use.

## Text Books

- Punmia B.C., Jain A. K., 2008, "Building Construction", Laxmi Pub. Pvt. Ltd., 10th Edi, N. Delhi
- Arora S. P. and Bindra S. P., 2010, "Text Book of Building Construction", Dhanpat Rai Publications
- Kumar Sushil, 2010, "Building Construction" Standard Publishers, 20th Edition,.
- P. Purushothama Raj, 2016, "Building Construction Materials and Techniques", Pearson Education
- Jain V.K., 2015, "Automation Systems in Smart and Green Buildings" ISBN NO: 978-81-7409-237-3

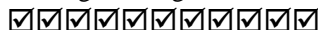
## Reference Books

- NBC 2005, National Building Code of India, Parts III, IV, VII and IX, B.I.S. New Delhi
- Chudley R., 1973, "Construction Technology", Vol.1, 2, 3 and 4 ELBS Publisher
- 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, B.I.S. New Delhi
- Sikka V. B., 2015, "A Course in Civil Engineering Drawing", S. K. Kataria and Sons

- Catalogues. Information Brochures, Trade Literature by material or product manufacturers
- Mehta, Scarborough, Armpriest, 2007, “Building Construction”, Pearson Education
- Macay W.B, 2004, “Building Construction”, Vol. I, II, III, IV, Pearson Education
- Jain V.K., 2015, “Handbook of Designing and Installation of Services in High Rise Building Complexes” ISBN : 978-81-7409-245-8

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

- CO1: Understand types of masonry structures.
- CO2: Comprehend components of building and there purposes.
- CO3: Draw plan, elevation and section of various structures.
- CO4: Apply the principles of planning and by laws used for building planning.
- CO5: Prepare detailed working drawing for doors and windows.



## **BTCVC 304 Hydraulics - I**

**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  
Forces on fluid elements, fundamental equation, manometers, hydrostatic thrust on submerged surfaces, buoyancy, stability of unconstrained bodies, fluids in rigid body motion

#### **Module 2: Fluid Dynamics**

**(Lectures 10)**

Types of flow, continuity equation, derivation and applications of momentum equation, flow measuring devices, Euler's equation, Bernoulli's equation, velocity potential and stream function, concept of flow net

#### **Module 3: Laminar & Turbulent Flow**

**(Lectures 10)**

Fully developed laminar flow between infinite parallel plates, both plates stationary, upper plate moving with constant speed, fully developed laminar flow in pipe.

**Turbulent flow:** Shear stress distribution and turbulent velocity profiles in fully developed pipe flow, velocity distribution and shear stresses in turbulent flow, Prandtl mixing length theory, Nikuradse's experiment, Introduction to Boundary Layer Theory

#### **Module4: Dimensional Analysis and Similitude**

**(Lectures 10)**

Nature of dimensional analysis, Rayleigh's Method, Buckingham pi theorem, dimensionless groups and their physical significance, flow similarity and model studies, Scale Effects, Distorted and Undistorted Models

#### **Module5: Flow through Pipes**

**(Lectures 08)**

Loss of energy in pipes, pipe discharging from a reservoir, pipe connecting two reservoirs in series and parallel, siphon, transmission of power through nozzle, water hammer in pipes- rigid and elastic water column theory, surge tanks - function, calculation of head loss, introduction to Moody's chart, nomograms and other pipe diagrams

#### **Text Books**

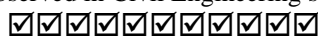
- Fox. R. W. And Mc-Donald. A. T., 2011, “Introduction to Fluid Mechanics”, John Wiley and Sons, Fifth Edition
- Modi and Seth, 2017, “Fluid Mechanics and Hydraulic Machinery”, Standard Book House, Tenth Edition , 1991
- Kumar K. L., 2010, “Fluid Mechanics”, S. Chand publication
- Bansal R. K., 1989, “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.



# **BTCVC305 Surveying**

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

**Course objectives:**

- 1) To determine the relative position of any objects or points of the earth.
- 2) To determine the distance and angle between different objects.
- 3) To prepare a map or plan to represent an area on a horizontal plan.

## **Course Contents**

**Module 1: Chain Surveying**

**(Lectures 08)**

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, Spirit 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.



# BTHM306 Soft Skill Development

Teaching Scheme: (2 Lectures) hours/week

## **Program Educational Objectives:**

- 1) To build the skills like team building so that they can work efficiently in groups.
- 2) To provide knowledge of conflict management while working in large organizations.
- 3) To develop management skills required in routine work environment.
- 4) To polish the personality of the learners in order to make them good leaders and employees.
- 5) To imbibe qualities like manners & etiquettes co-ordination, mutual understanding while working in a group.

