Course Structure
for Degree Programme
B. Tech. in Civil Engineering

with effect from AY 2018-19

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

Program Objectives

Goal of the Civil engineering with a specialization in Structural Engineering (SE) at Dr. Babasaheb Ambedkar technological University, Lonere (BATU) is to provide students with preparation to become worthy of professional careers in the field and to be motivated for lifelong learning. All prescribed courses have definite objectives and outcomes. Program objectives are expected qualities of engineers as under:

a) **Preparation:** To prepare students to excel in various educational programmes or to succeed in industry / technical profession through further education/training;

b) **Core Competence:** To provide students with a solid foundation in mathematical, scientific fundamentals required to solve Structural problems;

c) **Breadth:** To train students with a breadth of scientific knowledge to comprehend, analyze, design & create novel products and solutions for real life problems;

d) **Professionalism:** To inculcate in students professional/ethical attitude, effective team work skills, multidisciplinary approach and to relate engineering issues to a broader context;

e) **Learning Environment:** To provide students with academic environment of excellence, leadership, ethical guidelines and life-long learning needed for a long / productive career.

In addition to above DBATU graduate is expected to be

1. Taking pride in their profession and have commitment to highest standards of ethical practices and related technical disciplines;

2. Able to design structural system that is safe, economical and efficient;

3. Capable of using modern tools efficiently in all aspects of professional practices;

4. Dealing successfully with real life civil engineering problems and achieve practical solutions based on a sound science and engineering knowledge;

5. Shall be engage in continuous research, development and exchange of knowledge for professional development;

6. Be honest in their control and performing their duties and promote effective use of resources through open, honest and impartial services to the public;

7. Act in such a manner which will uphold the honour, integrity, or dignity of the engineering profession, and avoid knowingly engaging in business or professional practices of a fraudulent, dishonest or unethical nature;

8. Recognize that the lives, safety, health and welfare of the general public are dependent upon engineering, decision and practices;

9. Continue their professional development throughout their careers and provide opportunities for the professional development;

Course Structure Evaluation Scheme

Sr. No	Particulars of Evaluation	MSE	CA		ESE		Total
			CA₁	CA₂	Internal	External	
01	Theory courses	20	10	10	---	60	100
02	Audit courses	---	50	50	---	---	100
03	Studio Courses (Product Design Engg)	---	30	30	40	---	100
03	Laboratory (Practical) courses	---	15	15	10	10	50
04	Seminar / Min Project/ Project Stage 1	---	30		20	---	50
05	Field Training	---	---	---	50	---	50
06	Project Stage II	---	---	---	50	50	100

Semester- III

Sr. No.	Subject Code	Subject	Contact Hours			Credit
			L	T	P	
Theory						
01	BTBSC301	Mathematics – III	3	1	-	4
02	BTCVC302	Mechanics of Solids	3	1	✓	4
03	BTCVC303	Hydraulics I	2	1	✓	3
04	BTCVC304	Surveying I	2	1	✓	3
05	BTCVC305	Building Construction	2	-	✓	2
06	BTCVC306	Engineering Geology	2	-	✓	2
07	BTHM303	Soft Skills Development	2	-	-	AU
Practical / Drawing and/or Design						
08	BTCVL307	Hydraulics Laboratory I	-	-	2	1
09	BTCVL308	Surveying Laboratory I	-	-	2	1
10	BTCVL309	Building Construction - Drawings Laboratory	-	-	2	1
11	BTCVL310	Engineering Geology Lab	-	-	2	1
12	BTCVS311	Seminar on Topic of Field Visit to Foundation Work	-	-	1	AU
13	BTCVF312	Field Training / Internship/Industrial Training Evaluation (from semester II)	-	-	-	1
		Sub-Total	16	4	09	
		Total	**29**			**23**

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			L	T	P	
Theory						
01	BTBSC301	Mathematics – III	3	1	-	4
02	BTCVC302	Mechanics of Solids	3	1	√	4
03	BTCVC303	Hydraulics I	2	1	√	3
04	BTCVC304	Surveying I	2	1	√	3
05	BTCVC305	Building Construction	2	-	√	2
06	BTCVC306	Engineering Geology	2	-	√	2
07	BTHM303	Soft Skills Development	2	-	-	AU
Practical / Drawing and/or Design						
08	BTCVL307	Hydraulics Laboratory I	-	-	2	1
09	BTCVL308	Surveying Laboratory I	-	-	2	1
10	BTCVL309	Building Construction - Drawings Laboratory	-	-	2	1
11	BTCVL310	Engineering Geology Lab	-	-	2	1
12	BTCVS311	Seminar on Topic of Field Visit to Foundation Work	-	-	1	AU
13	BTCVF312	Field Training / Internship/Industrial Training Evaluation (from semester II)	-	-	-	1
		Sub-Total	16	4	09	
		Total	**29**			**23**

