



**KALINGA  
UNIVERSITY**

# **SCHEME OF EXAMINATION & SYLLABUS**

**For  
Bachelor of Vocational Studies  
(B. Voc.)  
(Building Construction Technology)**



*Kalinga University, Naya Raipur, Chhattisgarh*



# BACHELOR OF VOCATIONAL STUDIES (B. VOC.) (BUILDING CONSTRUCTION TECHNOLOGY)

Semester I							
Code No.	Paper	L	T/P	Credits	End Semester Exam	Internal Marks	Total Marks
BVBCT101	Building Construction-I	3	0	3	70	30	100
BVBCT102	Estimating & Costing-I	3	0	3	70	30	100
BVBCT103	Applied Mathematics for Construction Technology	3	0	3	70	30	100
BVBCT104	Communication Skills	2	1	3	70	30	100
BVBCT105	Applied Mechanics	3	0	3	70	30	100
	<b>GENERAL ELECTIVE-I (Select any one)</b>	2	0	3	70	30	100
BVBCT106A	Human Values and Professional Ethics						
BVBCT106B	Life Skills						
BVBCT106C	Personality Development & Behavioural Science						
	<b>PRACTICAL/VIVA VOCE</b>						
BVBCT107P	Applied Mechanics Lab	0	2	2	30	20	50
BVBCT108P	Building Construction I Lab	0	2	2	30	20	50
BVBCT109P	Estimating & Costing I	0	2	2	30	20	50
BVBCT110P	Basic Electrical Engineering-Lab	0	2	2	30	20	50
BVBCT111P	Engineering Graphics-Lab	0	2	2	30	20	50
BVBCT112P	Basic Information Technology Lab	0	2	2	30	20	50
	<b>Total</b>	<b>16</b>	<b>13</b>	<b>30</b>	<b>600</b>	<b>300</b>	<b>900</b>

### Semester II

Code No.	Paper	L	T/P	Credits	End Semester Exam	Internal Marks	Total Marks
BVBCT201	Building Construction-II	3	0	3	70	30	100
BVBCT202	Estimating & Costing-II	3	0	3	70	30	100
BVBCT203	Surveying-I	3	0	3	70	30	100
BVBCT204	Environmental Science	3	0	3	70	30	100
BVBCT205	Construction Materials	3	0	3	70	30	100
	<b>PRACTICAL/VIVA VOCE</b>						
BVBCT206P	Construction Materials Lab	2	0	2	70	30	100
BVBCT207P	Civil Engineering Drawing Lab	0	2	2	30	20	50
BVBCT208P	Estimating & Costing-II Lab	0	2	2	30	20	50
BVBCT209P	Surveying-I Lab	0	2	2	30	20	50
BVBCT210P	Environmental Science Lab / Field work	0	2	2	30	20	50
BVBCT211P	Industrial Training-I	0	0	2	30	20	50
BVBCT212P	Project-I	0	6	3	30	20	50
	<b>Total</b>	<b>17</b>	<b>14</b>	<b>30</b>	<b>600</b>	<b>300</b>	<b>900</b>

### Semester III

Code No.	Paper	L	T/P	Credits	End Semester Exam	Internal Marks	Total Marks
BVBCT301	Concrete Technology	3	0	3	70	30	100
BVBCT302	Reinforced Cement Concrete Design-I	3	0	3	70	30	100
BVBCT303	Surveying-II	3	0	3	70	30	100
BVBCT304	Strength of Materials	3	0	3	70	30	100
BVBCT305	Fluid Mechanics	3	0	3	70	30	100
	<b>PRACTICAL/VIVA VOCE</b>						
BVBCT306P	Concrete Technology Lab	0	2	2	30	20	50
BVBCT307P	CAD based CED Lab	0	4	2	30	20	50
BVBCT308P	Surveying-II Lab	0	4	2	30	20	50
BVBCT309P	Strength of Materials Lab	0	2	2	30	20	50
BVBCT310P	Hydraulics Lab	0	2	2	30	20	50
BVBCT311P	Industrial Training-II	0	2	4	30	20	50
	<b>Total</b>	<b>15</b>	<b>16</b>	<b>29</b>	<b>530</b>	<b>270</b>	<b>800</b>

### Semester IV

Code No.	Paper	L	T/P	Credits	End Semester Exam	Internal Marks	Total Marks
BVBCT401	Reinforced Cement Concrete Design-II	3	0	3	70	30	100
BVBCT402	Soil Mechanics	3	0	3	70	30	100
BVBCT403	Highway Engineering	3	0	3	70	30	100
	<b>CORE ELECTIVE-I (Select any one)</b>	3	0	4	70	30	100
BVBCT404A	Structural Analysis						
BVBCT404B	<b>Water Engineering</b>						
	OPEN ELECTIVE-I (Select any one)	3	0	3	70	30	100
BVBCT405A	Global Warming & Climate Change						
BVBCT405B	Entrepreneurship Development and Planning						
	<b>PRACTICAL/VIVA VOCE</b>						
BVBCT406P	Reinforced Cement Concrete Design Lab	0	3	3	30	20	50
BVBCT407P	Soil Mechanics Lab	0	3	3	30	20	50
BVBCT408P	Highway Engineering Lab	0	2	2	30	20	50
BVBCT409P	Concrete Mix Design Lab	0	2	2	30	20	50
BVBCT410P	Industrial Training-III	0	0	2	30	20	50
BVBCT411P	Project-II	0	6	3	30	20	50
	<b>Total</b>	<b>15</b>	<b>16</b>	<b>31</b>	<b>530</b>	<b>270</b>	<b>800</b>

### Semester V

Code No.	Paper	L	T/P	Credits	End Semester Exam	Internal Marks	Total Marks
BVBCT501	Technical English	3	0	3	70	30	100
BVBCT502	Steel Design	3	0	3	70	30	100
	<b>CORE ELECTIVE-II (Select any one)</b>	3	1	4	70	30	100
BVBCT503A	Foundation Engineering						
BVBCT503B	Advanced Surveying						
	<b>CORE ELECTIVE-III (Select any one)</b>	3	1	4	70	30	100
BVBCT504A	Waste Water Engineering						
BVBCT504B	Advanced Structural Analysis						
	<b>PRACTICAL/VIVA VOCE (Select any one Lab based on CORE ELECTIVE-II)</b>	0	4	2	30	20	50
BVBCT505A(P)	<b>Foundation Engineering Lab</b>						
BVBCT505B(P)	Advanced Surveying Lab						
	<b>PRACTICAL/VIVA VOCE</b>						
BVBCT506P	Language Lab	0	3	2	30	20	50
BVBCT507P	Software Training in Civil Engineering	0	3	3	30	20	50
BVBCT508P	Minor Project	0	8	4	30	20	50
BVBCT509P	Industrial Training-IV	0	2	4	30	20	50
BVBCT510P	Seminar	0	4	2	30	20	50
	<b>Total</b>	<b>12</b>	<b>26</b>	<b>31</b>	<b>460</b>	<b>240</b>	<b>700</b>

### Semester VI

Code No.	Paper	L	T/P	Credits	End Semester Exam	Internal Marks	Total Marks
BVBCT601	Construction Management	3	0	3	70	30	100
	<b>CORE ELECTIVE-IV (Select any one)</b>	3	0	4	70	30	100
BVBCT602A	Railway, Bridges, Airport and Tunnel Engineering						
BVBCT602B	Repair and Rehabilitation of Structures						
	<b>CORE ELECTIVE-V (Select any one)</b>	3	1	4	70	30	100
BVBCT603A	Water Resources Engineering						
BVBCT603B	Pre-Stressed Concrete						
	<b>PRACTICAL/VIVA VOCE</b>						
BVBCT604P	Construction Management Study	0	3	3	30	20	50
BVBCT605P	MATLAB/Open Source Software Training (Such as R-Package)	0	3	3	30	20	50
BVBCT606P	Industrial Training-V	0	2	2	30	20	50
BVBCT607P	Major Project#*	0	24	12	100	50	150
	<b>Total</b>	<b>09</b>	<b>33</b>	<b>31</b>	<b>400</b>	<b>200</b>	<b>600</b>

# SEMESTER-I

## BUILDING CONSTRUCTION-I

### (BVBCT101)

#### OBJECTIVES AND PRE-REQUISITES:

Well versed with salient features of site selection, building bye-laws, types of foundations & their suitability, concept of masonry and types, significance and details of floors, lintels & arches, roofs, stairs, damp-proofing, surface finishes, building planning and services, seismic planning and interior design. To have exposure about various components of buildings as required in construction engineering. Urge to thrive and learn and commonsense are pre requisites.

**Learning outcomes:** The students should be able to visualize the concepts of different components buildings. Ability to perform the task of supervising construction of buildings will be improved. This subject helps in better understanding of the various subjects of this course in later stages.

#### UNIT-I

**Definition of a building, classification of buildings based on occupancy, Site selection:** Factors to be considered for selection of site for residential, commercial, industrial and public building, Components of building, arrangement of doors, windows, cupboards etc. for residential building. Concept of foundation and its purpose, Types of foundations-shallow and deep; suitability and use of - Spread foundations, stepped foundation, masonry pillars and concrete columns, raft foundation, combined footing. Thumb rules for depth and width of foundation and thickness of concrete block. Pile foundations; their suitability, classification of piles according to function, material and installation of concrete piles

#### UNIT-II

**Masonry, brick masonry-Definition of terms:** mortar, bond, facing, backing, hearting, column, pillar, jambs, reveals, soffit, plinth, plinth masonry, header, stretcher, bed of brick, bat, queen closer, king closer, frog and quoin, Bond-meaning and necessity; English bond; Bond only 1, 1-1/2 and 2 Brick thick walls in English Bond. T, X and right-angled corner junctions Thickness for 1, 1-1/2 and 2 Brick square pillars in English bond. Construction of Brick Walls-Method of laying bricks in walls, precautions observed in the construction of walls, method of bonding new brick work with old (Toothing, raking back and block bonding) Construction, expansion and contraction joints; purpose and constructional details. Stone Masonry, glossary of terms-Natural bed, bedding planes, string course, corbel, cornice, block-in course, grouting, mouldings, templates, throating, through stones, parapet, coping, pilaster and buttress. Types of stone Masonry: Rubble Masonry: random and coarsed, Ashlar Masonry: Ashlar fine, Ashlar rough, Ashler facing, specifications for coarsed rubble masonry, principles to be observed in construction of stone masonry walls.

#### UNIT-III

**Surface Finishes:** different types, preparations and applications of plastering, pointing, painting, white washing and curing. Damp Proofing: Dampness: sources, causes and its ill effects, Damp proofing materials and their specifications, Methods of damp proofing: basement, ground floors, plinth and walls, special damp proofing arrangements in bathrooms, WC and kitchen, roofs and window sills, Plinth protection and aprons.

Purpose and Classification of walls- load bearing, non-load bearing, dwarf, retaining, breast walls and partition walls. Classification of walls as per materials of construction: brick, stone, reinforced brick, reinforced concrete, precast, hollow and solid concrete block and composite masonry walls. Partition walls: Constructional details, suitability and uses of brick and wooden partition walls.

#### UNIT-IV

**Scaffolding:** Constructional details and suitability of mason's brick layers and tubular scaffolding.

**Arches & Lintels:** Meaning and use of arches and lintels: Glossary of terms used in arches and lintels – abutment, pier, arch

ring, intrados, soffit, extrados, voussoiers, springer, springing line, crown, key stone, skew back, span, rise, depth of an arch, haunch, spandril, jambs, bearing, thickness of lintel, effective span. Arches: Types of Arches –

Semi-circular, segmental, elliptical and parabolic, flat, inverted and relieving. Stone arches and their construction, brick arches and their construction.

**Doors and Windows:-** Glossary of Terms used in Doors and windows, Doors – name, uses and Types: metal doors, ledged and battened doors, ledged, battened and braced door, framed and panelled doors, glazed and panelled doors, flush doors, collapsible doors, rolling steel shutters, side sliding doors, door frames, PVC shutters and metal doors, Window-names, uses and Types: metal windows, fully panelled windows, fully glazed windows, casement windows, fanlight windows and ventilators, sky light window frames, louvered shutters (emphasis shall be given for using metals and plastics etc. in place of timber).

**Text Book(s):**

1. Shushil Kumar, “Building Construction”, Standard Publication
2. Arora, S.P. and Bindra, S.P.; “A Text Book of Building Construction”; Dhanpt Rai and Sons, New Delhi

**References Book(s):**

1. P.C.Varghese, “Building Construction”, PHI Publications
2. Gurucharan Singh: “Building Construction Technology & Materials”, Standard Book House
3. M.L. Gambhir and Neha Jamwal, “Building and Construction Materials”, Mc-Graw Hill
4. Moorthy, NKR; “A Text Book of Building Construction”, Poona, Engineering Book Publishing Co
5. Rangwala, SC: “Building Construction”; Anand, Charotar Book Stall/ Publishing House.

# ESTIMATING & COSTING-I (BVBCT102)

## OBJECTIVES AND PRE-REQUISITES:

Basic knowledge of building construction, surveying are the prerequisites and enhance ability of understanding of the subject. To study concepts of quantity surveying; To learn different types of estimates; to understand analysis of rates of various building operations; to study the details of contracting; to study billing and valuation. To prepare detailed estimate of a building;

Learning outcomes: Students gain the knowledge of estimating and costing which is an essential requirement of employability. Able to do the quantity surveying work independently. Ability to understand the contracting procedures, billing & valuation aspects further helps in better understanding of intricacies of Civil Engineers role. Improved ability to prepare material estimates for various construction and civil engineering projects.

### UNIT-I

Introduction to quantity surveying/ estimating and its importance. Types of estimates; - Preliminary estimates, Plinth area estimate, Cubic rate estimate and Estimate per unit base. Detailed estimates- Definition- Stages of preparation – details of measurement and calculation of quantities and abstract.

### UNIT II

Units of measurement for various items of work as per BIS:1200. Rules for measurements. Different methods of taking out quantities – Centre line method and long wall & short wall method. Preparation of detailed estimate complete with detailed reports, specifications, abstract of cost and material requirement statements for a small residential building with



flat roof.

#### **UNIT-III**

Analysis of rates: Detailed specifications of different types of building works from excavation to foundations, superstructure and finishing operation.

Steps in the analysis of rates for any item of work: Requirement of materials, labour, sundries, water charges and contractor's profit

#### **UNIT-IV**

##### **Calculation of quantities of materials for:**

- a. Cement mortars of different proportion
- b. Cement concrete of different proportion
- c. Brick/stone masonry in cement mortar
- d. Plastering and pointing
- e. White washing, painting
- f. R.C.C. work in slab, beams.

##### **Running and maintenance cost of construction equipment.**

1. B. N. Dutta- Estimating and costing in Civil Engg, UPSPD.
2. M .Chakraborty, "Estimating costing and Specifications in Civil Engg", Jain Book Depot

##### **Reference Book(s):**

1. D.S.R. [Delhi Schedule Rates] C.P.W.D
2. PWD Account Code
3. Samuelson and Nardhaus-Economics, Mc Graw Hill
4. „Text book of Estimating and Costing“ by G.S.Birdie
5. „Civil Engineering Building Drawing“ by Gurucharan Singh

# APPLIED MATHEMATICS FOR CONSTRUCTION TECHNOLOGY (BVBCT103)

## OBJECTIVES AND PRE-REQUISITES:

To provide the students a strong mathematical background so as to be able to reflect the knowledge in various real life domains, To stress on geometrical interpretation of analytically obtained results, To explore mathematical concepts and develop a wide range of mathematical skills which have direct applications in their respective fields, To facilitate rational thought process and implement mathematics to the sectors they work for, in future.

**Learning Outcomes:** Use pedagogy of mathematical knowledge flexibly in authentic situations, Identify, analyse and compare different techniques in real life problems in their respective fields, Create a better workforce at a national level and contribute to a systematic solution formation team.

#### UNIT-I ALGEBRA

- i. Sequence and series. Arithmetic Progression, Geometric progression- general term, sum up to n terms. Infinite geometric series.
- ii. Logarithm, Laws of Logarithm.
- iii. Permutations and Combinations: fundamental principle of counting, factorial n, permutations and combinations

#### UNIT-II TRIGONOMETRY

**Vector Algebra:** Concept of a vector, position vector of a point, addition and subtraction of vectors, multiplication of a vector by a scalar product, vector of two vectors, application to problems on work done, moment and angular velocity

- i. Measuring angles in radians and degrees, signs of the trigonometric ratio of angles
- ii. Sum and difference formulas for trigonometric ratios of angles and their applications and transformation formulae. Multiple and submultiple angles.
- iii. Properties of triangle
- iv. Plotting of curves of trigonometric functions.

#### UNIT-III COORDINATE GEOMETRY

**Straight Lines:** Equation of straight line in various standard form, intersection of two straight lines and angle between them, distance of a point from a line.

**Conic Sections:** Sections of a cone: Circle, Ellipse, parabola, hyperbola, a point, a straight line and pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of Circle, Parabola, Ellipse and Hyperbola.