## **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 Attitudes and Empathies: comprehending others' opinions, points of views, and face them with understanding Mutuality, Trust, Emotional Bonding, Handling Situations (Interview), Importance of interpersonal skills

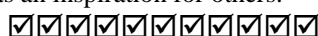
Designing an effective Presentation, Contents, appearance, themes in a presentation, -Tone and Language in a presentation, Role and Importance of different tools for effective presentation

## **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.





## 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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## BTCVL308 Hydraulics- I Laboratory

**Practical:** 2 hours / week

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

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.

☑☑☑☑☑☑☑☑☑☑

# 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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Semester- IV										
Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				Credit
			L	T	P	CA	MSE	ESE	Total	
PCC 4	BTCVC401	Building Planning and Drawing	2	-	-	20	20	60	100	2
PCC 5	BTCVC402	Environmental Engineering	2	-	-	20	20	60	100	2
PCC 6	BTCVC403	Structural Mechanics - I	2	1	-	20	20	60	100	3
PCC 7	BTCVC404	Water Resources Engineering	3	-	-	20	20	60	100	3
PCC 8	BTCVC405	Hydraulics - II	2	1	-	20	20	60	100	3
PCC 9	BTCVC406	Engineering Geology	2	1	-	20	20	60	100	3
LC 4	BTCVL407	Building Planning and CAD Lab.	-	-	2	20	-	30	50	1
LC 5	BTCVL408	Environmental Engg. Lab.	-	-	2	20	-	30	50	1
LC 6	BTCVL409	HE-II Lab.	-	-	2	20	-	30	50	1
Internship	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.
<b>Total</b>			<b>13</b>	<b>03</b>	<b>06</b>	<b>180</b>	<b>120</b>	<b>450</b>	<b>750</b>	<b>19</b>

## BTCVC 401 Building Planning and Drawing

**Teaching Scheme:** (2 Lectures) hours/week

### Course Contents

#### Module 1: Principles of building planning

(6 Lectures)

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 Services

(8 Lectures)

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

Anthropometry: Study of Human dimensions, Concept of percentile in Indian standards, space required for various simple activities, Circulation spaces.

#### Module 3: Plumbing Systems

(8 Lectures)

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, building materials and their resistance to fire

#### Module4: Ventilation

(8 Lectures)

Definition, necessity of ventilation, functional requirements, various system & selection criteria.

**Air conditioning:** Purpose, classification, principles, various systems

**Thermal Insulation:** General concept, Principles, Materials, Methods, Computation of Heat loss & heat gain in Buildings

#### Module 5: Introduction to Acoustics & Green Building

(6 Lectures)

Absorption of sound, various materials, Sabine's formula, optimum reverberation time, conditions for good acoustics Sound insulation: Acceptable noise levels, noise prevention at its source, transmission of noise, Noise control-general considerations

**Green Building:** Concept, Principles, Materials, Characteristics, Applications

## Reference Books

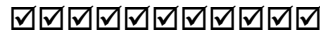
- Shah, Kale, Pataki, “Building Drawing”, Tata McGraw- Hill
- Sane Y. S., “Building Design and Drawing”, Allied Book Stall, Pune
- Jain V.K., “Automation Systems in Smart and Green Buildings”, Khanna Publishers, N. Dehli ISBN No 978-81-7409-237-3
- Jain V.K., “Handbook of Designing and Installation of 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.



## BTCVC402 Environmental Engineering

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

### Course Contents

#### Module 1: Introduction

(6 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: Treatment of Water

(10 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, 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

**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 3: System of Water Supply

(6 Lectures)

Continuous and intermittent system, type of distribution systems, layouts, methods of supply: gravity, pumping and combination, hydraulic analysis of distribution system

#### Module 4: Treatment

(10 Lectures)

##### Treatment of Waste Water

Sources of wastewater flows, components of wastewater flows, wastewater constituents, characteristic of municipal waste water, necessity of treatment of waste water, sewerage systems, concept of sewage, sullage, storm water, introduction of preliminary treatment, primary treatment, secondary treatment, introduction to tertiary or advanced treatment fundamentals of anaerobic treatment, sewage and industrial waste of common origin, types