BTBSC 301 Mathematics – III

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

Course Contents

Module 1: Laplace Transform (Lectures 08)

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 08)

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 05)

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 05)

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 (i.e. Laplace equation)

Module5: Functions of Complex Variables (Differential calculus)(Lectures 05)

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.

Module6: Functions of Complex Variables (Integral calculus)(Lectures 07)
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. VermaRajnish, "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 VidyarthiGrihaPrakashan, 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.
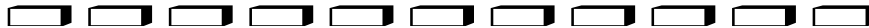
BTCVC 302 Mechanics of Solids

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

Course Contents

Module 1: Stress and Strain
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 Beams
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: 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
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

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

Module 6: Theories of Failure: Concept of failure in strength and failure in deformation, statement and application of 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, "Strength of Materials", Harper Collins Publishers, Fourth Edition
- Junnarkar S.B. (2014), "Mechanics of Structures", Charotor Publishers, Anand, 31st edition,
- Khurmi R.S., "Strength of Material", S. Chand and Co., Edition revised 1968, New Delhi
- Sadhu Singh, "Strength of Materials", Khanna Publishers, N. Dehli, ISBN No. 978-81-7409-048-7
- Prasad I.B, "A text book of Strength of Materials", Khanna Publishers, N. Dehli, ISBN NO:978-81-7409-069-X
- Beer F P., Jhonston E. R., John. T. D E wolf, "Mechanics of Materials" TMH, 7th edition
- Timoshenko S.P. and Young D.H., "Elements of Strength of Materials", East West Press, 4th edition 1962, New Delhi
- Prasad I.B, "A text book of Strength of Materials", ISBN: 978-81-7409-069-X
- Dr. Sadhu Singh, "Strength of Materials", ISBN: 978-81-7409-048-7

Reference Books

- Popov E.P., "Introduction to Mechanics of Solids", Prentice-Hall, Second Edition 2005
- Crandall S.H., Dahl N.C., & Lardner T.J., "An Introduction to Mechanics of Solids", Tata McGraw Hill, 2nd Edi, 1978
- Nash W., "Strength of Materials Schaum's outline series", McGraw Hill, fourth edition
- Punmia B. C., "Mechanics of Materials" Laxmi Publications, revised edition, 2016
- Subramanian R., "Strength of Materials" Oxford University Press, 2nd edition, New Delhi
- Dr. Sadhu Singh, "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: Find deflections in determinant beams.

CO4: Visualize force deformation behavior of bodies.
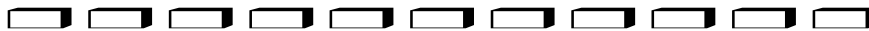
BTCVC 303 Hydraulics I

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

Course Contents

Module 1: Fundamental Concepts   (Lectures 06)

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

Module 2: Fluid Statics   (Lectures 06)

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

Module 3: Fluid Kinematics   (Lectures 06)

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

Module 4: Laminar Flow **(Lectures 06)**

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

Module 5: Dimensional Analysis and Similitude **(Lectures 06)**

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

Module 6: Flow Measurement **(Lectures 06)**

Direct methods, restriction flow meters, linear flow meters, traversing methods, measurements in open channel flow

Flow Through Pipes: 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., "Introduction to Fluid Mechanics", John Wiley and Sons, Fifth Edition
- Modi and Seth, "Fluid Mechanics and Hydraulic Machinery", Standard Book House, Tenth Edition, 1991
- Kumar K. L., "Fluid Mechanics"
- Bansal R. K., "Fluid Mechanics"
- Jain A.K, "Fluid Mechanics including Hydraulic Machines" ISBN: 978-81-7409-194-7

Reference Books

- Streeter V. L., Bedford K. W. and Wylie E. B., "Fluid Dynamics", New York, McGraw-Hill, Ninth Edition, 1998
- Som S. K. & Biswas G., "Introduction to Fluid Mechanics & Fluid Machines", Tata McGraw-Hill, 2nd Edi., 2003