#### UNIT-IV DETERMINANTS AND MATRICES

1. **Determinants:** Definitions, Evaluation of a determinant up to order three, minors and cofactors, Properties of determinants, Product of two determinants, adjugate and reciprocal determinants, Cramer's Rule for solving Linear non-homogeneous simultaneous equations.
2. **Matrices:** Concept of a matrix, definitions, Transpose of a matrix, Symmetric and Skew-Symmetric Matrix, Diagonal Matrix, Unit Matrix, Addition and Multiplication of matrices, Adjoint and Inverse of a matrix, solving simultaneous equations containing up to 3 unknowns only.

#### Text Book(s):

1. Applied Mathematics by R.D. Sharma
2. Plane Trigonometry by S.L. Loney

#### Reference Book(s):

1. Applied Maths – Dr. Niraj Pant, King India Publication
2. Applied Maths – H.K. Dass, C.B.S. Publication

# COMMUNICATION SKILLS

## (BVBCT104)

### OBJECTIVES AND PRE-REQUISITES:

Students should have studied General English up to secondary level and the subject aims at developing communication skills in writing, speaking as well as body language.

**Learning Outcomes:** The students should be able to communicate effectively to his/her superiors as well as juniors at work place in his/her professional field.

#### UNIT-I

**Recognizing and Understanding Communication Styles:** What is Communication?, Passive Communication, Aggressive Communication, Passive-Aggressive Communication, Assertive Communication, Verbal and Non Verbal Communication, Barriers and Gateways to Communication.

#### UNIT-II

**Listening Skills:** Types of Listening (theory /definition), Tips for Effective Listening Academic Listening-(lecturing), Listening to Talks and Presentations, Basics of Telephone communication

**Writing Skills:** Standard Business letter, Report writing, Email drafting and Etiquettes, Preparing Agenda and writing minutes for meetings, Making notes on Business conversations, Effective use of SMS, Case writing and Documentation.

#### UNIT-III

**Soft Skills:** Empathy (Understanding of someone else point of view), Intrapersonal skills, Interpersonal skills, Negotiation skills, Cultural Aspects of Communication.

#### UNIT-IV

**Group Communication:** The Basics of Group Dynamics, Group Interaction and Communication, How to Be Effective in Groups, Handling Miscommunication, Handling Disagreements and Conflicts, Constructive Criticism.

#### Text Book(s):

1. Mckay, M., Davis, M. & Fanning, P.(2008). Messages: The Communication Skills Book, New Harbinger Publications.
2. Perkins, P.S., & Brown, L. (2008). The Art and Science of Communication: Tools for effective communication in the workplace, John Wiley and Sons

#### Reference Book(s):

1. Krizan et al (2010). Effective Business Communication, Cengage Learning.
2. Scot, O. (2009). Contemporary Business Communication, Biztantra, New Delhi.
3. Chaney & Martin (2009). Intercultural Business Communication, Pearson Education
4. Penrose et al (2009). Business Communication for Managers, Cengage Learning.

# APPLIED MECHANICS (BVBCT105)

## OBJECTIVES AND PRE-REQUISITES:

The subject Applied Mechanics deals with basic concepts of mechanics like laws of forces, moments, friction, centre of gravity, laws of motion and simple machines which are required to the students for further understanding of other applied subjects. To introduce the concepts of rigid body mechanics for bodies at rest and in motion to students. To make the students appreciate the applications of basic laws of physics to a variety of problems. Inculcating and enhancing analytical skills to solve numerical problems. Upon the completion of course student should be able to understand the importance of mechanics in engineering and various concepts.

**Learning outcomes:** Students will be able to state the relevant laws and apply them to numerical problems. Students will be able to draw free-body diagrams for a given problem and get the required solution. Students will be able to visualize the applications of basic laws in solving numerical problems. Students will be able to correlate the concepts learnt in the relevant courses of higher classes.

#### **UNIT-I:**

**Introduction-** Concept of mechanics and applied mechanics – Explanation of mechanics and applied Mechanics, its importance and necessity, giving suitable examples on bodies at rest and in motion, explanation of branches of this subject. Laws of Forces- Force and its effects. Units and measurement of force. Characteristics of force vector representation. Bow's notation. Types of forces, action and reaction, tension & thrust. Force systems: Coplanar and space force systems. Coplanar, concurrent and non-concurrent forces. Free body diagrams. Resultant and components of forces, concept of equilibrium; parallelogram law of forces. Equilibrium of two forces, super-position and transmissibility of forces, Newton's third law, triangle law of forces, different cases of concurrent coplanar, two forces systems, extension of parallelogram law and triangle law to many forces acting at one point-polygon law of forces, method of resolution into orthogonal components for finding the resultant, graphical methods, special case of three concurrent, coplanar forces, Lami's theorem. (simple numericals should be given in examination)

#### **UNIT-II:**

**Moments-** Concept of moment, Varignon's theorem – statement only. Principle of moments – application of moments to simple mechanism. Parallel forces, like and unlike parallel forces, calculation of their resultant, concept of couple, moving a force parallel to its line of action, general cases of coplanar force system, general conditions of equilibrium of bodies under coplanar parallel forces.

**Friction-** Concept of friction, laws of friction, limiting friction and coefficient of friction, sliding friction and rolling friction, inclined plane.

#### **UNIT-III:**

**Centre of Gravity and Centroid-** Concept of gravity, gravitational force, Centroid and centre of gravity. Centroid for regular lamina and center of gravity for regular solids. Position of centre of gravity of compound bodies and centroid of composite area. CG of bodies and areas with portions removed.

**Moment of Inertia of Plane Areas-** Concept of Moment of Inertia and second moment of area and Radius of gyration, theorems of parallel and perpendicular axes, second moment of area of common geometrical sections: rectangle, triangle, circle (without derivations). Second moment of area for L, T and I sections. Section modulus without derivation.

#### **UNIT-IV:**

**Laws of Motion-** Concept of momentum, Newton's laws of motion, their application, derivation of force equation from second law of motion, numerical problems on second law of motion, piles, lifts, bodies tied with string, Newton's third law of motion numerical problems, conservation of momentum, impulse and impulsive force (definition only).

**Simple Lifting Machines-** Concept of machine, mechanical advantage, velocity ratio and efficiency of a machine, their relationship, law of machine, simple machines (lever, wheel and axle, pulleys, jacks winch crabs only).

#### **Text Book(s):**

1. A.K.Tayal, "Engineering Mechanics: Statics and Dynamics", Umesh publications
2. R.K. Rajput, "Applied Mechanics", Lakshmi Publications
3. A. K. Upadhyay, "Applied Mechanics, Kataria Publications

#### **References Book(s):**

1. Beer and Johnston, "Mechanics for Engineers (Statics and Dynamics)", McGraw Hill Co. Ltd.
2. R. S. Khurmi, "Applied Mechanics", S. Chand publications
3. Hibbeler R C, "Engineering Mechanics: Statics, Low Price Edition", Pearson Education
4. Hibbeler R C, "Engineering Mechanics: Dynamics, Low Price Edition", Pearson Education
5. Timoshenko, S.P., and Young, D.H., "Engineering Mechanics", McGraw Hill international
6. V.S. Mokashi, "Engineering Mechanics Vol. I and II", Tata McGraw Hill Publishing Co. Ltd., New Delhi

# GENERAL ELECTIVE-I (SELECT ANY ONE) HUMAN VALUES AND PROFESSIONAL ETHICS (BVBCT106A)

## OBJECTIVES AND PRE-REQUISITES:

### This introductory course input is intended

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a holistic perspective among students towards life, profession and happiness, based on the correct understanding of the Human reality and the rest of the Existence. Such a Holistic perspective forms the basis of value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

### UNIT-I: Introduction to Value Education

1. Understanding the need, basic guidelines, content and process for value education.
2. Basic Human Aspirations: Prosperity and happiness
3. Methods to fulfil the human aspirations – understanding and living in harmony at various levels.
4. Practice Session – 1.

### UNIT-II: Harmony in the Human Being

1. Co-existence of the sentient "I" and the material body—understanding their needs—Happiness & Conveniences.
2. Understanding the Harmony of "I" with the body—Correct appraisal of physical needs and the meaning of prosperity.
3. Programme to ensure harmony of "I" and Body-Mental and Physical health and happiness.
4. Harmony in family and society: Understanding Human-human relationship in terms of mutual trust and respect.
5. Understanding society and nation as extensions of family and society respectively.
6. Practice Session – 02

### UNIT-III: Basics of Professional Ethics

1. Ethical Human Conduct – based on acceptance of basic human values
2. Humanistic Constitution and universal human order – skills, sincerity and fidelity.
3. To identify the scope and characteristics of people – friendly and eco-friendly production system, Technologies and management systems.
5. Practice Session – 03.

### UNIT-IV: Professional Ethics in practice

1. Profession and Professionalism – Professional Accountability, Roles of a professional, Ethics and image of profession.
2. Engineering Profession and Ethics - Technology and society, Ethical obligations of Engineering professionals, Roles of Engineers in industry, society, nation and the world.

3. Professional Responsibilities – Collegiality, Loyalty, Confidentiality, Conflict of Interest, Whistle Blowing
4. Practice Session – 04
1. Professional Ethics, R. Subramanian, Oxford University Press.
2. Professional Ethics & Human Values: S.B. Srivasthva, SciTech Publications (India) Pvt. Ltd. New Delhi.
3. Professional Ethics & Human Values: Prof. D.R. Kiran, TATA Mc Graw Hill Educat
4. Professional Ethics & Human Values: S.B. Srivasthva, SciTech Publications (India) Pvt. Ltd.

**References Book(s):**

1. Success Secrets for Engineering Students: Prof. K.V. SubbaRaju, Ph.D., Published by SMART student.
2. Ethics in Engineering Mike W. Martin, Department of Philosophy, Chapman University and Roland Schinzinger, School of Engineering, University of California, Irvine.
3. Human Values: A. N. Tripathy (2003, New Age International Publishers)
4. Value Education website, <http://www.universalhumanvalues.info>[16]
5. Fundamentals of Ethics, Edmond G. Seebauer & Robert L. Barry, Oxford University Press.
6. Human Values and Professional Ethics: R. R. Gaur, R. Sangal and G. P. Bagaria, Eecel Books (2010, New Delhi). Also, the Teachers' Manual by the same author.

# LIFE SKILLS

## (BVBCT106B)

### OBJECTIVES AND PRE-REQUISITES:

Students should have studied subjects such as General languages, social studies and Moral education at school level. The objective of this subject is to prepare the students to become a good citizen and a professional useful to the society.

**Learning Outcomes:** The knowledge of this subject will give the student a value system which will help him in taking decisions in professional and social life for the benefit of society at large.

#### UNIT-I

**Introduction:** Definition and importance of Life Skills, Livelihood Skills, Survival Skills, Life Skills Approach, Life Skills based education, Life Skills Training- Implementation Models

#### UNIT-II

Learning and Performance, Cognitive Development, Maturation, Adult Learning, Approaches to Learning Pillars of Education and Life Skills- Four Pillars: Learning to Know, Learning to Do, Learning to Live Together, Learning to be learning throughout Life.

#### UNIT-III

**Social Skills and Negotiation Skills:** Self Awareness, Empathy, Effective Communication, Interpersonal Relationships

**Thinking Skills:** Nature, Element of Thought, Types, Concept Formation, Reasoning, Creative and Critical Thinking

#### UNIT-IV

**Coping Skills:** Coping with Emotions, Coping with Stress, Integrated use of thinking skills, social skills and coping skills

#### Text Books:

1. Rajasenan, N.V. (2010). Life Skills, Personality and Leadership, Rajiv Gandhi National Institute of Youth Development, TamilNadu
2. Duffy, Grover, K., Eastwood, A. (2008). Psychology for Living-Adjustment, Growth and Behaviour Today, Pearson Education

#### Reference Books:

1. Debra McGregor, (2007), "Developing Thinking; Developing Learning - A Guide to Skills in Education", Open University Press, New York, USA

2. Singh Madhu, (2003). "Understanding Life Skills, Background paper prepared for Education for All: The Leap to Equality"
3. Nair. A. Radhakrishnan, (2010). "Life Skills Training for Positive Behaviour", Rajiv Gandhi National Institute of Youth Development, Tamil Nadu.
4. Dahama O.P., Bhatnagar O.P, (2005). "Education and Communication for Development, (2nd Ed.)", Oxford& IBH Publishing Co. Pvt. Ltd. New Delhi.

# PERSONALITY DEVELOPMENT & BEHAVIOURAL SCIENCE (BVBCT106C)

## OBJECTIVES AND PRE-REQUISITES:

Students should have studied subjects such as General languages, social studies and Moral education at school level. The objective of this subject is to prepare the students to become a good citizen and a professional useful to the society.

**Learning Outcomes:** The knowledge of this subject will give the student a value system which will help him in taking decisions in professional and social life for the benefit of society at large.

### UNIT-I

Definition and Basics of Personality, Understanding Traits and Types of Personality, Analyzing strength and weakness (SW), Body language.

### UNIT-II

Business Etiquettes and Public Speaking: Business Manners. Body Language Gestures, Email and Net Etiquettes, Etiquette of the Written Word, Etiquettes on the Telephone, Handling Business Meetings;

Introducing Characteristic, Model Speeches, Role Play on Selected Topics with Case Analysis and Real Life Experiences.

### UNIT-III

How to Make a Presentation, the Various Presentation Tools, along with Guidelines of Effective Presentation, Boredom Factors in Presentation and How to Overcome them, Interactive Presentation & Presentation as Part of a Job Interview, Art of Effective Listening.

Resume Writing Skills, Guidelines for a Good Resume, How to Face an Interview Board, Proper Body Posture, Importance of Gestures and Steps to Succeed in Interviews. Practice Mock Interview in Classrooms with Presentations on Self; Self Introduction – Highlighting Positive and Negative Traits and Dealing with People with Face to Face.

### UNIT-IV

Coping Management, Working on Attitudes: Aggressive, Assertive and Submissive Coping with Emotions, Coping with Stress

### Text Books:

1. McGraw, S. J., (2008), "Basic Managerial Skills for All, Eighth Edition", Prentice Hall of India.
2. The Results-Driven Manager (2005). Business Etiquette for the New Workplace: The Results-Driven Manager Series (Harvard Results Driven Manager)

### Reference Books:

1. Pease, A. & Pease, B. (2006)., "The Definitive Book of Body Language", Bantam Books.
2. Scannell, E. & Rickenbacher, C. (2010)., "The Big Book of People Skills Games: Quick, Effective Activities for Making Great Impressions, Boosting Problem-Solving Skills and Improving Customer Service", McGraw Hill Education

# PRACTICAL/VIVA VOCE APPLIED MECHANICS LAB (BVBCT107P)

## LIST OF EXPERIMENTS:

1. Verification of the laws of polygon of forces.
2. To verify the forces in the different members of a jib crane.
3. To verify the reaction at the supports of a simply supported beam.
4. To find out centre of gravity of regular and irregular laminas.
5. To verify the principle of moments using the bell crank lever apparatus
6. To determine the coefficient of static friction between two surfaces
7. To find moment of inertia of a flywheel
8. To find the mechanical advantage, velocity ratio and efficiency in the case of inclined planes.
9. To find the mechanical advantage, velocity ratio and efficiency in the case of Screw Jack
10. To find the mechanical advantage, velocity ratio and efficiency in the case of worm and worm wheel
11. To find the mechanical advantage, velocity ratio and efficiency in the case of single winch Crab.
12. Graphical solutions for the following problems a. Resultant of Coplanar Non Concurrent force system:
  - i. One problem with resultant as a force
  - ii. One problem with resultant as a couple b. Equilibrium of Coplanar Non Concurrent force system: one Problem
  - c. Friction: One Problem

# BUILDING CONSTRUCTION-I LAB (BVBCT108P)

## LIST OF EXPERIMENTS:

1. Demonstration of tools and plants used in building construction
2. Study of layout of building
3. Preparation of mortar and cement concrete
4. Importance of form work and material used in form work
5. To construct brick bonds (English bond only) in one, one and half and two brick thick walls
6. To study and construct English bond for L junction/ T junction/ cross junction/ for columns
7. Differentiate and demonstrate steel reinforcement bars of different diameters (plain bar, ribbed, tor steel etc.)