##### Treatment of Solid Waste

Types, sources, characteristics, ill-effects of improper solid waste management, collection, processing techniques, methods of treatment of solid waste-composting, incineration, pyrolysis and sanitary land filling. biodegradable, non-degradable segregation of solid waste, concept of hazardous waste management, e-waste disposal

### Module 5: Air Pollution

(4 Lectures)

Definition, sources of air pollution, types air pollutants, atmospheric stability, mixing heights, plume types and meteorological parameters, effects of air pollution, control measures of air pollution

#### Text Books

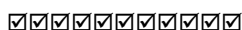
- Rao and Rao, "Air Pollution", Tata McGraw Hill Publications, New Delhi, 1990
- Garg S. K., "Water Supply Engineering", Khanna Publishers, New Delhi
- Birdi J. S. and Birdi G. S., "Water Supply & Sanitary Engineering", DhanpatRai Pub. Company, 8th edition, New Delhi

#### Reference Books

- Peavy and Rowe, "Environmental Engineering", McGraw Hill Publications
- Stern, "Environmental Engineering", Vol. I to IV, McGraw Hill Publications
- Sharma and Kaur, "Environmental Chemistry", Goyal Publisher
- Government Of India Publication, "Water Supply and Treatment Manual"
- Fair and Geyr, "Environmental Engineering", McGraw Hill Publications
- Steel and McGhee, "Environmental Engineering", McGraw Hill Publications
- Viessman & Hammer, "Water Supply & Pollution Control", Harper Collins Collage Publishers
- Publications by reouted organizations such as WHO, NEERI, MERI, MPCB, CWPRS, etc.

**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.
- CO4: Apply the solid waste management concepts.



## BTCVC 403 Structural Mechanics– I

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

### Course Contents

#### Module 1: Beam Deflections

(Lectures 06)

Calculations of deflection for determinate beams by double integration, Macaulay's method, moment area method, conjugate beam method, deflection by method of superposition

#### Module 2: Energy Principles

(Lectures 06)

Strain energy and strain energy density, strain energy in traction, shear, flexure and torsion - Castiglano's and Engessor's energy theorems, principle of virtual work, application of energy theorems for computing deflections in beams, Maxwell's reciprocal theorem, Williot Mohr diagrams

#### Module 3: Method of Consistent Deformation

(Lectures 08)

Different structural systems, concept of analysis, basic assumptions, indeterminacy, choice of unknowns, Castiglano'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 4: Moment Distribution Method

(Lectures 08)

Analysis of continuous beams propped cantilevers, continuous beams - theorem of three moments - analysis of continuous beams settlement effects, thermal effect, Shear Force and Bending Moment diagrams for continuous beams, portal frames with and without sway

#### Module 5: Slope Deflection Method

(Lectures 08)

Analysis of continuous beams, analysis of rigid frames, frames without sway and with sway, settlement effects, introduction to difficulties in frames with sloping legs and gabled frames

#### 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, 9<sup>th</sup> Edition
- Schodek, “Structures”, Pearson Education, 7<sup>th</sup> edition
- Ramamrutham S. and Narayanan R., “Theory of Structures” Dhanpat Rai Publishers, Delhi

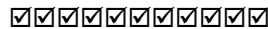
**Course Outcomes:** On completion of the course, the students will be able to:

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 in the continuous beam and frame



## BTCVC 404 Water Resources Engineering

**Teaching Scheme:** (3 Lectures) hours/week

### Course Contents

**Module 1: Introduction**

**(6 Lectures)**

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**

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

**Module 2: Reservoirs**

**(6 Lecturers)**

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**

**(8 Lectures)**

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 3: Weirs and Canals**

**(8 Lectures)**

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 4: Hydrology**

**(6 Lectures)**

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 5:**

**Lift Irrigation**

**(8 Lectures)**

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

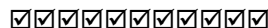
### References Books

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. CO3: Develop basis for design of irrigation schemes.



## BTCVC405 Hydraulics-II

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

### Course Contents

#### Module 1: Uniform Flow in Open Channel

(Lectures 06)

Introduction, difference between pipe flow and open channel flow, types of open channels, types of flows in open channel, geometric elements, velocity distribution, measurement of velocity-(pitot tube, current meter) weir & spillway: sharp, broad & round crested weirs, calibration of weir, time of emptying tank with weir, profile of ogee spillway, flow below gates

#### Module 2: Steady & Uniform Flow

(Lecture 06)

Chezy's & Manning's formula, Roughness coefficient, uniform flow computations, hydraulically efficient section- considerations for rectangular, triangular, trapezoidal, circular sections  
Specific energy: definition & diagram, concept of critical, sub-critical, super-critical flow, specific force, specific discharge derivation of relationships and numerical computations