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.
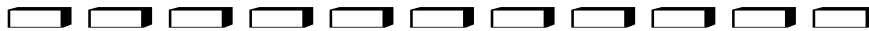
BTCVC 304 Surveying – I

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

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 Surveying **(Lectures 08)**

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

Module 3: Plane Table Surveying **(Lectures 05)**

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

Module 4: Leveling and Applications **(Lectures 08)**

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 5: Theodolite Surveying   **(Lectures 05)**

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 6: Engineering Surveys   **(Lectures 05)**

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., "Surveying and Leveling", Vols. I, II and III, Vidyarthi Gruh Prakashan, Pune
- Punmia B.C., "Surveying", Vols. I, II and III, Laxmi Publications, 16th edition, 2016

Reference Books
- Clark D., "Plane and Geodetic Surveying", Vol. I & II, C.B.S. Pub. &Distri., N. Delhi, 6th edi.
- Anderson J. M. and Mikhail E. M., "Introduction to Surveying", McGraw Hill Book Company
- Bannister A. and Raymond S., "Surveying", ELBS, Sixth Edition, 1992
- KahmenHeribert and Faig Wolfgang, "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.
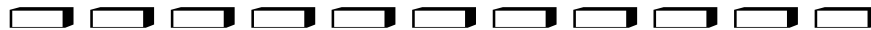
BTCVC 305 Building Construction

Teaching Scheme: (2 Lectures) 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 08)**
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, various types, uses and limitations

Ramps: Requirements and types, planning aspects for physically handicapped persons **Elevators:**Types and their Use

Module 5: Flooring Roofs and Types   (Lectures 06)

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

Module 6: Precast and Pre-engineered Buildings   (Lectures 05)

Principles- advantages and disadvantages, types of prefabricate, standardization, basic, nominal and actual dimensions, tolerances, joints production, transportation and erection

Text Books
- Punmia B.C., Jain A. K., "Building Construction", Laxmi Pub. Pvt. Ltd., 10th Edi, N. Delhi
- Arora S. P. and Bindra S. P., "Text Book of Building Construction", Dhanpat Rai Publications
- Kumar Sushil, "Building Construction" Standard Publishers, 20th Edition, 2010.
- P. Purushothama Raj, "Building Construction Materials and Techniques", Pearson Education
- Jain V.K., "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., "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., "A Course in Civil Engineering Drawing", S. K. Kataria and Sons
- Catalogues. Information Brochures, Trade Literature by material or product manufacturers
- Mehta, Scarborough, Armpriest, "Building Construction", Pearson Education
- Macay W.B, "Building Construction", Vol. I, II, III, IV, Pearson Education
- Jain V.K., "Handbook of Designing and Installation of Services in High Rise Building Complexes" ISBN : 978-81-7409-245-8
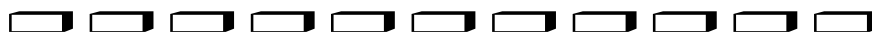
Course Outcomes: On completion of the course, students will be able to:

CO1: Understand types of masonry structures.
CO2: Understand composition of concrete and effect of various parameters affecting strength.
CO3: Comprehend components of building and there purposes.
CO4: Comprehend the precast and pre-engineered building construction techniques.

BTCVC 306 Engineering Geology

Teaching Scheme: (2 Lectures) 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 07)**

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 **(Lectures 05)**

Outcrop, Strike and Dip, Unconformity-Types, Outliers and Inliers, Overlap Fold and Fault: Parameters, Classification, Causes, Civil Engineering significance Joint: Types, Civil engineering considerations

Module 4: Building Stones **(Lectures 05)**

Properties of rocks, Requirement of good building stone, Building stones of India

Groundwater: Sources of groundwater, water table, Zones of groundwater, Porosity and permeability

Module 5: Geology of Dams and Reservoirs, Tunnels and Bridges **(Lectures 08)**

Preliminary geological survey, Influence of geological conditions on location, alignment, Design and Type 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 reservoir site

Tunnels and Bridges: Influence of geological conditions on tunneling, difficulties during tunneling, tunnel lining, tunneling in folded strata, sedimentary rocks and Deccan traps, dependence of types of bridges on geological conditions

Module 6: Preliminary Geological Investigations **(Lectures 06)**

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

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

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

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.

BTHM 303 Soft Skills 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 02)**

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 02)**

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 02)**

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 02)**

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 Skills Development   **(Lectures 02)**

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

Module 6: Effective Computing Skills   **(Lectures 02)**

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.
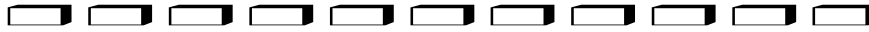
BTCVL 307 Hydraulic Engineering Laboratory I

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.