8. To study Slab, lintel & sunshade, column & footing and beam reinforcement
9. **Field visit to construction sites:**
  - i. Construction of foundations
  - ii. Masonry works
  - iii. Flooring: Laying of flooring on an already prepared lime concrete base
  - iv. Plastering & pointing, White & colour washing
  - v. Damp proof courses
  - vi. Shuttering/cranes/heavy machines in construction work

## ESTIMATING & COSTING-I LAB (BVBCT109P)

### LIST OF EXPERIMENTS:

- A. Detailed estimate for building taking of quantities for all items of works in the following types of building:
  1. A small residential building (1 BHK & 2 BHK with RCC roof)
  2. Two storeyed building (framed structure) with RCC roofs.
  3. Cottages with sloped RCC roofs.
  4. Industrial buildings with AC / GI sheet roof with steel trusses.
  5. Taking out quantities for embankment and canals
- B. Rate analysis for following item of works.
  3. A) Brick work for super structures B) PCC work for footing.
  4. RCC work for beam, Column and slabs.
  5. A) Plaster work & B) White/ Colour washing

## BASICS OF ELECTRICAL ENGINEERING-LAB (BVBCT110P)

### LIST OF EXPERIMENTS:

1. Demonstration, function and use of commonly used tools.
2. Care, maintenance of tools and safety measures to be observed in Electrical shop.
3. Familiarization with various electrical tools and safety measures
4. Study of various types of wirings: conduit/concealed/batten etc
5. Study of distribution boards
6. Various types of faults in house wiring
7. Use of Megger for testing wiring

8. Study of protection devices- fuse, MCB, ELCB/RCCB etc
9. Measurement of earth resistance
10. Study of various home appliances/ different types of earthing/ single and three phase induction motor/ firefighting equipment
11. Field visit to electrical substation- indoor/ outdoor

# ENGINEERING GRAPHICS-LAB

## (BVBCT111P)

### LIST OF EXPERIMENTS:

1. A) Study of Drawing Office Practice tools- Drawing instruments, Sizes and layout of standard drawing sheets, Sizes of drawing boards, drafting table/board.  
B) To draw and practice:
  - i. Different types of Lines and Free Hand Sketching (minimum 1 sheet).
  - ii. Different types of lines in engineering drawing as per BIS specifications.
  - iii. Practice in free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, small and large circles, parabolas, curves and ellipses.
2. A) Lettering Techniques and Practice:  
Instrumental single stroke (capital and inclined) lettering of 35 mm height in the ratios of 7:4.  
Free hand lettering (alphabet and numerals) lower case and upper case, single stroke vertical and inclined at 75 degree in different standard series of 2.5, 3, 5, 7, 10, and 15 mm heights in the ratio of 7:4.  
B) Dimensioning-
  - i. Necessity of dimensioning, terms and notations – methods and principles, dimensioning small components (practice & theoretical instructions).
  - ii. Dimensioning of overall sizes, circles, thread holes, chamfered surfaces, angles, tapered surface holes equally spaced on PCD, counter sunk hole counter bored holes, cylindrical parts, narrow space and gaps, radii, curves and arches – chain and parallel dimensioning.
3. Scales
  - i. Need and importance, Definition of representative fraction (RF); Find RF of a given scale.
  - ii. Study Types of scales.
  - iii. Construction of plain and diagonal scales.
4. A) Principle of orthographic projection & Projection of points situated in different quadrants.  
B) Projection of lines, Lines inclined to one plane and parallel to the other and vice versa.
5. Projection of Planes: Planes perpendicular and parallel to either of the planes; planes perpendicular to one plane and parallel to the other or vice versa.
6. Sectional views-
  - i. Cutting planes methods of representing sections.
  - ii. Conventional sections of various material.
  - iii. Classification of sections.
  - iv. Conventions in sectioning.
7. Drawing of full section, half section, partial or broken out section, offset sections, revolved sections & removed sections. Exercises on sectional views of different objects.
8. Drawing of different conventions for materials in sections. Conventional breaks for shafts, pipes: Rectangular /square/ circular, angle, channel and Rolled sections.
9. Fundamentals of isometric projections and draw Isometric views from given orthographic views.
10. Symbols, Conventions and simple drawing of Sanitary fitting symbols.
11. Draw the Electrical fittings Symbols for domestic interior installations.
12. Building plan drawing with Electrical and Civil Engineering symbols.

# BASIC INFORMATION TECHNOLOGY-LAB (BVBCT112P)

## LIST OF EXPERIMENTS:

1. a. Introduction to programming- "C/C++  
b. Development of C, starting with C- alphabets, digits, special symbols  
c. Constants, variables and special symbols  
d. Instructions
5. Study of C- pre-processor features
6. Study of structures- case control structures, loops control structures and decision control structures
7. Study of input output functions, types of functions
8. Study of file concept- opening, reading, closing, writing etc
9. Study and use of concept of pointers
10. Study the concept of arrays
11. Programming based on above concepts

# SEMESTER-II

## BUILDING CONSTRUCTION-II

### (BVBCT201)

#### OBJECTIVES AND PRE-REQUISITES:

To cover the study of building planning aspects of various residential, commercial and hospital buildings, planning of various projects. To learn and understand building byelaws and their applicability; principles of planning; importance of orientation and CAD; To understand the basics of construction technology; to study the significance of quality and safety; To study the nuances of concrete and concrete technology. To understand different stages of preparation of concrete & significant types of concretes; To study the concept of Non-destructive testing. The pre requisite knowledge on building components and construction is necessary.

**Learning outcomes:** After completing this course, student will be able to visualize the concept and applicability of building bye-laws and implement the same in planning and construction. Shall acquire the required planning skills and in a position to suggest plans for various buildings. Enhanced confidence and understanding of various aspects of construction technology, enables him in making better engineer. Knowledge of concrete, concreting and their types is immensely useful in construction sites. This subject helps in understanding the various subjects of this course in later stages.

#### UNIT-I

**Floors, Ground floors- glossary of terms:** floor finish, topping, under layer, base course, rubble filling, dado and their purpose. Types of floor finishes –cast-in-situ, concrete flooring (monolithic, bonded) Terrazzo flooring, Stone flooring(marble/Granite), Timber flooring, PVC floor, ceramic floor description with sketches and the methods of construction of the floors and their specifications, floor polishing. Upper floors- flooring on RCC slab, Maintenance of floors. Types of roofs, concept of flat, pitched, arched and cell roofs, Glossary of terms for pitched roofs – Various types of Trusses: Timber and steel, batten, eaves, barge, fascia board, gable hip, lap, purlin, rafter, rag bolt, valley, ridge, etc. Stairs- Glossary of terms: different means of access to various floor, stair case, winders, landing, stringer, newel, baluster, riser, tread, width of staircase, hand rail, nosing, etc. Planning and layout of staircase: Relations between rise and tread, determination of width of stair, landing etc. Various types of layout-straight flight, dog legged, open well, quarter turn, half turn (newel and geometrical stairs), bifurcated stair, spiral stair. Introduction to anti-termite measures; building services; earthquakes: Magnitude and intensity, seismic zoning, seismograph, Precautions to be observed in the design of earthquake prone buildings.

#### UNIT-II

Building bye-Laws- Introduction, Terminology, Objectives, Floor area ratio (FAR) and Floor space Index (FSI), Principles underlying building byelaws, Minimum plot sizes and building frontage, Open spaces, Minimum standard dimensions of building elements. Provisions for - lighting & ventilation, safety from fire & explosions, means of access, drainage & sanitation and safety of works against hazards or accidents. Requirements for- off street parking, green belt and landscaping, special requirements for low income housing, Sizes of structural elements and Applicability of the bye-laws. Climate and its influence on building planning- Solar radiation, Temperature of air, Wind, Humidity, Precipitation, Climatic zones, Climate and comfort, Earth and its motion, Directions and their characteristics, Landscaping.

#### UNIT-III

Principles of Planning of Buildings- Aspect, Prospect, Privacy, Furniture requirement, Roominess, Grouping, Circulation, Sanitation, Lighting, Ventilation, Cleanliness, Flexibility, Elegance, Economy, Practical Considerations.

**Orientation Of Buildings-** Introduction, Orientation, Factors affecting orientation, Sun, Wind, Rain, C.B.R.I.: Suggestions for obtaining optimum orientation, Orientation criteria for Indian conditions. Economy Measures in Building Construction- General, Economy of land, material of construction, labour, time and money spending.

#### UNIT-IV

**Fundamentals of Construction Technology-** brief introduction to definition and discussions, construction activities and processes, construction workers and estimating; construction scheduling, productivity and mechanization, documents and records, quality, safety and codes & regulations. Site lay out and infrastructure development. Transportation and handling- road, railway, water way and airway. Fabrication of structural steel and erection of steel structures, erection of precast reinforced concrete structures. Quality control and assurance- definitions and introduction to ISO 900 quality systems. Safety- basic principles on safety, housekeeping, personal safety, fire protection, electrical safety, mechanical handling, transportation, scaffolds & ladders, excavation, formwork and concreting.

#### Text Books:

1. Kumara swamy and Kameswara Rao, Building Panning and Drawing, Charotar Publishing House Pvt. Ltd.
2. Shushil Kumar, "Building Construction", Standard Publication
3. Subir K Sarkar, SubhajitSaraswati, Construction Technology, Oxford University Press

#### References Books:

1. Dr. H. J. Shah, Building Panning and Drawing, Charotar Publishing House Pvt. Ltd.
2. Malik, R. S., "Civil Engineering Drawing", Asia Publishing House
3. Shah, M. G. and Kale, C. M., "Principles of Building Drawing", MacMillan, Delhi
4. Neville, A. M. and Brooks, J. J., "Concrete Technology", Pearson Publications

# ESTIMATING & COSTING-II

## (BVBCT202)

### OBJECTIVES AND PRE-REQUISITES:

Basic knowledge of building construction, surveying are the prerequisites and enhance ability of understanding of the subject. To study concepts of quantity surveying; To learn different types of estimates; to understand analysis of rates of various building operations; to study the details of contracting; to study billing and valuation. To prepare detailed estimate of a building;

**Learning outcomes:** Students gain the knowledge of estimating and costing which is an essential requirement of employability. Able to do the quantity surveying work independently. Ability to understand the contracting procedures, billing & valuation aspects further helps in better understanding of intricacies of Civil Engineers role. Improved ability to prepare material estimates for various construction and civil engineering projects.

#### UNIT-I

**Contracting:** Meaning of contract, Qualities of a good contractor, Essentials of a contract, Types of contracts, their advantages, disadvantages and suitability, system of payment. Single and two cover-bids;

#### UNIT-II

Tender, tender forms and documents, tender notice, submission of tender and deposit of earnest money, security deposit, retention money, maintenance period. Types of contracting firms/ construction companies. Introduction to CSR and calculation of cost based on premium on Common Schedule Rates (CSR).

#### UNIT-III:

**Billing:** Measurement of work for payment of contractors and suppliers. Type of Measurement book, Maintenance of measurement book. Types of payments: First, running, advance, first & final and final payment.

#### UNIT-IV

**Valuation:** Purpose of valuation, principles of valuation, Definition of various terms related to valuation like depreciation,

sinking fund, salvage and scrap value, market value, fair rent, year's purchase etc. Methods of valuation (i) replacement cost method (ii) rental return method .

**Text Book(s):**

1. B. N. Dutta- Estimating and costing in Civil Engg, UPSPD.
2. M .Chakraborty, "Estimating costing and Specifications in Civil Engg", Jain Book Depot

**Reference Book(s):**

1. D.S.R. [Delhi Schedule Rates] C.P.W.D
2. PWD Account Code
3. Samuelson and Nardhaus-Economics, Mc Graw Hill
4. „Text book of Estimating and Costing“ by G.S.Birdie
5. „Civil Engineering Building Drawing“ by Gurucharan Singh

# SURVEYING-I

## (BVBCT203)

### OBJECTIVES AND PRE-REQUISITES:

The students should have basic knowledge of understanding of building components. To learn the basic concept of surveying, study and understand the types of surveying and its applications in Civil Engineering. To have exposure about chain surveying, compass surveying, leveling and plane tabling as required in field.

**Learning outcomes:** The students should be able to visualize the concepts of different types of surveying. To perform surveying work individually. Well versed with computations of traversing, plotting, adjustments as required. Well conversant with levelling operation and calculations. Able to perform surveying projects in the field. Helpful in performing survey work in the construction projects such as: detailed surveying, plotting of survey data, preparation of survey maps and setting out works.

#### UNIT-I

Introduction and concept of surveying, purpose and objective of surveying, classification of surveying, basic principles of surveying, measurements-linear and angular, units of measurements, Instruments used for taking these measurements. Chain surveying: Introduction, technical terminology (chaining, ranging, offsetting, leader, follower, different points, different lines, different sketches etc.) principle of chain surveying purpose of chain surveying, advantages and disadvantages. Instruments: - types, construction, working and tests & adjustments. Methodology: Field procedure & operations- chaining, ranging and offsetting in different cases; recording and plotting. Obstacles in chaining, ranging and both, solutions to obstacles. Errors in chain surveying and corrections, traversing by chain surveying- recording and plotting.

#### UNIT-II

**Compass surveying:** Introduction and purpose of compass surveying, principle of compass surveying. Concept of meridian, types of meridians; concept of bearing, different types of bearing; systems of bearing; forward bearing and backward bearing, systems of bearing- WCB & QB. Magnetic dip and declination, isogonics, agonic and isoclinic lines; Local attraction- definition, causes, detection, elimination; Types of compass- construction, working. Use of prismatic compass: Setting and taking observations. Traversing by compass: - different types, field procedure, recording, plotting, checks, closing error and its adjustment; Errors in compass surveying. Numerical problems shall be solved on systems of bearing, declination, local attraction and traversing.

#### UNIT-III

Purpose of leveling, concept of a level surface, horizontal surface, vertical surface, datum, MSL, station, gradient, reduced level, bench marks, line of collimation, axis of the bubble tube, axis of the telescope, vertical axis, back sight, foresight,

intermediate sight, change point etc. Types of levels and staves- Temporary adjustments and permanent adjustment of dumpy level.

**Methods of computing reduced levels-** Height of Instrument method and rise and fall method (Arithmetic checks, problem on reduction of levels). Types of leveling:- simple leveling, Differential leveling, Fly leveling, check leveling, profile leveling (Longitudinal-section & cross-section) and reciprocal leveling. Errors in leveling and permissible limits.

#### **UNIT-IV**

**Plane Table Surveying-** Introduction and purpose of plane table surveying, principle of plane table surveying, study of plane table and its accessories used in plane table survey. Field operations/ procedure. Methods of plane table surveying: Radiation, Intersection, Traversing and Resection. Resection: - Concept of Two point and Three point problems (Concept only). Errors, precautions, advantages and disadvantages of plane table surveying.

#### **Text Book(s):**

1. N.N. Basak "Surveying and Leveling" Tata McGraw Hill Publications, New Delhi
2. Punmia, B.C.; "Surveying and Leveling", Delhi Standard Publishers Distributors.
3. Subramanian, R., "Fundamentals of Surveying and Leveling", Oxford University Press

#### **References Books:**

1. K.R. Arora, Surveying Vol. I and II Standard Book House, New Delhi
2. Arthur Bannister, "Surveying", Pearson Education
3. Mimi Das Saikia, Madan Mohan Das, "Surveying", PHI Publications
4. S.K. Roy, "Fundamentals of Surveying", PHI Publications
5. T. P. Kanetkar and Kulkarni, "Surveying and Leveling", Standard Publishers C. Venkatramaiah, "Textbook of Surveying", 2nd Edition, University Press.

# ENVIRONMENTAL SCIENCE (BVBCT204)

## OBJECTIVES AND PRE-REQUISITES:

The objective of this course is to make students environment conscious. They will be exposed through the fundamental concepts of environment and ecosystem so that they can appreciate the importance of individual and collective efforts to preserve and protect our environment. This course must raise various questions in student's mind that how our environment is inter dependent on various factors and how human being must care for their natural surroundings.

#### **OBJECTIVES:**

1. To learn the importance in conservation of environment and natural resources.
2. To learn causes, effects and control measures of environmental pollution.
3. To understand the concepts of disaster management and preparedness to overcome

**UNIT- I : Natural Resources :** Introduction to Environment and natural resources (Definition, scope and important) – Forest Resources: Use and over-exploitation of forest resources and its impact on forest and tribal people – Water Resources: Use and over- exploitation of water and impact – Land Resources: Land degradation and soil – erosion, desertification – Food Resources: Effects of modern agriculture, fertilizer- pesticide problems – Energy Resources: Growing energy needs renewable and non- renewable energy source-use of alternative energy sources.

**UNIT- II: Ecosystem and Biodiversity:** Concept of an ecosystem – Structure and function of an ecosystem – Energy flow in the ecosystem - Food chains, food webs and ecological pyramids – Types of ecosystem – Biodiversity: genetic, species

and ecosystem diversity, India as a mega – diversity nation – Treats to biodiversity : habit loss, poaching of wild life, man-wildlife conflicts; Endangered and endemic species of India – Conservation of Biodiversity: In-situ and Ex-situ conservation of biodiversity.

**UNIT– III: Environmental Pollution:** Causes, effects and control measure of: Air pollution, Water pollution, Soil pollution, Noise pollution and nuclear hazards, Solid waste management, Global environmental problems.

**UNIT– IV: Social Issues and the Environment :** Sustainable development, Rural Urban problems related to environment, Water management and rain water harvesting – Environment ethics: Issues and possible solutions, Environmental Protection Policy, Acts and Legislation, Population and the Environment – Environmental and Population concern: Environment and human health, Environment education at various levels – HIV/AIDS, Women and child welfare, gender issues, gender equity, institutions for gender studies / research.

**UNIT– V: Disaster Management:** Disaster: Meaning and concepts, types, causes and management – Effects of disaster on community, economy, environment – Disaster management cycle: early response, rehabilitation, reconstruction and preparedness – Vulnerability Analysis and role of community in Disaster Mitigation – The Disaster Management Act 2005 – Disaster Management Authority : National, State and District level – Ill effects of fireworks.