#### Module 3: Varied Flow & Impact of Jet

(Lectures 10)

**Gradually (G.V.F.):** Definition, classification of channel Slopes, dynamic equation of G.V.F. (Assumption and derivation), classification of G.V.F. profiles-examples, direct step method of computation of G.V.F. profiles

**Rapidly varied flow (R.V.F.):** Definition, examples, hydraulic jump- phenomenon, relation of conjugate depths, parameters, uses, types of hydraulic jump

**Impact of Jet:** Impulse momentum principle, impact of jet on Vanes-flat, curved (stationary and moving), inlet & outlet velocity triangles under various conditions, Series of flat, curved vanes mounted on wheel

#### Module 4: Turbines

(Lectures 08)

**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: Pumps

(Lectures 06)

**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

### Text Books

- Modi, Seth, "Fluid Mechanics – Hydraulic & Hydraulic Mechanics" Standard Book House
- Bansal R.K., "Fluid Mechanics", Laxmi Publications, 9th edition 2017
- Garde R. J., "Fluid Mechanics through Problems", New Age Publications, 3rd edition 2011
- Jain A. K., "Fluid Mechanics", Khanna Publications, 8th edition, 2003, Delhi
- Kumar K. L., "Fluid Mechanics", Eurasia Publication House, 11th edition, Delhi
- Rangaraju, "Open Channel flow", Tata McGraw-Hill Pub. Co., Delhi
- Subramanian K., "Fluid Mechanics through Problems" Tata McGraw-Hill Pub. Co., Delhi
- Subramanian K., "Flow in Open Channel", Edition V, Tata McGraw-Hill Pub. Co., Delhi

## Reference Books

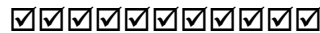
- Streeter, "Fluid Mechanics" McGraw-Hill International Book Co., 3rd edition, Auckland
- Shames, "Mechanics of Fluids", McGraw Hill, 4th edition
- Chaw V. T., "Flow in Open Channel", McGraw-Hill International Book Co., Auckland
- Hughes & Brighton, "Fluid Mechanics", Tata McGraw Hill

**Course Outcomes:** On completion of the course, the students will

CO1: Design open channel sections in a most economical way.

CO2: Know about the non-uniform flows in open channel and the characteristics of hydraulic jump.

CO3: Understand application of momentum principle of impact of jets on plane



## 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, "Rulvey'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

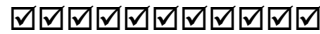


- Megascopic study of Metamorphic rocks
- Cross-section Preparation and interpretation of geological maps
- Study of Structural Geological models
- Preparation of bore log /lithologs
- Interpretation of bore- hole data

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.



## BTCVL407 Building Planning and CAD Lab

**Practical:** 2 hours / week

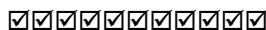
Term work shall consist of detailed report of in form of set of drawings mentioned below. In practice sessions, free-hand sketching in drawing book shall be insisted.

- 1) Imperial size sheets based on actual measurement of existing residential building consisting of plan, elevation, section passing through staircase, Site plan. Area statement & brief specifications.
- 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.



## BTCVL 408 Environmental Engineering Laboratory

**Practical:** 2 hours / Week

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

**(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 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 and its growth rate.



## BTCVL 409 Hydraulic Engineering Laboratory - II

**Practical:** 2 hours / week

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

### Group (A)

- 1) Calibration of V notch / Rectangular notch.
- 2) Calibration of Ogee Weir.
- 3) Study of hydraulic jump
  - a) Verification of sequent depths,
  - b) Determination of loss in jump.
  - c) Study of parameters with respect to Froude Number: i)  $Y_2/Y_1$ ; ii) Length; iii) Energy loss
- 4) Study of flow below gates – Discharge v/s head relation, Equation of flow, Determination of contraction in fluid in downstream of gate.
- 5) Velocity distribution in open channel in transverse direction of flow.

### Group (B)

- 1) Impact of jet.
- 2) Study of Turbines (Demonstration).
- 3) Tests on Centrifugal Pump.
- 4) Study of Charts for Selection of Pumps

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: Understand various properties of fluids and measurement techniques.
- CO2: Carry out calibrations of various flow measuring devices.
- CO3: Understand mechanism of hydraulic jump, various jets and pumps.



## 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.



**Dr. Sachin M. Pore**

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