BTCVL308 Surveying Laboratory – I

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. Practical examination shall be based on above practical course.

Essential Practical

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 four 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
6) Study and use of Minor Instruments

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.

BTCVL 309 Building Construction - Drawings Laboratory
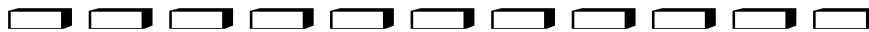
Practical: 2 hours / week

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.

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

CO1: Draw plan, elevation and section of various structures.

CO2: Apply the principles of planning and by laws used for building planning. CO3: Prepare detailed working drawing for doors and windows.

BTCVL 310 Engineering Geology Laboratory

Practical: 2 hours / Week

List of Experiments

Practical Work 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 tour to the places of Engineering Geological importance

A Journal containing record of above practical work shall be examined as Term Work. Practical examination shall be based on above practical course.

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

CO1: Calculate the linear measurement on surface.

CO2: Find out engineering properties of various geological materials. CO3: Draw subsurface lithologs.
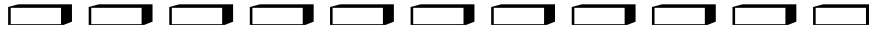
CO4: Identify minerals and rocks by studying physical properties.

BTCVS 311 Seminar on Topic of Field Visit to Foundation Work

Student shall visit to ongoing construction sites in field to witness and collect necessary information from works of foundation execution. It is desirable to collect basic information of geotechnical aspects of foundations, types and components of foundations, tools and plants, construction machinery, etc. Intention is to introduce students to process of collection and presentation of technical information. Report shall be submitted to cover above aspects as studied.

BTCVF 312 Field Training (from semester I I)

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.

Semester- IV

Sr. No.	Subject Code	Subject	Contact Hours			Credit
			L	T	P	
		Theory				
01	BTCVC401	Hydraulics II	2	1	✓	3
02	BTCVC402	Surveying – II	2	1	✓	3
03	BTCVC403	Structural Mechanics-I	3	1	-	4
04	BTID405	Product Design Engineering	1	2	-	3
05	CV E1	**Elective I**	3	-	-	3
06	BTCVC406	Engineering Management	1	-	-	AU
07	BTHM3401	Basic Human Rights	2	-	-	AU
Practical / Drawing and/or Design						
08	BTCVL407	Hydraulics Laboratory II	-	-	2	1
09	BTCVL408	Surveying Laboratory II	-	-	4	2
10	BTCVL409	Mechanics of Solids Laboratory	-	-	2	1
11	BTCVM410	Mini Project	-	-	2	1
12	BTCVF411	Seminar on Topic of Field Visit to works involving Superstructure Construction	-	-	1	1
		Sub-Total	**14**	**5**	11	
		Total	**31**			**22**
		Elective I				
	BTCVE404A BTCVE404B BTCVE404C	Numerical Methods in Engineering Planning for Sustainable Development Instrumentation & Sensor Technologies for Civil Engineering Applications	3	-	-	3

BTCVC 401 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 lube, 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 05)**
Chezy's & Manning's formula, Roughosity 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 **(Lectures 07)**
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

Module 4: Impact of Jet **(Lectures 05)**
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 5: Hydraulic Machines **(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

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 **Module6:**

Boundary Layer Theory **(Lectures 06)**
Concept, Boundary layer along thin plate- Characteristics, Laminar, Turbulent Boundary Layer, laminar sub layer, Various Thicknesses- Nominal, displacement, Momentum, Energy. Hydraulically smooth and Rough boundaries, Separation of Boundary layer, control of Separation, Introduction to Drag and Lift on submerged bodies (Flat plates, Sphere, Cylinder, aerofoil), Stokes law, Concept of Drag and Lift coefficients

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
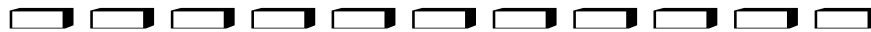
BTCVC 402 Surveying – II

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

Course Contents

Module 1: Tachometry **(Lectures 08)**
Significance and systems, principle, constants, basic formulae and field work stadia method, auto reduction tachometer, tangential system

Electronic Distance Measurement: Importance, principles of electronic distance measuring (EDM) instruments, classification of EDM's based on carrier waves used, study and use of total station