#### REFERENCES

1. A text book of Environmental Studies, 2006, Asthana, D.K., Meera Asthana, S.Chand & Company Ltd., New Delhi.
2. Environmental Studies, 2005, Benny Joseph, Tata Macgraw – Hill Publishing Company, New Delhi
3. A text book of Environmental Studies, 2005, Erach Bharueha, UGC, University Press, New Delhi.
4. Panchayats in Disaster: Preparedness and Management, 2009, Palanithurai, G., Concepts Publishing company.
5. A text book of Environmental Studies, 2003, Thangamani and Shyamala, Pranav Syndicate, Publication Division, Sivakasi.

#### LEARNING OUTCOME

1. Students able to learn in-situ and ex-situ conservation of bio-diversity
2. Students able to learn the control measures of environmental pollution

# CONSTRUCTION MATERIALS

## (BVBCT205)

### OBJECTIVES AND PRE-REQUISITES:

To acquire proper knowledge about different construction materials and their applications. To have exposure about various construction materials as required in engineering. The students should learn the details of various construction materials such as stones, bricks and tiles, cement and cement based products, and lime, timber and wood based products, paint and varnishes metals and other miscellaneous materials and their applications.

**Learning outcomes:** Helps in making him as a better super visor at construction sites/ industries. Improved ability to identify and visualize various construction materials that are being used in construction and other industries. Enhanced knowledge of construction materials helps students in pursuing their careers in material testing field. This subject helps in understanding the various subjects related to different vocational courses in later stages.

#### UNIT-I:

**Building Stones:** Classification of Rocks, Geological classification: Igneous, sedimentary and metamorphic rocks. Chemical classification: Calcareous, argillaceous and siliceous rocks. Physical classification: Un-stratified, stratified and foliated rocks; Requirements of good building stones, testing & identification of common building stones and their uses. Bricks and Tiles: Introduction to bricks, Raw materials for brick manufacturing and properties of good brick making earth, Classification of bricks as per IS: 1077, Testing of common building bricks as per IS: 3495. Compressive strength, water absorption, efflorescence test, Dimensional tolerance test. Types and use of- tiles for wall, roofing & flooring; ceramic tiles; Hollow masonry blocks; Fly ash bricks.

#### UNIT-II:

**Cement:** Introduction, raw materials, manufacturing of ordinary Portland cement, flow diagram for wet and dry process.



Properties and uses of ordinary Portland cement. Special cements and their uses. Storage of cement. Lime:-Introduction: Lime as one of the cementing materials. Definition of terms; quick lime, fat lime, hydraulic lime, hydrated lime, lump lime. Calcinations and slaking of lime IS classification of lime. Definition- Properties and uses of Mortar. Types of mortar, cement & lime Mortar, Preparation of cement Mortar.

**UNIT III:**

Timber and wood based products. Identification of different types of timber: Teak, Deodar, Shisham, Sal, Mango. Market forms of converted timber as per IS. Seasoning of timber: purpose, methods of seasoning. Defects and decay in timber, Preservation of timber and methods of treatment, Properties and specifications of structural timber. Other wood based products, their brief description of manufacture and uses: Lamina board, Black board, fiber board. Hard board and gypsum board.

**UNIT IV:**

Purpose and use of paints, Types, ingredients, properties and uses of oil paints, water paints and Cement paints. Types, properties and uses of varnishes, Trade name of different products. Metals: - uses of ferrous and non- ferrous metals, Commercial forms of ferrous and non-ferrous metals. Plastics – Introduction and uses of various plastic products in buildings such as doors, water tanks and PVC pipes. Types uses and application of- Fiber Sheets, insulating materials, Materials used in interior decoration works like POP, Water proofing compounds, fire resisting materials.

**Text Book(s):**

Surendra Singh; “Engineering Materials; “New Delhi”. Vikas Publishing House Pvt. Ltd.

TTTI, Chandigarh “Civil Engineering Materials; “Tata McGraw Hill.

**Reference Book(s):**

1. M.L.Gambhir and Neha Jamwal, “Building Materials”, Tata McGraw Hill.
2. Building Materials, P.C.Varghese, PHI Publications
3. Engineering materials S.C. Rangwala, Charotar Publishing House
4. Building Materials, Duggal, New Age Publication
5. Kulkarni, GJ; “Engineering Materials; “Ahmedabad, Ahmedabad Book Depot.

# PRACTICAL/VIVAVOCE

## CONSTRUCTION MATERIALS LAB

### (BVBCT206P)

#### LIST OF EXPERIMENTS:

1. To determine the crushing strength of bricks
2. To determine the water absorption of bricks.
3. To conduct field tests on cement.
4. To determine fineness (by sieve method) of cement.
5. To determine normal consistency of cement.
6. To determine initial and final setting times of cement.
7. To determine soundness of cement.
8. To determine compressive strength of cement.
9. Field visit to study different types of cements/ bricks/ timber/ plastic materials/ tiles/ paints/ new & advanced material that are used in construction industry

Teachers are expected to physically show various materials while imparting instructions. Field visits should be organized and active participation of students shall be encouraged.

# CIVIL ENGINEERING DRAWING LAB (BVBCT207P)

## LIST OF EXPERIMENTS:

1. A) Drawing of different conventions for materials in section, conventional breaks for shafts, pipes, rectangular, square, angle, channel, rolled sections.  
B) Elevation, sectional plan and sectional side elevation of flush door & glazed door.  
C) Elevation, section plan and sectional side elevation of paneled window and glazed window.
2. Details of spread footing foundations, load bearing and non-load bearing wall for given thickness of walls with the help of given data or rule of the thumb, showing offsets, position of DPC. The details of the concrete and brick plinth protection have to be shown in the drawing.
3. Plans of „T“ and Corner junction of walls of 1 Brick, 1-1/2 Brick and 2 brick thick in English bond.
4. A) Wooden roof truss showing details of joints, fixation of roof coverings, eaves and gutters- King post truss.  
B) Wooden roof truss showing details of joints, fixation of roof coverings, eaves and gutters- queen post truss.
5. A) Drawing plan and section of a dog legged stair (excluding reinforcement details).  
B) Drawing plan, elevation of a small building by measurement.
6. Drawing detailed plan, elevation and section of a two room residential building from a given line plan, showing details of foundations, roof and parapet.
7. Drawing of a small single storey building showing position of sanitary fittings house drainage and electrical fittings.
8. Drawing of floors (concrete flooring, ceramic/vitrified tile flooring).
9. Drawing details of damp proofing arrangement of roofs, basement floors and walls as per BIS Code.
10. Drawing the plan and elevation of an office building.
11. Drawing the plan and elevation of primary health care centre.
12. Drawing the plan and elevation of post office.

# ESTIMATING & COSTING-II LAB (BVBCT208P)

## LIST OF EXPERIMENTS:

1. Collection different types of documents required for tendering
2. Study of different types of tenders from newspapers and other sources
3. Computation of standard rent for a property (valuation)
4. Study of contract documents
5. Preparation of contract document (e.g. construction of compound wall at ABIT)
6. Prepare a tender notice for newspaper for construction of New class room building in your institute
7. Study of e- tendering
8. Prepare a e-tender for procuring lab instruments

# SURVEYING-I LAB (BVBCT209P)

## LIST OF EXPERIMENTS:

1. A) To study linear measurement instruments.  
B) Chaining, ranging and off-setting of a survey line.
2. To find out the area using offset-survey.
3. Traversing using chain surveying.
4. A) To study prismatic compass.  
B) To measure the angles between the intersecting lines using compass.
5. Traversing using chain and compass survey (recording, plotting and adjusting closing error).
6. A) To study dumpy level and leveling staves.  
B) To find out the reduced levels of different stations using Height of Instrument (HI) method.
7. To find out the reduced levels of different stations using rise and fall method.
8. To carry out leveling of a small area.
9. A) To study plane table and its accessories.  
B) To find out the distance between different points using Radiation method.
10. To find out the distance between different points using Intersection.
11. To conduct plane table traversing.
12. To set out a building plan.

# ENVIRONMENTAL SCIENCE LAB/ FIELD WORK (BVBCT210P)

## LIST OF EXPERIMENTS:

1. Determination of pH, conductivity and turbidity in drinking water sample.
2. Determination of pH and conductivity of soil/sludge samples.
3. Determination of moisture content of soil sample.
4. Determination of Total Dissolved Solids (TDS) of water sample.
5. Determination of dissolved oxygen (DO) in the water sample.
6. Determination of Biological oxygen demand (BOD) in the water sample.
7. Determination of Chemical oxygen demand (COD) in the water sample.
8. Determination of Residual Chlorine in the water sample.

9. Determination of ammonia in the water sample.
10. Determination of carbon dioxide in the water sample.
11. Determination of nitrate ions or sulphate ions in water using spectrophotometer.
12. Determination of the molecular weight of polystyrene sample using viscometer method.
13. Base catalyzed aldol condensation by Green Methodology.
14. Acetylation of primary amines using eco-friendly method.
15. To determine the concentration of particulate matter in the ambient air using High Volume Sampler.

# INDUSTRIAL TRAINING-I

## (BVBCT211P)

### PROJECT:-I

## (BVBCT212P)

#### LIST OF EXPERIMENTS:

- a. Develop understanding regarding the size and scale of operations and nature of field work in which students are going to play their role after completing the courses of study.
- b. Develop understanding of subject based knowledge given in the class room in the context of its application at work places
- c. Develop first-hand experience and confidence amongst the students to enable them to use and apply polytechnic/ institute based knowledge and skills to solve practical problems in the world of work.
- d. Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values.

# SEMESTER-III

## CONCRETE TECHNOLOGY

### (BVBCT301)

#### OBJECTIVES AND PRE-REQUISITES:

To understand the basics of construction technology; to study the significance of quality and safety; to study the nuances of concrete and concrete technology. To understand different stages of preparation of concrete & significant types of concretes; Prerequisite knowledge on building components and construction is necessary.

**Learning outcomes:** After completing this course, student will be able to visualize the concept and applicability of concrete as a construction material. Enhanced confidence and understanding of various aspects of concrete technology, enables him in making better engineer. Knowledge of concrete, concreting and their types is immensely useful in construction sites. This subject helps in understanding the various subjects of this course in later stages.

#### UNIT-I

**Introduction-** Definition of concrete, uses of concrete in comparison to other building materials. Ingredients of Concrete- Cement: physical properties of cement, different types of cement as per IS Codes; Aggregates: Classification, characteristics, grading of aggregates, fineness modulus; interpretation of grading charts. Water: Quality requirements as per IS: 456-2000; Admixtures. Water Cement Ratio: Hydration of cement, principle of water-cement ratio, Duff Abram"s Water-cement ratio law: Limitations of water-cement ratio law and its effects on strength of concrete.

#### UNIT-II

**Concreting Operations-** (to be studied in detail) Storing of Cement, Storing of Aggregate, Batching (to be shown during site visit), Mixing, Transportation of concrete, Placement of concrete, Compaction, Finishing concrete slabs, curing and form work.

#### UNIT-III

**Properties of Concrete-** in plastic state: (concept & tests are to be studied) Workability, Segregation, Bleeding and Harshness; in hardened state: Effects of water cement ratio, compaction, age, curing on strength of concrete. Compressive strength, grades of concrete, bond strength, shrinkage and creep, durability, chemical attack, sulphate attack, resistance to abrasion, resistance to fire, Impermeability, Dimensional changes.

#### UNIT-IV

Special concrete and concreting methods, concreting under special conditions, difficulties and precautions before, during and after concreting- Cold weather concreting, Under water concreting & Hot weather concreting.

#### Text Book(s):

1. Shetty M. S, "Concrete Technology- Theory and Practice, S. Chand & Company Limited, New Delhi
2. Gambhir, M. L. "Concrete Technology" Tata Mc-Graw Hill Publishing Company Limited, New Delhi

#### Reference Book(s):

1. Neville, AM; "Properties of Concrete", Pitman (ELBS Edition available), London
2. Varshney, R.S "Concrete Technology" Oxford and IBH Publishing, New Delhi
3. Vazirani, V. N. & Chandola, S. P. "Concrete Technology" Khanna Publishers, Delhi
4. Kulkarni, P. D, Ghosh, R. K & Phull, YR; "Text Book of Concrete Technology" Oxford and IBH Publishing Co. New Delhi

# REINFORCED CEMENT CONCRETE DESIGN-I (BVBCT302)

## OBJECTIVES AND PRE-REQUISITES:

To provide basic understanding of concepts of reinforced concrete design. The course also aims at designing of elements of structure. Knowledge of structural mechanics, building construction and construction materials is pre required.

**Learning outcomes:** After completing this course, student will be able to learn the intricacies of reinforced cement concrete design. Able to understand the concepts of limit state and working stress methods. Ability to design beam. This subject helps in understanding the various subjects of this course in later stages.

### UNIT-I

Reinforced concrete design philosophies, Concept of Reinforced Cement Concrete (RCC), Reinforcement Materials: Suitability of steel as reinforcing material, Properties of mild steel and HYSD steel, Loading on structures as per IS: 875. Introduction to- Working stress method & Limit state method, Shear and Development Length; Shear as per IS:456-2000 by working stress method- Shear strength of concrete without shear reinforcement, Maximum shear stress and Shear reinforcement.

### UNIT-II

Singly Reinforced Beam (Working stress method)-Basic assumptions, stress strain curve, neutral axis, balanced, under-reinforcement and over reinforced Beams, Moment of resistance for singly reinforced Beam. Design of singly reinforced Beam including sketches showing reinforcement details.

### UNIT-III

**Concept of Limit State Method-** Definitions, assumptions made in limit state of collapse (flexure), Partial factor of safety for materials, Partial factor of safety for Loads, Design Loads and Stress block, parameters. Singly Reinforced Beam-Theory & design of singly reinforced Beam

### UNIT-IV

**Doubly Reinforced Beams-** Theory & design of simply Supported doubly reinforced rectangular Beam by Limit State Method; Behaviour of T Beam, inverted T Beam, isolated T Beam & L Beams

### Text Book(s):

1. Punmia, BC; "Reinforced Concrete Structure Vol I", Standard Publishers, Delhi
2. Ramamurtham, S; "Design and Testing of Reinforced Structures", Dhanpat Rai and Sons, Delhi

### Reference Book(s):

1. Jain A.K., "Limit State Design of Reinforced Concrete Structures", Nem Chand Publishers, Roorkee.
2. Shetty M.S., "Concrete Technology, Theory and Practice", S.Chand and Co., New Delhi.
3. Raju K., "Reinforced Concrete", New Age International (P) Ltd., New Delhi.
4. Varghese P.C., "Limit State Design of Reinforced Concrete", PHI (P) Ltd., New Delhi
5. SanthaKumar A.R., "Concrete Technology", Oxford Publications, New Delhi
6. Unnikrishna Pillai S., "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., ND.
7. Sinha S.N., "Handbook of Reinforced Concrete Design", McGraw Hill Publishing Company., ND.
8. Gambhir M.L., "Fundamentals of Reinforced Concrete Design", PHI Learning (P) Ltd., New Delhi.

# SURVEYING-II

## (BVBCT303)

### OBJECTIVES AND PRE-REQUISITES:

To study the concept of contouring, methods of contouring and their interpolation & applications. To study theodolite and its field applications. To study curve setting and different methods. To study tachometry and modern survey equipment. Having better understanding of surveying I is a prerequisite.

**Learning outcomes:** Ability to understand contour maps. Intricacies of surveying fieldwork. Use of equipment in the field with ease. Able to work with theodolite for various applications. Able to set the curves in the field able to use tachometric principles as required. Exposure to advancement equipment.

#### UNIT-I

**Contouring:** Concept of contours, purpose of contouring, contour interval and horizontal equivalent, factors effecting contour interval, characteristics of contours, methods of contouring- Direct and indirect, interpolation of contours-methods; Applications of contour map, marking alignment of a road/ railway/ canal on a contour map, computation of reservoir capacity from a contour map.

#### UNIT-II

**Theodolite Surveying:** Construction and working of a transit vernier theodolite, axes of a theodolite and their relation; meaning of temporary and permanent adjustments of a transit theodolite; concept of transiting, swinging, face left, face right and changing face; measurement of horizontal angle- general, repetition and reiteration methods, and vertical angles. Prolonging a line (forward and backward), measurement of bearing of a line; traversing- included angles, Deflection angle and stadia measurement, plotting a traverse; concept of coordinates and solution of omitted measurements (only one side affected), errors in theodolite survey and precautions taken to minimize them; limits of precision in theodolite traversing.

#### UNIT-III

**Curves:** Need and definition curves; Designation curve- Degree of the curve/ radius of the curve; Elements of simple circular curve, transition curve and vertical curve. Methods of Setting out of simple circular curves.

Transition Curve- Need (centrifugal force and super elevation) and definition of transition curve; requirements of transition curve, length of transition curve for roads and shift of a curve. Vertical curves- Types of curves, Setting out of a vertical curve (simple numerical problems)

#### UNIT-IV

**Tacheometric surveying-** Tacheometry-principle of tacheometry, additive and multiplying constants, Instruments to be used in tachometry, methods of tachometry, stadia system of tachometry. General requirement and specifications for Engineering project surveys. Introduction to the use of Modern Surveying equipment.

#### Text Book(s):

1. Basak, N.N "Surveying and Leveling" Tata McGraw-Hill, Delhi
2. Punmia, BC; "Surveying and Leveling", Delhi Standard Publishers Distributors.
3. Subramanian, R., "Fundamentals of surveying and levelling", oxford university press

#### Reference Book(s):

1. K.R. Arora, Surveying Vol. I and II Standard Book House, New Delhi
2. Surveying, Arthur Bannister, Pearson Education
3. Surveying, Mimi Das Saikia, Madan Mohan Das, PHI Publications
4. Fundamentals of Surveying, S.K. Roy, PHI Publications
5. Surveying and Leveling, T. P. Kanetkar and Kulkarni, Standard Publishers
6. C. Venkatramaiah, "Textbook of Surveying", 2nd Edition, University Press.

# STRENGTH OF MATERIALS

## (BVBCT304)

### OBJECTIVES AND PRE-REQUISITES:

To impart basic knowledge and skill regarding properties of materials, concept of stresses and strains, bending moment and shear force diagrams, second moment of area, bending and shear stresses. To develop knowledge of mechanics and to have in-depth understanding of material responses to Load. Thorough understanding of applied mechanics subject is prerequisite for studying this subject.

**Learning outcomes:** Ability to understand the concepts- stress- strain, BMD-SFD. Helpful in better understanding of structural subjects in lateral stage.

#### UNIT I

**Properties of Materials-** Classification of materials, elastic materials, plastic materials, ductile materials and brittle materials; Introduction to tensile test, compressive test, impact test, fatigue test, torsion test on metals. Simple stresses and strains : Definition, types of stresses and strains; Hooke's law, Modulus of elasticity, various elastic constants and their relationship, stress strain curve for ductile materials, deformation of bars under axial Loads, temperature stresses, bars of varying cross sections and composite sections, Poisson's ratio, volumetric strain.

#### UNIT II

**Shear force and bending moment:** Different types of beams and loads; shear force and bending moment diagrams for cantilever and simply supported beams with and without overhangs subjected to different kinds of Loads, relation between Loading, shear force and bending moments.

**Moment of Inertia:** Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical Sections: rectangle, triangle, circle. Second moment of area for L, T and I Sections, Section modulus.

#### UNIT III

**Bending and shear stresses in Beams:** Theory of simple bending, moment of resistance, modulus of Section, calculation of bending stresses in Beams for different Loads and different types of structural Sections. Shear stress and its distribution on different types of cross Sections of Beams. (No derivation)

#### UNIT IV

**Combined direct and bending stresses:** Middle third rule, core of a Section, stresses due to wind, water and earth pressure in structures like retaining walls, dams, chimneys, walls etc.

**Columns & struts-** columns and struts of uniform Section, crippling/buckling Load, Euler theory and concept of equivalent length, Rankine's formula, Eulers and Rankine Formula (No derivation).

#### Text Book(s):

1. Ramamrutham, S., "Strength of Materials", Dhanpat Rai and Sons., New Delhi
2. Punmia, BC., "Strength of Materials", Standard Publishers, Delhi

#### Reference Book(s):

1. Mechanics of Materials, Popov E.P., Prentice Hall of India
2. Structures, Schodek, Pearson Education
3. Strength of Materials, Nash, W.A., Tata Mc Graw Hill Publications
4. Basic Structural Analysis, Reddy, Mc Graw Hill Publications
5. B.S. Basavarajaiah, P. Mahadevappa, "Strength of Materials", 3rd Edition, University Press.
6. James M Gere, "Strength of Materials", Cengage Publication
7. Timoshenko, Stephen, Elements of Strength of Materials Part-2, CBS publication



# FLUID MECHANICS

## (BVBCT305)

### OBJECTIVES AND PRE-REQUISITES:

To understand the concept of fluid mechanics, different types of fluids, fluid properties. To study the behaviour of the fluid at rest and at motion. To study pressure measurements, flow measurements, types of flow, systems of pressure. To study pipe flow and open channel flow. Basic knowledge of mathematics and applied mechanics enable better understanding of this subject.

**Learning outcomes:** Ability to visualize and analyse concept of fluid mechanics. Better understanding of this subject is helpful in later stages.

#### UNIT I

**Introduction:** Concept of fluid and its behaviour, types of fluids- liquid, gas & vapour; ideal & real; Newtonian & non-Newtonian properties, Properties of fluids- Mass density, specific weight/ volume, specific gravity, Concept of viscosity-dynamic & kinematic, cohesion & adhesion; surface tension, capillarity, vapour pressure, compressibility, capillary inversion and cavitation. Types of fluid flow: steady & unsteady, uniform and non- uniform, laminar & turbulent, compressible & incompressible, rotational and Irrotational, one, two & three dimensional (concept only. No mathematical equations)

#### UNIT II

**Hydrostatic Pressure-** Concept of pressure, Force, Pascal law and its applications, hydrostatic law of pressure variation, Hydrostatic forces on surfaces-Total pressure & Centre of pressure, vertical, plane & inclined plane surfaces (Rectangular, triangular, trapezoidal, circular shapes).

**Pressure measurements-** systems- absolute & gauge, measurement: manometers- simple & differential; Mechanical gauges.

#### UNIT III

Meaning of system, control volume, continuum, Basic principles- principle of conservation of mass, energy and momentum. Discharge and continuity equation. Types of hydraulic energy: Potential energy, kinetic energy, pressure energy. Bernoulli's theorem: statement and description (without proof of theorem), assumptions and limitations.

**Discharge measurement-** Orifice (hydraulic coefficients), Venturi meter, Notches and weirs, Pitot tube, and Current Meter (simple Numerical Problems)

#### UNIT IV

**Flow through Pipes:** Reynold's experiment- laminar, transition & turbulent flow; meaning of Reynold's number (upper and lower critical), velocity (upper and lower critical) and velocity distribution. Head loss in pipelines- Major & minor (due to friction, sudden expansion and sudden contraction, entrance, exit, obstruction and change of direction- No derivation of formula). Hydraulic Gradient Line and Total Energy Line. Flow from single reservoir, between two reservoirs. Water hammer phenomenon and its effects elementary treatment. Pipes in series and parallel.

Difference between pipe flow and open channel flow. Classification of open channel flow. Discharge through channel by Chezy's and Manning's formulae. Concept of prismatic channel & most economic section. General lay out of hydroelectric power plant.

#### Text Book(s):

1. R. K. Bansal, "Fluid Mechanics", Laxmi Publications, Delhi
2. A.K. Jain, "Fluid Mechanics and Fluid Machines", Khanna Publishers, New Delhi

#### Reference Book(s):

1. Vijay Gupta, Santosh K Gupta, "Fluid Mechanics and its Application", New Age Publications.
2. R.J.Garde, "Fluid Mechanics through Problems", New Age Publications.
3. Victor Streeter, "Fluid Mechanics", International Edition, Tata McGraw Hill Publications
4. Hughes and Brighton, "Fluid Mechanics", , Tata McGraw Hill

# PRACTICAL/VIVA VOCE CONCRETE TECHNOLOGY LAB (BVBCT306P)

## LIST OF EXPERIMENTS:

1. To determine flakiness and elongation index of coarse aggregates
2. To determine silt in fine aggregate
3. Determination of specific gravity and water absorption of aggregates
4. Determination of bulk density and voids of aggregates
5. To determine surface moisture in fine aggregate by displacement method
6. To determine fineness modulus of fine and coarse aggregate
7. Determination of particle size distribution of fine, coarse and all in aggregate by sieve analysis (grading of aggregate)
8. To determine necessary adjustment for bulking of fine aggregate
9. To determine the fineness, specific gravity and unit weight of cement
10. To determine workability by slump test
11. Compaction factor test for workability
12. Effect of water cement ratio on strength of concrete
13. Non-destructive tests-
14. Tests for compressive strength of concrete cubes for different grades of concrete.
15. Field visit to Ready Mix Concrete plant.

# CAD BASED CED LAB (BVBCT307P)

## LIST OF EXPERIMENTS:

Teachers are expected to develop skills in preparation of proper drawings with emphasis onto prepare drawings on AutoCAD as per IS code of practice. Students are expected to draw following drawing (already learned/ practiced in CED subject) in AUTOCAD

1. AutoCAD- An over view- Practice of various commands used in AUTOCAD and draw different Geometric Constructions, conventional signs, as per I. S. standards and , different symbols used in civil engineering drawing & dimensioning and lettering
2. Elevation, Sectional plan and Sectional side elevation of flush door & glazed door
3. Elevation, Section plan and Sectional side elevation of paneled window and glazed window
4. Details of spread footing foundations, Load bearing and non-Load bearing wall for given thickness of walls with the help of given data or rule of the thumb, showing offsets, position of DPC. The details of the concrete and brick plinth protection have to be shown in the drawing.
5. Plans of „T“ and Corner junction of walls of 1 Brick, 1-1/2 Brick and 2 brick thick in English bond

6. Wooden roof truss showing details of joints, fixation of roof coverings, eaves and gutters- King post truss
7. Wooden roof truss showing details of joints, fixation of roof coverings, eaves and gutters- queen post truss
8. Drawing plan and Section of a dog legged stair (excluding reinforcement details)
9. Drawing plan, elevation of a small building by measurement.
10. Drawing detailed plan, elevation and Section of a two room residential building from a given line plan, showing details of foundations, roof and parapet

## SURVEYING-II LAB (BVBCT308P)

### LIST OF EXPERIMENTS:

1. Computation of horizontal angle between intersecting lines by general method
2. To determine horizontal angle between intersecting lines by repetition method
3. Find out horizontal angles formed at center by different stations by reiteration method
4. i) To find out height of an object/ tower  
ii) To determine elevation of Points by Trigonometrical Leveling
5. i) To compute magnetic bearings of different lines using theodolite  
ii) To prolong Centre line of a road/ railway line
6. i) To compute tachometric constants- multiplying constant (k) & additive constant (c)  
ii) To find out the gradient of between two given stations/ Centre line of a road
7. To run a closed traverse with a theodolite/ tachometer (at least five sides) and its plotting by coordinate method
8. Preparing a contour plan by radial line method/ stadia method
9. Preparing a contour plan by method of squares
10. Setting out of a simple circular curve by linear method(s)
11. To set out a simple circular curve by angular method (s)
12. Study of Total Station
13. To verify/ compute area of regular & irregular figures by digital Planimeter
14. Demonstration of digital instruments through field visits and government agencies.

## STRENGTH OF MATERIALS LAB (BVBCT309P)

### LIST OF EXPERIMENTS:

1. Introduction to testing equipment.
2. Determination of yields stress, ultimate stress, percentage elongation and plot the stress strain diagram and compute the value of young's modulus on mild steel.
3. Determination of Young's modulus of elasticity for steel wire with Searl's apparatus.
4. Determination of modulus of rupture of a timber Beam.
5. Uniaxial compression test:
6. Timber-along and across/ concrete specimens/ brick masonry specimens

7. Torsion test:
8. Mild Steel/Aluminum)
9. Hardness Test
10. Spring Test
11. Impact test

## HYDRAULICS LAB (BVBCT310P)

### LIST OF EXPERIMENTS:

1. Determination of Pressure using different pressure measuring devices such as Piezometers, U-tube manometer and Bourdon's pressure gauge.
2. To verify Bernoulli's Theorem.
3. To calibrate a Venturi-meter & orifice-meter.
4. To determine the coefficient of discharge of an orifice (or a mouth piece) of a given shape. Also to determine the coefficient of velocity and the coefficient of contraction of the orifice (or the mouth piece).
5. To determine coefficient of discharge of a rectangular notch/triangular notch.
6. To perform Reynold's experiment- To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number.
7. To determine Darcy's coefficient of friction for flow through pipes.
8. To determine minor losses due to Sudden enlargement, Sudden Contraction and bEnds.
9. To determine velocity of flow of an open channel by using a current meter.
10. Study and working of Reciprocating pump/ Centrifugal pump/ Impulse turbine/ Reaction turbine.
11. Study of water meter/mechanical flow meter/Pitot tube.

## INDUSTRIAL TRAINING-II (BVBCT311P)

# SEMESTER-IV

## REINFORCED CEMENT CONCRETE DESIGN-II (BVBCT401)

### OBJECTIVES AND PRE-REQUISITES:

To provide better understanding of RCC design. To study design of one way slab and two way slabs, axially loaded columns, stair cases and footings. To study basics of pre stressed concrete and mix design. Basic understanding and knowledge of RCC 1 and Concrete technology are prerequisites.

Learning outcomes: Able to understand the design of reinforced cement concrete structural elements such as one way and two way slabs, columns, footings and stair cases. Enhanced employability. Better understanding of mix design.

#### UNIT-I

**One Way Slab-** Theory and design of simply Supported one way slab including sketches showing reinforcement details (plan and Section) by Limit State Method. Two Way Slab- Theory and design of two-way simply Supported slab by Limit State Method including sketches showing reinforcement details

#### UNIT-II

**Axially Loaded Column-** Definition and classification of columns, Effective length of column, Specifications for longitudinal and lateral reinforcement, Design of axially loaded square, rectangular and circular short columns by Limit State Method including sketching of reinforcement.

#### UNIT-III

**Staircases by L.S.M.-** Structural behaviour of stairs, effective span of stairs, estimation and distribution of Loads, effective breadth of flights, design of cantilever steps, design of doglegged and open well stairs spanning parallel to the flight.

**Design of Column Footings by L.S.M.-** Types of RCC footings, Footings with uniform thickness and Sloped footings – minimum thickness – critical Sections – minimum reinforcement , distribution of reinforcement, development length, cover, minimum edge thickness requirements as per IS 456 – 2000. (Only design of isolated footing (square and rectangular) with uniform thickness is to be asked)

#### UNIT-IV

**Pre-stressed Concrete-** Concept, methods: pre-tensioning and post tensioning, advantages & disadvantages and losses (No numericals. Concept only). Introduction to concrete mix design.

#### Text Book(s):

1. Punmia, BC; "Reinforced Concrete Structure Vol I", Standard Publishers, Delhi
2. Ramamurtham, S; "Design and Testing of Reinforced Structures", Dhanpat Rai and Sons, Delhi

#### Reference Book(s):

1. Jain A.K., "Limit State Design of Reinforced Concrete Structures", Nem Chand Publishers, Roorkee.
2. Shetty M.S., "Concrete Technology, Theory and Practice", S.Chand and Co., New Delhi.
3. Raju K., "Reinforced Concrete", New Age International (P) Ltd., New Delhi.
4. Varghese P.C., "Limit State Design of Reinforced Concrete", PHI (P) Ltd., New Delhi
5. SanthaKumar A.R., "Concrete Technology", Oxford Publications. New Delhi
6. Unnikrishna Pillai S., "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., ND
7. Sinha S.N., "Handbook of Reinforced Concrete Design", McGraw Hill Publishing Company., ND
8. Gambhir M.L., "Fundamentals of Reinforced Concrete Design", PHI Learning (P) Ltd., New Delhi.

# SOIL MECHANICS

## (BVBCT402)

### OBJECTIVES AND PRE-REQUISITES:

To study concept of soil formation and physical properties. To understand laboratory tests and field tests on soils. To study the concept of permeability and seepage, deformation of soils, shear strength of soils and compaction of soils. Basic knowledge of fluid mechanics and construction materials is further helpful in better understanding of this subject.

**Learning outcomes:** Better understanding of concept of soil mechanics helpful in the construction sites. Able to classify and identify different soils. Enhanced soil testing( both field and in-situ) abilities. Understanding of importance of compaction of soils. Helpful in better understanding of foundation engineering and soil exploration techniques in later stage.

#### UNIT-I

Soil formation, properties: Origin of soils, soil formation, geographical distribution of major soils in India, composition of soil, particle size and shapes, inter-particle forces. Three phase diagram and relationships among void ratio, specific gravity, dry density, porosity, water content, unit weights and degree of saturation. Classification of soils: Necessity, principles, Indian and unified classification, plasticity charts.

Laboratory and field identification of soil: Determination of water content, specific gravity and grain size distribution for coarse grained and fine grained soils, Atterberg limits and indices, visual identification by simple field test, field density by core cutter and sand, replacement methods.

#### UNIT-II

**Permeability and seepage:** Concept of pore water pressure, Total, effective and neutral stresses. Darcy's law, laboratory and field permeability tests, factors affecting permeability, shrinkage and swelling of soil. Deformation of soils: Concept of effective stress, definition and meaning of total stress, effective stress and neutral stress.

**Definition:** consolidation and compaction. Definition and practical significance of compression index, coefficient of consolidation, degree of consolidation. Meaning of total settlement, uniform settlement, differential settlement and rate of settlement and their importance; Settlement due to construction operations and lowering of water table, Tolerable settlement for different structures as per BIS.

#### UNIT-III

**Shear strength of soil:** stress strain curve, Concept of shear failure in soils along with examples. Factors contributing to shear strength of soils, Coulomb's law, Determination of shearing strength- direct shear test and unconfined compression test. Brief idea about tri-axial shear test, Drainage conditions of test and their significance. Peak strength and ultimate strength, their significance Comparisons between laboratory and field test.

#### UNIT-IV

**Soil Compaction:** Definition of compaction and its necessity, Laboratory compaction test (as per BIS) definition and importance of optimum water content, maximum dry density; moisture dry density relations for typical soils. Field compaction: methods and equipment, choice of equipment; Compaction requirements; Compaction control; Density control, field density test, (sand replacement), moisture control, Proctor's needle and its use, thickness control.