Module 2: Triangulation **(Lectures 06)**
Principle & classification, system, selection of station, base line measurement, correction and use of subtense bar, signals, satellite station, reduction to center, spherical excess, angular observations, tri-iteration

Triangulation Adjustments: Theory of errors, laws of weights, concept of most probable value

Module 3: Field Astronomy **(Lectures 06)**
Terms, co-ordinate systems, determination of latitude and true bearing by observation on the sun and pole star

Module 4: Curves **(Lectures 06)**
Horizontal and vertical curves, simple curves, setting with chain and tapes, tangential angles by theodolite, double theodolite, compound and reverse curves, transition curves, functions and requirements, setting out by offsets and angles, vertical curves, sight distance requirements

Module 5: Photogrammetry **(Lectures 06)**
Terms, types, vertical photographs, scale, ground coordinates, relief displacement, flight planning photomaps and mosaics, stereoscopy and photo interpretation

Module 6: Remote Sensing **(Lectures 06)**
Introduction, classification and principles, electromagnetic energy and its interaction with matter, idealized systems, sensors, platforms, and application in civil engineering, G.P.S & G.I.S. as surveying techniques – Overview, uses and applications

Text Books
- Bannister A., Raymond S., Wartikar J.N., Wartikar P.N., "Surveying", ELBS, 6th Editon, 1992
- Heribert Kahmen and Wolfgang Faig, "Surveying ", Walter de Gruyter, 1995
- Kanetkar T.P., "Surveying and Leveling", Vols. I, II and III, VidyarthiGruhPrakashan, Pune
- Punmia B.C., "Surveying", Vols. I , II and III, Laxmi Publications

Reference Books
- James M. Anderson and Edward M. Mikhail, "Introduction to Surveying", McGraw Hill Book Company
- Clark D., "Plane and Geodetic Surveying", Vol. I and II, C.B.S. Publishers and Distributors, New Delhi, Sixth Edition
- Agor, "Advanced Surveying", Khanna Publications, Delhi
- Arora K. L., "Surveying", Vol.1 & 2
- Basak, "Surveying and Levelling"Vol 1 & 2, Tata Mcgraw Hill Publications, New Delhi
- Duggal S. K., "Surveying", Vol 1 & 2, Tata Mcgraw Hill Publications, New Delhi

- Gopi S., Satikumar R. and Madhu N., "Advanced Surveying", Pearson Education,
- Chandra A. M., "Higher Surveying", New Age International Publication

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

CO1: Understand basics different types of curves on roads and their preliminary survey.

CO2: Perform setting of curves, buildings, culverts and tunnels.

CO3: Comprehend different geodetic methods of survey such as triangulation, trigonometric leveling.

CO4: Comprehend modern advanced surveying techniques.

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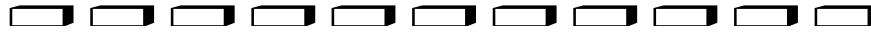
BTCVC 403 Structural Mechanics – I

Teaching Scheme: (3 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 05)

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 07)

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 06)

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 06)

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

Module 6: Thin Cylinders (Lectures 07)

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

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.
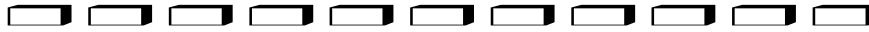
BTID 405 Product Design Engineering

Course Contents

Pre Requisites: Knowledge of Basic Sciences, Mathematics and Engineering Drawing

Design Studio: 2 hr / week to develop designs through sketching, practical skills and learning digital tools

Continuous Assessment: Documentation of steps in the selected product design

Final Assessment: Product Design in Studio with final product specifications

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

1. Create simple design of components or a system as whole
2. Create design documents for knowledge sharing
3. Manage own work to meet design requirements
4. Work effectively in a team

Subject refers to products in civil engineering. Product may an entity such as a building, bridge, road, railway, airport, tunnel, port, harbor, water supply or disposal schemes or components involved in such entities as tiles, doors, windows, walls, structural members, abutment, pier, etc., or even materials produced in industry such as cement, steel, composits, FRP, bricks or blocks etc. It is intended to refer to few of these products which may be chosen by student. Group activity is encouraged.

Module1: Introduction to Engineering Product Design: **(Lectures 02)**
Concept of a product, Problem solving approach for Product Design, Trigger for Product/ Process/ System, Disassembling existing Product(s) and understanding relationship of components with each other, Sketching of components, identifying materials and their processing for final product, fitting of components, understanding manufacturing as scale of the components, Reverse engineering concept, case studies of products in markets, (or in each discipline), underlying principles, Case studies of product failures, revival of failed products, Public/Society's perception of products, and its input into product design.