#### Text Book(s):

1. Punmia, B. C. "Soil Mechanics and Foundations"; Delhi Standard Publishers Distributors.
2. Bharat Ingh and Shamsheer Prakash; "Soil Mechanics and Foundations Engineering"; Roorkee, Nem Chand and Bros.

#### Reference Book(s):

1. Soil Mechanics and Foundation Engg., Purushothama Raj, Pearson Education
2. Geotechnical Engg, Venkataramaiah, New Age International Publishers

3. GeoTechnical Engineering [Principles and Practices], P. Donald, Coduto, PHI Publications
4. Soil mechanics in engineering practice by Karl Terzaghi, Ralph Brazelton Peck, Gholamreza Mesri, Wiley.
5. Geotechnical engineering: principles and practices of soil mechanics and foundation engineering, by V. N. S. Murthy, Marcel Dekker
6. Soil mechanics by Lambe and Whitman Wiley edition
7. Basic And Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New age international Ltd
8. Soil Engineering, Alam Singh, CBS Publication
9. Geotechnical Engg, Gulati and Dutta, McGrawHill Education (I) Pvt. Ltd

# HIGHWAY ENGINEERING

## (BVBCT403)

### OBJECTIVES AND PRE-REQUISITES:

To learn the fundamentals for alignment and geometric and pavement design of highway, various aspects of traffic engineering, highway construction materials, quality control and maintenance etc. Having knowledge of surveying and, construction materials is pre-requisite.

**Learning outcomes:** After completing this course, student will be able to learn the intricacies of highway engineering. Able to understand geometric design aspects of roads, details of highway materials and necessity of roadside development. This subject helps in understanding the various subjects of this course in later stages.

#### UNIT-I

**Highway Development and Alignment:** Scope of highway engineering, road development and planning in India, role of NHAI, IRC, CRRI, MORT&H, classification of roads, types of road pattern, Planning and Engineering surveys, Highway alignment- requirements, Highway project financing and economics of urban roads, expressways, national and state highways.

#### UNIT-II

**Highway Geometric Design:** Glossary of terms used in road geometrics and their importance, Cross Section, elements, width, camber, gradient, sight distance, requirements and design principles of horizontal and vertical alignment, Alignment and Geometrics of hill roads. Highway safety and safety audit.

#### UNIT-III

**Highway materials:** Properties of sub-grade and pavement component materials, Tests on sub grade soil, aggregates and bituminous materials, Bituminous paving mixes, Marshall Mix design criteria. Use of fly ash, concrete and polymers in highway construction.

#### UNIT-IV

**Road Pavements-** Types of pavements, their merits and demerits, typical cross-Sections, functions of various components, Pavement Construction Techniques and Quality Control, road construction equipment. Highway Drainage: Surface drainage and subsoil drainage, Pavement failures, Maintenance and Strengthening. Introduction to software pertaining to maintenance of records w.r.t. Highway Engineering.

#### Text Book(s):

1. Khanna and Justo, "Highway Engineering", Nem Chand and Bros. Publishers
2. Saxena, "Textbook of Highway and Traffic Engineering", CBS Publishers
3. Kadiyali, L. R., "Highway Engineering", Khanna Publishers, Delhi, 1996.

**Reference Book(s):**

1. I.S. specifications on concrete, aggregates and bituminous materials
2. David Croney, "Design and performance of road pavements", McGraw Hill
3. Wright Dixon, "Highway Engineering", Wiley India.
4. Dr. L. R. Kadiyali, "Traffic Engineering and Transport Planning", KP.
5. James H. Banks "Introduction to Transportation Engineering", McGraw Hill
6. R. Srinivasa Kumar, "Textbook of Highway Engineering", University Press.

# CORE ELECTIVE-I (SELECT ANY ONE) STRUCTURAL ANALYSIS (BVBCT404A)

## OBJECTIVES AND PRE-REQUISITES:

To study elements of structural analysis, moment area method & conjugate beam method, double integration method and singularity function method, deflection by energy methods. Having mathematical and analytical ability, proper understanding of applied mechanics & strength of materials is a prerequisite.

**Learning outcomes:** Enhanced knowledge in the field of structural analysis. Better understanding of elements of structural analysis, moment area method & conjugate beam method, double integration method and singularity function method, deflection by energy methods. Useful in later stages for studying advance structural analysis.

### UNIT-I

**Elements of Analysis-** Brief introduction to structures and loads, determinate and indeterminate structures, degree of freedom, degree of static indeterminacy, analysis of determinate truss.

### UNIT-II

Moment Area Method & Conjugate beam method.

### UNIT-III

Double integration method & Singularity function method.

### UNIT-IV

Deflection by energy methods- virtual work method and Castigliano's theorem

### Text Book(s):

1. Negi L. S. and Jangid R. S. "Structural analysis"
2. B.C. Punmia, Ashok Jain & Arun Jain "Theory of structures"
3. Khurmi R. S., "Theory of structures" S. Chand publications, Delhi

### Reference Book(s):

1. Analysis of structures by V.N. Vazirani & M.M. Ratwani
2. Strength of materials by F.V. Warnock
3. G.S. Pandit, "Structural Analysis", CBS Publication.
4. C.S. Reddy, "Basic Structural Analysis", Tata McGraw Hill



# WATER ENGINEERING (BVBCT404B)

## OBJECTIVES AND PRE-REQUISITES:

To familiarize the students with the basics of water quality and its treatment methods, importance of planning, analysis and design of modern water supply schemes. To study demand of water, sources of water, water quality, water purification and distribution. Basic knowledge of fluid mechanics and soil mechanics are helpful.

**Learning outcomes:** Able to compute demands of water. Better understanding of sources of water and purification processes. Better understanding of procedures of water purification and distribution. Useful in understanding waste water engineering in later stages.

### UNIT-I

**Demand of water:** Domestic, commercial and public requirements, Factors affecting demand fluctuations, Estimate of prospective population, fire demand requirements and other allowances.

**Sources of water:** Surface and underground sources, such as, impounded, perennial stream, shallow wells artesian wells, deep wells, infiltration galleries, intake works from different sources.

### UNIT-II

**Water quality:** Suspended solids, turbidity, colour, taste odour, temperature, Total dissolved solids, pH, acidity, alkalinity, hardness, nitrates, chlorides, fluorides, metals, organics, nutrients, and Pathogens.

**In-stream standards:** Potable water standards, waste water / effluent standards, standards for receiving wastes in natural streams / sewer / sea, Bio-monitoring of streams and lakes Groundwater quality, chemical/ biological remediation of ground water.

### UNIT-III

**Water Purification-** Water pollutants and their sources, Sedimentation - purpose, types of sedimentation tanks; Coagulation flocculation - usual coagulation and their feeding, Filtration - significance, types of filters, their suitability; Necessity of disinfection of water, forms of chlorination, break Point chlorine, residual chlorine, application of chlorine. Flow diagram of different treatment units, functions of (i) Aeration fountain (ii) mixer (iii) flocculator, (iv) classifier, (v) slow and rapid sand filters (vi) chlorination chamber. Removal of dissolved impurities.

### UNIT-IV

**Water Distribution-** Methods of distributing water, Different types of pipes - cast iron, PVC, steel, asbestos cement, concrete and lead pipes. Their suitability and uses, types of joints in different types of pipes. Appurtenances: Sluice, air, reflux valves, relief valves, scour valves, bib cocks, stop cocks, fire hydrants, water meters their working and uses; Distribution site: Requirement of distribution, minimum head and rate, methods of layout of distribution pipes; Systems of water supply - Intermittent and continuous service reservoirs - types, necessity and accessories; Wastage of water - preventive measures; Maintenance of distribution system & Leakage detection; Laying out pipes and building water supply. Plumbing and Sanitary installations.

### Text Book(s):

1. Duggal, KN; "Elements of Public Health Engineering"; S. Chand and Co. New Delhi
2. Rangwala, SC; "Water Supply and Sanitary Engineering"; Anand Charotar Book Stall

### Reference Book(s):

1. Steel, EW; "Water Supply and Sewerage"; McGraw Hill.
2. Venugopala Rao, "Principles of Environmental Science and Engineering", Prentice Hall India

# OPEN ELECTIVE-I (SELECT ANY ONE)

## GLOBAL WARMING & CLIMATE CHANGE (BVBCT405A)

### OBJECTIVES AND PRE-REQUISITES:

To study concepts of global warming & climatic change. To study factors responsible for global warming, impact of climatic change, national and international policies. To study and understand Kyoto mechanism. Basic knowledge of environmental studies subject is a pre requisite.

**Learning outcomes:** Understanding of philosophy of global warming and climatic change. Able to realize the factors responsible for global warming and corresponding climatic change. Understanding the importance and nuances of Kyoto mechanism.

#### UNIT-I

**The Climate system:** Sun, Atmosphere, Ocean, Ice and energy balance of the earth, history of climate change, human-caused climate change, impacts of climate change on human well-being and the natural world.

#### UNIT-II

Key concepts of global warming, climate change, greenhouse gas effect, Interrelationship between these three phenomenon, Green-House Effect as a Natural Phenomenon and increase in Greenhouse gas effect because of anthropogenic activities, Green House Gases (GHGs) and their Emission Sources, Global Warming Potential (GWP) of GHGs, Past Present and Future trends of global warming.

#### UNIT-III

Impacts of climate change Extreme weather events, Temperature Rise, Sea Level rise, Coastal Erosion and landslides; future impacts of global warming, global warming and the hydrological cycle, climate change impact on ecosystems and agriculture.

#### UNIT-IV

Possible remedies of global warming- various mitigation and adaptation measures taken/ proposed to combat global warming; National and International policies to combat global warming and climate change-UNFCCC- Kyoto Protocol, Paris agreement its role in Climate Change; IPCC- its role in global climate protection Role of countries and citizens in containing Global Warming.

#### Text Book(s):

1. Current trends in Global Environment by A.L. Bhatia (2005) Energy Sources
2. Global Warming – A Very Short Introduction, Mark Maslin, oxford.
3. UNFCC & IPCC reports ([www.unfccc.int](http://www.unfccc.int) & <http://www.ipcc.ch/>)

#### Reference Book(s):

1. Global Warming The Complete Briefing - John T Houghton Cambridge press
2. Climate Change: A Multidisciplinary Approach, by William James Burroughs, Cambridge press
3. Contemporary climatology-Robinson, Taylor and Francis group

# ENTREPRENEURSHIP DEVELOPMENT AND PLANNING (BVBCT405B)

## OBJECTIVES:

The Course Aims at Instituting Entrepreneurship Skills in the Students by giving an overview of the process of entrepreneurship. The Course aims at inculcating entrepreneurial spirit among the students.

### UNIT-I

**Foundations of Entrepreneurship:** What is an Entrepreneur? The benefits of Entrepreneurship. The power of small business. Class exercise- case discussion on entrepreneurs like - Dhirubhai Ambani, Karsenbhai Patel, Ramesh Babu, Kailash Katkar, Patricia Narayan etc.

### UNIT-II

**Launching Entrepreneurial Ventures:** Creativity and innovation. Methods to initiate ventures. Legal challenges in Entrepreneurship ventures. The search for Entrepreneurial capital. Class exercise- Survey your locality and come up with at least one entrepreneurial venture. Discuss in class about ways to enhance the business in most innovative manner.

### UNIT-III

**Formulation of the Entrepreneurial Plan:** The assessment functions with opportunities. The marketing Aspects of new ventures. Business plan preparation for new ventures. Class Exercise- Building your own Business Plan.

### UNIT-IV

**Institutions Supporting Small Business Enterprises:** Central level institutions. State level institutions. Other agencies. Industry Associations. Class exercise- discussions on current government schemes supporting entrepreneurship and finding out which scheme will most suit the business plan devised by the student.

### Text Book(s):

1. Kuratko, D.F. & Rao T.V. (2012). Entrepreneurship: A South Asian Perspective. Cengage
2. Charantimath, P. (2009). Entrepreneurship Development: Small Business Enterprises. Pearson

### References Book(s):

1. Nagendra S.and Manjunath V.S. (2009). Entrepreneurship and Management. Pearson

# PRACTICAL/VIVA VOCE REINFORCED CEMENT CONCRETE DESIGN LAB (BVBCT406P)

## LIST OF EXPERIMENTS:

1. Drawing/ Design based on RCC Design I and RCC Design II have to be prepared

2. Singly reinforced beam (working stress method)
3. Singly reinforced beam (limit state method)
4. Doubly reinforced beam
5. T- beam
6. L- beam
7. One way slab
8. Two way slab
9. Column
10. Stair case
11. Footing

## SOIL MECHANICS LAB (BVBCT407P)

### LIST OF EXPERIMENTS:

1. To determine the moisture content of a given sample of soil
2. Determine the specific gravity of soil.
3. Determine the in situ density of natural or compacted soils by sand replacement method and core cutter method.
4. Extraction of Disturbed and Undisturbed Samples- Extracting a block sample, Extracting a tube sample, Extracting samples for mechanical analysis and Field identification of samples
5. Grain size analysis/ Mechanical analysis- plotting and interpretation of grain size distribution curve
6. Determination of consistency limits
7. Permeability test
8. Laboratory Compaction Tests (Standard Proctor Test)- Computation of results and plotting & Determination of optimum moisture content and maximum dry density
9. Demonstration of- Direct Shear and Vane Shear Test on sandy soil samples
10. Site visit to any in-situ testing/ testing Centers

## HIGHWAY ENGINEERING LAB (BVBCT408P)

### LIST OF EXPERIMENTS:

1. Determination of penetration value of bitumen
2. Determination of softening Point of bitumen
3. Determination of ductility of bitumen
4. Viscosity test
5. Flash and fire Point test
6. Determination of bitumen content by centrifuge extractor
7. Aggregate crushing strength test
8. Determination of impact value of the road aggregate
9. Determination of abrasion value (Los Angeles") of road aggregate

10. Determination of the California bearing ratio (CBR) for the sub-grade soil
11. Determination of marshal stability value.
12. Study of rebound Deflection of pavement by Benkelman Beam.
13. Field visit to Hot mix plant/ Field visit to highway construction site for demonstration of operation of: Tipper, tractors (wheel and crawler), scraper, bulldozer, dumpers, shovels, grader, roller, dragline, road pavers, JCB etc.

## CONCRETE MIX DESIGN LAB (BVBCT409P)

### LIST OF EXPERIMENTS:

A Report based on following aspects/ items has to be prepared for evaluation

- Field visit to RMC plant should be conducted and salient features have to be observed
- To study different methods of concrete mix designs
- Concrete mix design for RMC
- Concrete mix design as per IS Hand book.

## INDUSTRIAL TRAINING-III (BVBCT410P) PROJECT-II (BVBCT411P)

### OBJECTIVES:

The practical training cum project work is intended to place students for project oriented practical training in actual work situations for the stipulated period with a view to:

- a. Develop understanding regarding the size and scale of operations and nature of field work in which students are going to play their role after completing the courses of study.
- b. Develop understanding of subject based knowledge given in the class room in the context of its application at work places
- c. Develop first-hand experience and confidence amongst the students to enable them to use and apply polytechnic/ institute based knowledge and skills to solve practical problems in the world of work.
- d. Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values.

# SEMESTER-V

## TECHNICAL ENGLISH

### (BVBCT501)

#### OBJECTIVES:

- To equip students to recognize, explain, and use the rhetorical strategies and the formal elements of specific genres of technical communication, such as technical abstracts, data based research reports, instructional manuals, technical descriptions etc.
- To help students understand the process of collection, analysis, documentation, and reporting of research clearly, concisely, logically, and ethically and understand the standards for legitimate interpretations of research data within scientific and technical communities.
- To initiate students into critical and creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information towards meaningful and effective communication
- To help students understand ethical considerations in technical and professional writing, realizing the consequences of various communication acts.

#### Learning Outcomes: Upon successful completion of the course the student shall be able to:

- Understand and demonstrate composing processes through invention, organization, drafting, revision, editing, and presentation as evidenced in satisfactory completion of all the written, visual, web-based, and oral discourses to be submitted in this course.
- To recognize and use the rhetorical and stylistic elements necessary for the successful practice of scientific and technical communication;
- Create various products most frequently used in scientific and technical communication.
- Develop ethical problem-solving communication skills in professional situations.

#### UNIT-I

**Technical Writing:** Definition, Purpose and Characteristics of Technical Writing.

**Technical Writing Skills:** Methods and means of the Pre-writing stage, the Writing Stage and the Post-writing Stage.

#### UNIT-II

**Formal Formatting:** Arrangement of Formal Elements, Front Material, Format Devices in the Body of Formal Report-Heading, Pagination, End Material – Citations, References and Bibliography, Appendix.

#### UNIT-III

**Writing and Designing for Electronic Media:** Use of Internet as a Writing tool; designing and writing for multimedia applications and the World Wide Web.

#### UNIT-IV

**Research and Writing Ethics:** Explaining Forms and Consequences of Plagiarism, Introduction to Intellectual Property Right and Copy Right Laws.

#### Text Book(s):

1. Sides, Charles H., "How to Write and Present Technical Information", Cambridge Univ. Press, 1999.
2. Basu, B. N., "Technical Writing", PHI Learning Pvt. Ltd., 2007.