Module 2: Ideation   **(Lectures 02)**
Generation of ideas, Funnelling of ideas, Short-listing of ideas for product(s) as an individual or group of individuals, Sketching of products, Market research for need, competitions, scale and cost, Initial specifications of products

Module 3: Conceptualization   **(Lectures 02)**
Computer operation principles and image editing through a graphical Composition; Computer aided 2D drafting and 3D Modeling through simple exercises.

Designing of components, Drawings of parts and synthesis of a product from its component parts, idea of rendering designs for 3-D visualization and to create a photo image, Parametric modelling of product, 3-D Visualization of mechanical products, Detail Engineering drawings of components

Module 4: Detailing (Lectures 02)

Managing assembling, Product specifications- data Sheet, Simple component designs, Workshop and erection safety and health issues, Create documents for knowledge sharing

Hands-on Activity Charts for Use of Digital Tools using software such as Autodesk Fusion 360 or similar freeware

Activity 1	Learn the basic vector sketching tools.	2
Activity 2	General understanding of shading for adding depth to objects. Understanding of editing vectors	2
Activity 3	Begin developing a thought process for using digital sketching.	3
Activity 4	Create a basic shape objects sphere, box cylinders	3
Activity 5	Create Automotive wheel concepts	3
Activity 6	Understanding Navigation and Data Panel Interface	2
Activity 7	Solid and Surface modelling, Rendering 3-D models	4
Activity 8	Product market and Product Specification Sheet	3
Activity 9	Documentation for the product	2

Reference Books

- Model Curriculum for "Product Design Engineer –Mechanical", NASSCOM (Ref. ID: SSC/Q4201, Ver 1.0, NSQF Level: 7)
- Eppinger, S., & Ulrich, K. (2015), "Product Design and Development". McGraw-Hill Higher Education.
- Green, W., & Jordan, P. W. (1999), "Human Factors in Product Design: Current Practice and Future Trends", CRC Press.
- Sanders, M. S., & McCormick, E. J. (1993), "Human Factors in Engineering and Design", McGraw-Hill Book Company
- Roozenburg, N. F., &Eekels, J. (1995), "Product Design: Fundamentals and Methods (Vol. 2)", John Wiley & Sons Inc.
- Lidwell, W., Holden, K., & Butler, J. (2010), "Universal Principles of Designs: Revised and Updated: 125 ways to Enhance Usability, Influence Perception, Increase Appeal, make Better Design Decisions and Teach through Design", Rockport Pub.

BTCVE 404 A Numerical Methods in Engineering

Teaching Scheme: (3 Lectures) hours/week

Pre Requisites: Mathematics - I and Mathematics – II

Course Contents

Module 1 (Lectures 06)

Basis of Computations, Matrix Operations on Computer, Multiplication and Inversion, Solution of Simultaneous Equations, Gauss Elimination Method, Cholesky Decomposition method, Gauss Jordan and Gauss Sceidal Methods

Module 2 (Lectures 06)

Roots of Equation, Trial and Error, Bisection, Secant Iteration, Newton Rapson Method, Solution of Ordinary Differential Equation, Euler's Method, Modified Euler's Method and Runga Kutta Methods.

Module 3 (Lectures 06)

Interpolation with Newton's Divided Differences, Lagrange's Polynomial, Finite Difference Method, Central, Forward and Backward Differences, Least Square Polynomial Approximations Application in Deflection of Determinate Beams, Buckling Load of Long Columns

Module 4 (Lectures 04)

Numerical Integration: Trapezoidal Rule, Simpon's Rules, Gauss Quadrature Rules

Module 5 (Lectures 04)

Statistical Analysis of Experimental Data, Mean, Median, Mode, Deviation, Measures of Dispersion, Least Square Method, Regression

Analysis: Linear, Parabolic, Curve Fitting

Module 6 (Lectures 04)

Implementation of above methods by algorithm development leading to programming in Spreadsheets / Fortran / C / C++

Text Books

- Balaguruswami E., "Numerical Methods", Tata Mc-Graw Hill
- Scheid F, "Numerical Analysis (Schaum's series)", Tata Mc-Graw Hill
- Chapra. S. C. and Canale R. P., "Numerical Methods for Engineers", by, Tata Mc-Graw Hill
- Shantha Kumar M , "Computer Based Numerical Analysis", Khanna Publication
- Grewal B.S. and Grewal J.S., "Numerical Methods in Engineering and Science", Khanna Publication, N. Delhi
- Sastry, S.S., "Introductory Methods of Numerical Analysis", Printice Hall of India, New Delhi

Reference Books

- Jain, Aryengon, "Numerical Methods for Scientific and Engineering Applications", Wiley Eastern Publication
- Numerical Recipe , Oxford Publishing
- Manuals for the Commercial Computer Programmes

BTCVE 404 B Planning for Sustainable Development

Teaching Scheme: (3 Lectures) hours/week

Course Contents

Module 1: (Lectures 06)

Sustainable Development-explains and critically evaluates the concept of sustainable development, Environmental degradation and poverty Sustainable development: its main principles, the evolution of ideas about sustainability,

Module 2: (Lectures 06)

Strategies for promoting sustainable development, resistances to the concept, and some alternative approaches. Examine some important current issues and areas of debate in relation to sustainable development.

Module 3: (Lectures 04)

Innovation for sustainable development- Environmental management and innovation strategies.

Module 4: (Lectures 04)

Societal transformations. Institutional theory.

Module 5: (Lectures 04)

Governance for sustainable development. Policy responses to environmental degradation.

Module 6: (Lectures 04)

Capacity development for innovation. Research methods.

Text/Reference Books:

- Harris, J.M. (2204) Basic Principles for Sustainable Development, Global Development and Environment
- Institute, working paper 00-04, available at:
  http://ase.tufts.edu/gdae/publications/Working_Papers/Sustainable%20Development.PDF
- Robinson, J. (2004), "Squaring the circle? Some thoughts on idea of sustainable Development" Ecological Economics 48(4): 369-384.
- Hjorth, P. & A. Bagheri (2006), "Navigating towards Sustainable Development: A System Dynamics Approach", Futures 38: 74-92.

- Mog, J.M. (2004) „Struggling with Sustainability – A Comparative Framework for Evaluating Sustainable Development Programs", World Development 32(12): 2139–2160. IISD Commentary on the OECD's Draft Principles for International Investor Participation in Infrastructure (PDF – 68 kb)

- Arundel, A., R. Kemp, and S. Parto (2004) Indicators for Environmental Innovation: What and How to Measure, forthcoming in International Handbook on Environment and Technology Management (ETM), edited by D. Annandale, J. Phillimore and D. Marinova, Cheltenham, Edward Elgar.

- Douthwaite, B. (2002) Enabling Innovation. A practical guide to understanding & fostering innovation, London, Zed Books.

BTCVC 406 Engineering Management

Teaching Scheme: (1 Lecture) hours/week

Course Contents

Module 1: Evolution of Management Thought   **(Lectures 02)**
Scientific, human behavior, system approach, introduction to elements of systems – input, output, process restriction, feedback, contingency approach, contributions by Taylor, Frank and Lillion, Gilbreth, Henry Fayol, Elton Mayo, McGregor (theory X and theory Y), H. L. Gantt, Maslow

Module 2: Functions of Management   **(Lectures 02)**
Planning – nature and purpose of planning, strategies and policies, management by objectives, formal and informal organization, centralization, decentralization, line, line and staff, functional organization, principles of site layout, leading and directing, controlling and coordination (introduction only), communication process, motivation

Module 3: Decision Making   **(Lectures 02)**
Importance of decision making, steps in decision making, analysis of decision, decision under certainty, uncertainty and decision under risk, criterion of optimism and regret, sensitivity of criteria and decision under conflict, expected monitory value, decision tree, theory of games (dominance pure and mixed strategy).

Module 4: Operations Research   **(Lectures 04)**
Linear programming, simple l-p model, simplex method - duality, sensitivity analysis, application of linear programming in transportation and assignment models

Module 5: Simulation Studies   **(Lectures 02)**
Monte-Carlo simulation, queuing or waiting line theory (simple problems), dynamic programming, introduction to emerging optimization techniques

Module 6: Material Management   **(Lectures 02)**
Material management – purchasing principles, stores, coding system function, responsibilities, record and accounting. Inventory control – an introduction, inventory cost, EOQ analysis, ABC analysis, safety stocks

Text Books
- Deshpande S. H., "Operation Research"
- Deshpande A. S., "A Text book of Management"
- Gopal Krishnan, "Material Management", Sdueshan.
- Taha, "Operation Research"
- Banga and Sharma, "Engineering Managnment"

References
- Stoner, "Engineering Management"
- Davar, "Principles of Management"
- Koontz, Dounell and Weigrick, "Essentials of Management"
- Kast and Rosinweig, "Management and Organization", Tata McGraw Hill Publication.