#### Reference Book(s):

1. Beer, David F. and David A. McMurrey, "A Guide to Writing as an Engineer", New York: Wiley, 2005.
2. Gibaldi, Joseph, and Walter S. Achtert, "MLA Handbook for Writers of Research Papers, Thesis, and Dissertations", Modern Language Association, 1980.
3. Rubens, Philip, "Science and Technical Writing: A Manual of Style", Routledge, 2002.
4. Anderson, Marilyn, Pramod K. Nayar, and Madhucchandra Sen, "Critical Thinking, Academic Writing and Presentation Skills", Pearson. 2010.

# STEEL DESIGN (BVBCT502)

## OBJECTIVES AND PRE-REQUISITES:

Having the basic knowledge of building construction, construction materials will enhance the understanding capacity of this subject. The basic objective of this subject is to study various concepts of steel design in construction and civil engineering perspective. To study and understand structural steel sections and connections including welded connections. to learn about tension and compression members. To study beams and trusses.

**Learning Outcomes:** Better visualization of structural steel sections. To have basic understanding of use of steels in civil engineering. Ability to design simple bolted and welded connections, tension and compression members, beams.

### UNIT-I

Structural Steel Sections and connections: Types of steel sections, Merits and demerits of steel structures, Designation of structural steel sections as per IS handbook and IS:800, Riveted connections, types of joints (Lap and Butt joints), Bolted connections, Design of riveted and bolted joints. Failures of joints, Assumptions in design of joints.

#### Welded connections:

Types of welds, permissible stresses in welds types of welded connections, design of butt and fillet welded connections with gusset plate subjected to axial loads, testing and inspection of welded joints as per IS:800.

### UNIT-II

#### Tension Members:

Permissible stresses in tension for steel, Design of tension members as per IS:800 (flats, angles and tee sections only).

#### Compression Members:

Concept of buckling of columns, effective length and slenderness ratio, permissible stresses in comparison as per IS:800, Strength of columns of single angle, double angle and built up sections, Design of single angle, double angle (struts) for axially loaded columns (no built up columns design), use of tacking rivets, Sketches of Slab base, Column base and Gusseted base (no design).

### UNIT-III

#### Beams:

IS specifications for the design of simply supported steel beams including design of base plate at the ends (laterally restrained beams only), structural behaviour deflected shapes and function of various elements of plate girder and freehand sketching of a plate girder and its elements. Beam and column, framed and seated connections (descriptive only, no design).

### UNIT-IV

Types of trusses, pitch of roof truss, spacing of trusses, spacing of purlins, connection between purlin and roof covering. Connection between purlin and principal rafter (no design, only concept) Drawings of king post, queen post and fink roof trusses with details of joints, fixing details of purlins and roof sheets.

#### Text Book(s):

1. N. KrishnaRaju, "Structural Design and Drawing", University Press, Hyderabad
2. Ramachandra, "Design of Steel Structures", Vol.-1, Universities Press. Hyderabad

#### Reference Book(s):

1. Subramanyam. N, "Steel Structures", Oxford Higher Education, New Delhi
2. S.K. Duggal, "Limit State Design of Steel Structures", Tata McGraw Hill, New Delhi.
3. Bhavikatti, "Design of Steel Structures" I. K. International Pvt Ltd, 2009

# CORE ELECTIVE-II (SELECT ANY ONE) FOUNDATION ENGINEERING (BVBCT503A)

## OBJECTIVES AND PRE-REQUISITES:

To help students understand analyzing the bearing capacity of soils, to design shallow and deep foundations, to estimate the settlements, to design the rigid and flexible retaining structures and to design cuts and excavations. Students will learn various sub surface exploration techniques and methods of ground improvement.

**Learning Outcomes:** Ability to understand the concepts of soil exploration in the field and analyze the concepts of Bearing capacity and correlate them in the field. Better understanding of shallow and deep foundations. Ability to apply the concepts of earth pressure, stability of slopes and soil improvement techniques in real life.

### UNIT-I

**Sub surface exploration:** Types of soil and rock sample, Indirect, direct and semi-direct methods of sub surface exploration; Routine field tests, Location, spacing and depth of borings.

**Bearing capacity of soils:** Bearing capacity criteria and factors affecting it, Modes of shear failure, Theories of **Bearing capacity**, Foundation Pressures, Permissible settlements, Allowable bearing pressure, Field tests to estimate bearing capacity **Shallow foundations:** Types of shallow foundations, selection of type of foundation, location and depth of foundation, causes of settlement, settlement analysis, Design of shallow foundations, design of combined footings, Mat foundations.

### UNIT-II

**Deep foundations:** Classification of Piles, Pile driving equipment, calculation of bearing capacity of a single pile, Under-reamed piles, Pile groups, Uplift and Lateral resistance of piles, Inclined loading of piles, pile cap.

**Drilled Piers:** Types and uses, bearing capacity, settlement, construction procedures

### UNIT-III

**Lateral Earth Pressure:** Limit analysis and Limit Equilibrium methods, Earth pressure at rest, Rankine's states of Plastic equilibrium, Earth pressure theories, Graphical methods to determine magnitude and location of resultant earth pressure

**Earth retaining structures:** Gravity type retaining walls: Proportioning retaining walls, stability requirements, backfill materials and drainage; Joints in retaining walls; Cantilever and Anchored sheet pile walls

### UNIT-IV

**Stability of slopes:** Short and long term failures, causes of failure, Types of landslides and slope movements, factor of safety, Concept of slope stability analysis, Infinite and finite slopes and their analysis, Selection of shear strength parameters, slope protection measures.

**Soil improvement techniques:** Compaction, Drainage and vibration methods, Precompression and consolidation, grouting and injection; Chemical stabilization, Geomembranes and geotextiles.

### Text Book(s):

1. R. B. Peck and Terzaghi, "Soil Mechanics in Engineering Practice", John Wiley
2. V.N.S. Murthy, "Soil Mechanics and Foundation Engineering", CBS



**References Book(s):**

1. Shashi K. Gulati and Manoj Datta, "Geotechnical Engineering", Tata McGraw Hill 2008
2. Donald P. Coduto, "Geotechnical Engineering", Prentice-Hall India.
3. J.E. Bowles, "Foundation Analysis and Design", Mc-Graw Hill
4. N.P. Kurian, "Design of foundation Systems, Principles and Practices" Narosa Publisher

# ADVANCED SURVEYING (BVBCT503B)

## OBJECTIVES AND PRE-REQUISITES:

The pre-requisites of this subject are Surveying I and Surveying II. The objectives of this subject are to understand the surveying in totality from modern surveying equipment point of view. To understand the concepts of surveying, geodetic surveying and engineering surveys. To understand the concepts behind modern surveying equipment and their utility in the field. To learn about modern surveying methods such as remote sensing, satellite based positioning systems, aerial surveying and GIS

**Learning Outcomes:** Enhanced ability of understanding of different types of surveying able to operate modern surveying equipment independently. Able to use EDM, Digital Theodolite and Total station in the field. Improved familiarity with GIS.

### UNIT-I

**Introduction:** Review of classification of surveys

**Geodetic Surveying-** Introduction, Basic concepts of Triangulation, systems, orders and trilateration

**Engineering Surveys:** Engineering and project surveys, Route surveys, Longitudinal and cross-section levelling, Topographic surveys, City surveys and Underground surveys

### UNIT-II

#### Modern Surveying Equipment

Introduction, concepts and application of Modern Surveying equipment and techniques such as:

- a. EDM
- b. Electronic/ Digital Theodolite
- c. Digital Planimeter
- d. Total station

### UNIT-III

Modern methods of surveying:

**Remote sensing-** Concepts and foundations of remote sensing- Introduction, Energy sources and radiation principles, Electromagnetic spectrum, use of systems of remote sensing, Resolution in remote sensing, ideal remote sensing systems, characteristics of real remote sensing systems, Remote sensing in India, Problems confronting remote sensing systems, Applications of remote sensing

**Satellite based positioning systems-** Concept, types, Applications in surveying.

### UNIT-IV

**Aerial surveying-** Introduction, advantages of aerial photogrammetry, Basic terminology, Equipment, Procedure of Aerial Surveying, Introduction to general features of Photographic images, Application of Aerial surveying Geo Graphical Information Systems- Introduction and concept of – GIS, systems & Information systems, Evolution of GIS, Components of GIS- Data, Technology, Application & People. Remote sensing and GIS Integration, Applications of GIS, GIS- issues, prospects & Internet resources

**Text Book(s):**

1. B.C. Purnimia-II/III, "Surveying", Laxmi Publication
2. R. Subramanian, "Surveying and Levelling", Oxford Higher Education
3. Duggal, "Surveying", Vol.2, McGraw Hill Education (I) Pvt.Ltd.

**Reference Books:**

1. A.M. Chandra, "Higher Surveying", New Age Publication
2. Dr. K.R. Arora, "Surveying", Vol. II, Standard Book House, New Delhi
3. Gopi, "Advanced Surveying: Total Station, GIS and Remote Sensing", Pearson Education
4. Saikai et al, "Surveying", PHI Publications
5. Bannister, Raymond and Baker, "Surveying", Pearson Education
6. Thomas, W. Norman, "Higher Surveying", Published by Arnold, London, 1920
7. Thomas M Lillesand, "Remote Sensing and Image Interpretation", Wiley India Edition
8. C. P. Lo, Albert K. W. Yeung, "Concepts and Techniques of Geographic Information Systems", Eastern Economic Edition

# CORE ELECTIVE-III (SELECT ANY ONE) WASTE WATER ENGINEERING (BVBCT504A)

## OBJECTIVES AND PRE-REQUISITES:

Pre requisite of this subject is Water Engineering. To study about waste water treatment and disposal, sewerage systems, BOD, COD, sewage treatment,

**Learning Outcomes:** Able to understand nuances of waste water engineering.

### UNIT-I

Introduction to waste water treatment and disposal, Purpose of sanitation, Necessity of systematic collection and disposal of waste water, Definitions of terms used in waste water/sanitary engineering, Collection and conveyance of sewage, Conservancy and water carriage systems, their advantages and Disadvantages. Surface drains: various types, suitability, Types of sewage: Domestic, industrial, storm water and its seasonal variation, Types of sewerage systems, Appurtenances: Location, function and construction features of. Manholes, drop manholes, catch basin, inverted siphon, flushing tanks, grease and oil traps, storm regulators, ventilating shafts.

### UNIT-II

Laying and Construction of Sewers, Setting out/alignment of sewers, Excavations, checking the gradient with boning rods preparation of bedding, handling and jointing testing and back filling of sewers/pipes. Different types of sewer joints, sewer materials used with neat sketches. Construction of surface drains and different sections of drains used. Sewage characteristics, Properties of sewage and IS standards for analysis of sewage, Physical, chemical and bacteriological parameters. Dissolved Oxygen, B.O.D. C.O.D etc.

### UNIT-III

Sewage Treatment, Meaning and principle of primary and secondary treatment and activated sludge process their flow diagrams, Introduction and uses of screens, grit chambers, detritus tanks, skimming tanks, plain sedimentation tanks,

primary clarifiers, secondary clarifiers, filters, control beds, intermittent sand filters, trickling filters, sludge treatment and disposal, oxidation ponds, oxidation ditch etc.

#### UNIT-IV

Natural Methods of Sewerage Disposal, General composition of sewage and disposal methods, Disposal by dilution, sewage farming, Self-purification of stream, Disposal by land treatment, Nuisance due to disposal Building Drainage, Aims of building drainage and its requirements, one pipe and two pipe systems of plumbing, Different types of sanitary fittings and installations, Traps, seals, causes of breaking seals. Construction, working principle and design of Septic tank, soak pit, Cess pools, Imhoff tank.

#### Text Book(s):

1. Metcalf and Eddy Inc: "Waste Water Engineering", Tata Mc. Graw Hill, New Delhi
2. Peavy, Rowe & Tchobanoglous, "Environmental Engineering", Mc. Graw Hill, New Delhi.

#### References Book(s):

1. G.L. Karia and R.A. Christian, "Wastewater Treatment Concept and Design Approach", PHI Publication
2. Qasim, S. "Water Works Engineering", Prentice Hall Publication, New Delhi.
3. "Manual on Sewerage & Sewage Treatment", C.P.H.E.E.O., Ministry of Urban Development (MoUD), GOI, New Delhi
4. Fair & Geyer, "Water Supply and Waste Water Disposal".
5. Parker, "Waste Water System Engineering", PHI
6. S. K. Garg, "Wastewater Engineering", Khanna publication
7. M. N. Rao & A. K. Dutta, "Wastewater Treatment", PHI, Publication
8. "Standard Methods for the Examination of Water and Wastewater", A.P.H.A., New York

# ADVANCED STRUCTURAL ANALYSIS (BVBCT504B)

## OBJECTIVES AND PRE-REQUISITES:

The pre-requisite for this subject are to study structural mechanics and structural analysis. The prime objective is to study Slope Deflection method, Moment Distribution Method, Kani's Method, Stiffness Matrix Method and Flexibility Matrix Method.

**Learning Outcomes:** Ability to apply Slope Deflection method, Moment Distribution Method, Kani's Method, Stiffness Matrix Method and Flexibility Matrix Method in structural analysis

#### UNIT-I

**Slope Deflection method:** analysis of continuous beams, analysis of rigid frames, frames with sloping legs, gabled frames, frames without sway and with sway, settlement effects.

#### UNIT-II

Moment Distribution Method: Analysis of beams and frames.

#### UNIT-III

**Kani's Method:** Analysis of beams and frames.

#### UNIT-IV

**Stiffness method:** Development of stiffness matrices by physical approach, stiffness matrices for truss and frame elements, displacement transformation matrix, development of total stiffness matrix, analysis of simple structures, plane truss and plane frame, nodal loads and element loads, lack of fit and temperature effects. Flexibility method: Development of flexibility matrices by physical approach, Flexibility matrices for truss and frame elements, load transformation matrix, development of total flexibility matrix of the structure, analysis of simple structures, plane truss and plane frame, nodal

loads and element loads, lack of fit and temperature effects.

**Text Books:**

1. G.S. Pandit, "Structural Analysis", CBS Publication.
2. Bhavikatti, "Structural Analysis (Vol. I and II)", Vikas Publication
3. S. Rajasekaran, "Computational Structural Mechanics", Prentice-Hall India.
4. Pandit and Gupta, "Structural Analysis a Matrix Approach" Tata McGraw Hill

**References Books:**

1. C.S. Reddy, "Basic Structural Analysis", Tata McGraw Hill
2. R.C. Hibbler, "Structural Analysis", Pearson Education
3. Schodek, "Structures", Pearson Education
4. R. Vaidyanathanand & P. Perumal, "Comprehensive Structural Analysis", Laxmi Publications
5. Sujitkumar Roy, "Fundamental of Structural Analysis", S. Chand Publication.
6. D.S. PrakashRao, "Structural Analysis", University Press.
7. C.K.Wang, "Statically Indeterminate Structures", McGraw Hill

# PRACTICAL/VIVA VOCE (SELECT ANY ONE LAB BASED ON CORE ELECTIVE-II) FOUNDATION ENGINEERING LAB (BVBCT505A(P))

## LIST OF EXPERIMENTS:

1. Study of Consolidation test
2. Study of Triaxial compression test
3. Study Unconfined compression test
4. Study of Direct shear test
5. Study Plate load test
6. Report/ study based on Unit I
7. Report/ study based on Unit II
8. Report/ study based on Unit III
9. Report/ study based on Unit IV
10. Field visit to Testing centres/ construction sites

# ADVANCED SURVEYING LAB (BVBCT505B(P))

## LIST OF EXPERIMENTS:

1. Study of Digital Planimeter
2. Computation of areas using Planimeter
3. Study of EDM
4. Field/ Indore Measurements using Distometer
5. Study of electronic/ Digital theodolite
6. Computations of Horizontal angles and vertical angles
7. Traversing and plotting
8. Trigonometric Leveling
9. Study of Total station
10. Study of GPS
11. Field visit to SOI/ Surveying organizations/ construction sites

# PRACTICAL/VIVA VOCE LANGUAGE LAB (BVBCT506(P))

## LIST OF EXPERIMENTS:

1. Fundamentals of Inter-personal Communication and Building Vocabulary
  - Self introduction and introducing others
  - Situational Dialogues: Starting a dialogue and responding relevantly & appropriately
  - Role-Play-Expressions in various situations
  - Social and Professional Etiquette: greetings, apologies, requests etc
  - Telephone Etiquette.
2. Non-verbal Communication
  - Gesture, posture and body language
  - Facial Expressions.
  - Paralinguistic Skills
  - Proxemics
  - Eye Gaze.
  - Haptics
  - Appearance.