- Wagner, "Operation Research", Wikey Easter Ltd., New Delhi
- Zhamb L.C., "Quantitative Techniques in Management", Vol. I,
- Miller and Stars, "Executive Decisions & Operation Research", Prentice Hall of India

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

CO1: Demonstrate the nuances of management functions.

CO2: Analyze the framework of a business organization.

CO3: Adopt an empirical approach toward business situations.

CO4: Apply various Management techniques.

BTHM 3401 Basic Human Rights

Teaching Scheme: (2 Lectures) hours/week

Course Contents

Module 1: Basic Concepts (Lectures 04)

Individual, group, civil society, state, equality, justice. Human Values, Human rights & Human Duties: Origin, Contribution of American bill of rights, French revolution. Declaration of independence, Rights of citizen, Rights of working & exploited people

Module 2: Fundamental Rights and Economic Program (Lectures 04)

Society, religion, culture, and their inter-relationship. Impact of social structure on human behavior, Social Structure and Social Problems: Social and communal conflicts and social harmony, rural poverty, unemployment, bonded labour.

Module 3: Workers and Human Rights (Lectures 04)

Migrant workers and human rights violations, human rights of mentally and physically challenged. State, Individual liberty, Freedom and democracy.

Module 4: NGOs and Human Rights in India (Lectures 04)

Land, Water, Forest issues.

Module 5: Human Rights in Indian Constitution and Law (Lectures 04)

i) The Constitution of India: Preamble; ii) Fundamental rights; iii) Directive principles of state policy; iv) Fundamental duties;

v) Some other provisions

Module 6: UDHR and Indian Constitution (Lectures 04)

Universal declaration of human rights and provisions of India; Constitution and law; National human rights commission and state human rights commission.

References

1) Shastry, T. S. N., "India and Human Rights: Reflections", Concept Publishing Company India (P Ltd.), 2005.

2) C. J. Nirmal, "Human Rights in India: Historical, Social and Political Perspectives (Law in India)", Oxford India.

BTCVL 407 Hydraulic Engineering Laboratory I I

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 Fraud Number: i) Y2/Y1; 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.

BTCVL 408 Surveying Laboratory - II

Practical: 4 hours / week

Practical Work consists of performing field practical from the list below and detailed reporting in form of journal. Practical examination shall be based on above.

    1. Tacheometry

a) Determination of tachometric constants,   b) Determination of grade of a line.

    2. Use of subtense bar for distance measurement.

    3. Setting out of curves

      a) Simple circular curves,   b) Transition curves

    4. Study of topo sheets

    5. Study of Aerial Photographs under Stereoscope

    6. Traversing by Total Station.

Projects: 1) Road Project 2) Radial Contouring. 3) Block Contouring Project 4) Theodolite Traversing

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

CO1: Determine contour level of field.
CO2: Determine the tachometric constants and grade of a line.
CO3: Use sub tense bar for distance measurement.

BTCVL 409 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:

Evaluate Young Modulus, torsional strength, hardness and tensile strength of given specimens. Determine the strength of coarse aggregates.

Find the compressive strength of concrete cubes and bricks.

Determine physical properties of given coarse aggregates, fine aggregates and cement samples.
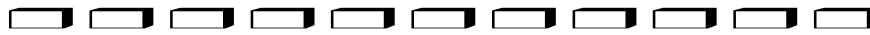
BTCVM 410 Mini Project

Practical: 2 hours / week

Students shall take up work leading to product development. Needs of community around may be of prime concern. Work may target at easing out conventional construction operation by improvement of traditional devices / tools or development of altogether new approach.
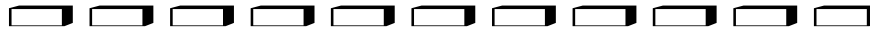
BTCVF 411 Seminar on Topic of Field Visit to works involving Superstructure Construction

Student shall visit to ongoing construction sites in field to witness and collect necessary information from works of execution of superstructure of buildings or other. It is desirable to collect basic information on components of superstructure, tools and plants, construction machinery, etc. Intention of the work is to introduce the student to the chronological order of execution of works and generate data on vocabulary of terms in field.