3. Reading Comprehension and Listening Exercise
  - General vs Local Comprehension
  - Skimming, Scanning
  - Inference drawing
  - Critical reading
  - Listening , Hearing
4. Presentation Skills
  - Oral presentation
  - Seminar/ conference Paper Presentation
  - PPTs and Written presentation through poster/projects/reports/e-mails/assignments etc
  - Camera ready presentation
5. Group Discussion
  - Dynamics of Group Discussion
  - Intervention
  - Summarizing
  - Body Language and Voice, Intonation
6. Interview Skills
  - Interview etiquette
  - Body posture and body language
  - Voice, intonation and modulation
  - Fluency and organization of ideas
  - Rubrics for evaluation: Concept and process, pre-interview planning, opening strategies, answering techniques,
  - Interview through tele-conferencing and video-conferencing
  - Mock interview
  - Campus placement interview
7. Public and Professional Speaking
  - Extempore
  - Public Speech
  - Professional speech/lecture
8. Articulation and Management
  - Time management
  - Articulation and expression
  - Assertiveness
  - Psychometrics
  - Stress management

# SOFTWARE TRAINING IN CIVIL ENGINEERING (BVBCT507(P))

Students have to undergo software training related to Civil Engineering during Semester. Demonstration of various civil

engineering software, such as STAAD-Pro/ ETAB/ MS Project/ Primavera Project Planner/ Auto Civil/ MX Road/ Auto plotter or any other/equivalent, shall be arranged for student during the semester. Further weekly presentations and viva-voce will be conducted in this semester. Emphasis must be given to presentations by various organizations on CAD software. Emphasis must be given to prepare a report on case study comprising of above features which may include Drawings/ Design (based on RCC/ Steel design), Programming (for various Construction/ Civil engineering problems). More experiments may be designed by the respective institutes as per their choice.

## MINOR PROJECT (BVBCT508(P))

### OBJECTIVES:

The main aim of the project shall be to:

- Develop understanding regarding the size and scale of operations and nature of field work in which students are going to play their role after completing the courses of study.
- Develop understanding of subject based knowledge given in the class room in the context of its application at work places
- Develop first-hand experience and confidence amongst the students to enable them to use and apply polytechnic/ institute based knowledge and skills to solve practical problems in the world of work.
- Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values.

This should be considered as sacred ritual for the fulfilment of above objectives. Institutes have to establish close linkage with relevant organizations for providing such an experience with the use of its training placement division. Projects selected should not be too complex which is beyond the level of the students. The placement of the students for such a practical cum project work should match with the competency profile of students and the project work assigned to them. Students may choose a project based on any subject of Construction /Civil Engineering. The students will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format.

The project work may be based on development of designs, site/ field work, Programming/ CAD based, case studies, market survey based on topics of Construction/ Civil engineering interest. It will be a group project.

## INDUSTRIAL TRAINING-IV (BVBCT509(P)) SEMINAR (BVBCT510(P))

### OBJECTIVES:

The objective is to assess and enhance the presenting capability of the students. Also to impart training to a student to face audience and present his ideas and thus creating in him self-esteem courage that is essential for an engineer. Students are required to give a seminar on Construction/ Civil Engineering Projects/Visits/Case Studies for about 10 minutes. Seminar will be liberally attended by faculty present in college in conference hall and award marks to the students based on presentation (50% weightage) and Interjections by the candidates will be observed in assessment (50% weightage). Each student shall submit hard copy and soft copy of a write up of the seminar topic.

# SEMESTER-VI

## CONSTRUCTION MANAGEMENT

### (BVBCT601)

#### OBJECTIVES AND PRE-REQUISITES:

This course requires basic knowledge of Building construction and construction material subjects. This course is aimed at providing both basic and advanced exposure to Construction Project Management so as to enable the manager/ consultant of tomorrow to successfully plan and complete sophisticated projects within the constraints of capital, time and other resources. The course also deals with basic concept of network analysis.

**Learning Outcome:** Ability to understand the intricacies of construction management. Usage and preparation of bar charts. Understanding of concepts PERT and CPM. Enhanced knowledge of usage of Construction equipment.

#### UNIT-I

##### Introduction:

Objectives and functions of project management, Classification of construction, stage, team-their functions and relationship, Importance of construction planning, Stages of construction planning Finance and cost accounting, Quality control, Methods of motivation and incentives.

#### UNIT-II

Scheduling construction works by bar charts - Preparation of bar charts for simple construction work, Limitations of bar charts Network Techniques: Introduction to CPM/PERT methods and their use in construction planning, preparation of construction schedules for jobs, materials, equipments, labour and funds and project monitoring.

#### UNIT III

**Construction Equipments:** Different types of construction equipments viz., earth moving equipments, dewatering and pumping equipments, grouting equipments, pile driving equipments and other construction equipments such as conveyors, cranes, concrete mixers, vibrators, road construction machinery, rollers, compactors etc. Factors affecting the selection of construction equipments.

#### UNIT IV

**Equipment Management:** Productivity, operational cost, owning and hiring cost and the work motion study.

**Contract Management:** Legal aspects of contraction, laws related to contracts, land acquisition, labour safety and welfare. Different types of contracts, their relatives advantages and disadvantages. Elements of tender operation, settlement of disputes, arbitration and commissioning of the project.

#### TextBook(s):

1. Sreenath L. S., "PERT and CPM", Affiliated East West Press, New Delhi.
2. Punmia B. C., and Khandelwal K. K., "PERT and CPM", Laxmi Pub., New Delhi.
3. Verma Mahesh, "Construction Planning and Management", Delhi Metropolitan.

#### References Books:

1. Peurifoy R. L., "Construction Planning, Equipments and Methods", McGraw Hill Book Co. Inc., New York.
2. Satyanarayanan & Saxena, "Construction Planning and Equipment", Standard Publishers Distributors, New Delhi.
3. Graham M. Winch, "Managing Construction Projects", John Wiley and Sons, 2010
4. Henry F. W., "Construction Project Management: Planning and Scheduling", Naylor -Delmar Pub
5. Peurifoy, "Construction Planning, Equipment and Methods", Tata McGraw Hill
6. Joseph Frein, "Handbook of Construction Management and Organization", Springer



7. Harpal Singh, "Construction Management and Accounts", Tata McGraw Hill Publishing Co., ND
8. Dharwadker, PP; "Management in Construction Industry", Oxford and IBH Publishing Company, ND
9. Gahlot PS; Dhir, BM; "Construction Planning and Management", Wiley Eastern Limited, New Delhi

## CORE ELECTIVE-IV (SELECT ANY ONE)

# RAILWAY, BRIDGES, AIRPORT AND TUNNEL ENGINEERING (BVBCT602A)

### OBJECTIVES AND PRE-REQUISITES:

Knowledge of highway engineering subject is a pre requisite for this subject. The objectives are to learn various aspects of Railway engineering, bridge engineering, airport & tunnel engineering

**Learning Outcome:** Enhanced ability to understand the different aspects of railway engineering for utilizing in the field. Ability to understand salient features of Bridge, airport and tunnel engineering.

#### UNIT-I RAILWAYS:

**Introduction to Indian Railways, Railway surveys:** Factors influencing the railways route, brief description of various types of railway survey,

**Classification of permanent way describing its component parts; Rail Gauge, Rails, Rail Fastenings:**

**Rail joints, Sleepers, Ballast, Crossings and signalings:** Brief description regarding different types of crossings/ signalings (Latest electronics operated signal devices).

**Maintenance of track:** Necessity, maintenance of track, inspection of soil, track and fixtures; maintenance and boxing of ballast maintenance gauges, tools.

**Earth work and drainage:** Features of rail road, bed level, width of formation, side slopes, drains, methods of construction, requirement of drainage system.

#### UNIT-II BRIDGES

**Introduction Bridges, Classification of Bridges:** Structural elements and suitability-permanent and temporary, deck level – Deck, through and semi-through, timber, masonry, steel, RCC, pre-stressed, - Grade Separators- Railway Over bridges (ROB), Railway under bridge (RUB), Beam type –RCC, T-Beam, steel girder bridges, plate girder and box girder, balanced cantilever, Trussed bridges. Arch type – open spandrel and filled spandrel barrel and rib type - Suspension type – unstiffened and stiffened and table (its description with sketches) - According to the position of highest flood level submersible and non- submersible; IRC classification.

**Bridge Foundations:** Introduction to open foundation, pile foundation, well foundation.

**Piers, Abutments and Wing-walls, Bridge bearings, Maintenance of Bridges**

#### UNIT-III

#### AIRPORT ENGINEERING

Necessity of study of airport engineering, aviation transport scenario in India. Factors to be considered while selecting a site for an airport with respect to zoning laws. Introduction to Runways, Taxiways and Apron [8]

#### UNIT-IV TUNNELS

**Definition and necessity of tunnels, Typical section** of tunnels for a national highway and single and double broad gauge

railway track.

**Ventilation:** Necessity and methods of ventilation, by blowing, exhaust and combination of blowing and exhaust.

**Drainage method** of draining water in tunnels.

**Lighting of tunnels**

**Text Book(s):**

1. Saxena and Arora, "A Text Book of Railway Engineering", Dhanpat Rai Publications
2. Khanna and Arora, "Airport Planning and design", Nemchand Bros
3. Vazirani V.N, Chandola S. P., "Railways, Bridges and Tunnels", Khanna Publications, New Delhi, 1997

**References Book(s):**

1. Horonjeff, "Planning and Design of Airports", TMH
2. Mundrey, "Railway Track Engineering", TMH
3. Docks and Harbors, Levison Francis, Clarendon press, (2006)
4. John O. Bickel, Thomas R. Kuesel, Elwyn H King, "Tunnel Engineering Handbook", CBS Publication.
5. Rangwala, S.C., "Railway Engineering", Anand, Charotar Book Stall
6. Victor Johnson, "Essentials of Bridge Engineering" Oxford and IBH, Delhi
7. Rangwala S.C., "Bridge Engineering", Anand, Charotar Book Stall

# REPAIR AND REHABILITATION OF STRUCTURES (BVBCT602B)

## OBJECTIVES AND PRE-REQUISITES:

Proper understanding of Construction/ Civil engineering subjects is a necessity and pre requisite of this subject. One of the major concerns of a civil engineer is to take care of the building works, already constructed, in order to keep these buildings in utmost workable conditions. Usually it is being felt that the buildings deteriorate faster for want of care and proper maintenance. The buildings usually have a shabby appearance due to cracks, leakage from the roofs and sanitary/ water supply fittings. Thus the need for teaching the subject in proper perspective has arisen making students aware of importance of maintenance of buildings.

**Learning Outcomes:** Enhanced ability to understand the repair and rehabilitation of existing structures. Better understanding of maintenance of structure, diagnosis of building, evaluating concrete in concrete structures, repair of surface defects of concrete.

### UNIT-I

Need of repair and Maintenance of structure, Agencies Causing Deterioration (Sources, Causes and Effects), Effects of various agencies of deterioration on various building materials. Investigation and Diagnosis of Defects, root causes. Main causes of building defects in various building elements- foundations, basements and DPC, Walls, Column and Beams, Roof and Terraces, Joinery, Decorative and protective finishes, Services and Defects caused by dampness

### UNIT-II

Systematic approach/procedure of investigation, sequence of detailed steps for diagnosis of building defects/problems, introduction non-destructive and others tests on structural elements and materials to evaluate the condition of the building, Materials for Repair, maintenance and protection, Remedial Measures for Building Defects- Preventive maintenance considerations, Surface preparation techniques for repair, Crack repair methods.

### UNIT-III

Evaluating concrete in concrete structures: site survey, cracking, disintegration and spalling, scaling, dusting, distortion, erosion, seepage, crack survey, joint inspections, physical and chemical analysis, NDT testing Causes of distress and deterioration: Accidental loading, chemical reactions, corrosion, freezing and thawing, settlement and movement, shrinkage, temperature changes.

### UNIT-IV

**Repair of surface defects of concrete:** Bug holes, Form tie holes, Honey comb and larger voids; Repair of corrosion in RCC elements- Steps in repairing, Prevention of corrosion in reinforcement; Material placement techniques- Pneumatically applied, Open top placement, Pouring from the top to repair bottom face, Birds mouth, Dry packing, Form and pump, Preplaced – aggregate concrete, Trowel applied method; Repair of DPC against Rising Dampness- Physical methods, Electrical methods, Chemical methods; Repair of walls- Repair of mortar joints against leakage, Efflorescence removal; Waterproofing of wet areas and roofs- Water proofing of wet areas, Water proofing of flat RCC roofs, Various water proofing systems and their characteristics; Repair of joints in buildings- Types of sealing joints with different types of sealants, Techniques for repair of joints, Repair of overhead and underground water tanks.

#### Text Book(s):

1. Gahlot P.S. and Sanjay Sharma, “Building Defects and Maintenance Management”, CBS Publishers, New Delhi
2. Nayak, BS, “Maintenance Engineering for Civil Engineers”, Khanna Publishers, Delhi
3. Ransom, WH “Building Failures - Diagnosis and Avoidance”, Publishing E and F.N. Span
4. Hutchinson, BD; et al, “Maintenance and Repair of Buildings”, Published by Newness – Butterworth

#### Reference Book(s):

1. S. N. Sinha, “RCC Design”, Tata McGraw-Hill Publishing Ltd, 2002
2. Allen R.T.L, “Repair Of Concrete Structures”, John Willey and Sons, 1987
3. “Handbook on repair and rehabilitation of RCC buildings”, published by CPWD, Government of India.
4. <http://cpwd.gov.in/Units/handbook.pdf>
5. R.Dodge Woodson, “Concrete Structures: Protection, Repair and Rehabilitation”, Elsevier Publications, 2009.
6. B. Sivagnanam – “Rehabilitation-Indian Concrete Journal”, vol.76, December 2002
7. [http://www.structural.net/Repair/repair\\_concrete.html](http://www.structural.net/Repair/repair_concrete.html)
8. [http://www.icivilengineer.com/Structural\\_Engineering/Structure\\_Maintenance/](http://www.icivilengineer.com/Structural_Engineering/Structure_Maintenance/)

# CORE ELECTIVE-V (SELECT ANY ONE) WATER RESOURCES ENGINEERING (BVBCT603A)

## OBJECTIVES AND PRE-REQUISITES:

Basic knowledge of water engineering & fluid mechanics is a necessity for better understanding of this subject. The course deals with various principles and requirements of irrigation scheme involving canals/channels carrying clear or Sediment-laden water, design of canal sections, sheet pile, cut-off walls, canal fall, distributory head regulator, cross regulator, cross drainage structures, canal head works, dams, spillways, guide bank and bank protection.

**Learning Outcomes:** Better understanding of concepts of water resources engineering. Ability to compute water requirement of crops in respect to irrigation. Clarity in the concepts of types of irrigation and related hydraulic structures and their design.

#### UNIT-I

**Introduction:** Definition, Necessity, Scope of irrigation science, benefits of irrigation, types of irrigation, multi- purpose river valley projects, soil moisture and crop water relations, consumptive use of water, ill effects of irrigation, principal Indian crop seasons and water requirements, water requirements of crops. Surface water sources and storage reservoirs: Ponds and lakes as surface sources, stream and rivers, types of reservoirs, Meaning of - capacity elevation curves of a river reservoirs, catchment yield and reservoir yield, reservoirs losses, reservoir clearance.

#### UNIT-II

**Canal Irrigation:** Introduction, types of canal, parts of canal irrigation system, assessment of water requirements, estimation of channel losses, hydraulic design of channels, meaning of regime (Kennedy's theory and Lacey's theory). Canal outlets: Introduction, types of outlets, Non-modular outlets, pipe outlets, Semi- module or flexible outlets, rigid outlets. Types of falls, cross drainage works, energy dissipation. Diversion head works.

**Well irrigation:** Introduction, Division of sub-surface water, types of aquifer, storage coefficient, advantages and disadvantages of well irrigation over canal irrigation. Introduction to Hydrology: Definition, hydrologic cycle, measurement of rainfall, rain gauges. Definitions of-peak flow, flood frequency, flood hydrograph, infiltration, unit hydrograph.

#### UNIT-III

**Regulation works:** Falls, classification of falls, distributary head regulator, cross-head regulator, escape. Cross-Drainage structures: Necessity of cross-drainage structures, their types and selection, comparative merits and demerits, aqueduct, siphon aqueduct, super passage, and level crossing.(No design only concept)

**Diversion Headworks:** Selection of site and layout, different parts of diversion headworks, types of weirs and barrages, use of silt excluders and ejectors.

#### UNIT-IV

Dams-Types of dams, suitable sites, Embankment Dams, Freeboard, Suitability of Foundation, Slope protection, Factors and General Design Criteria for Gravity Dams, Forces on gravity Dam, Causes of failure of a gravity Dam, mass concreting of dams, Stability Analysis of Gravity Dams. Main components of Spillway, Types of spillways, energy dissipaters, Cavitations, River training objectives, bank protection.

#### Text Book(s):

1. N.N. Basak, "Irrigation Engineering", Tata McGraw Hill Education Private Limited
2. G.L Asawa, "Irrigation and Water Resources Engineering", New Age Internal Publishers, New Delhi.
3. S. K. Garg, "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, Delhi

#### References Book(s):

1. Ralph A. Wurbs, Wisley P. James, "Water Resources Engineering", PHI, New Delhi.
2. R.K.Sharma and T.K.Sharma, "Irrigation Engineering".S.Chand and Company Ltd., New Delhi.
3. Satya Narayana Murty Challa, "Water Resources Engineering [Principles and Practice]", New Age Intl.
4. Ven T Chow, David R Maidment, Larry W Mays, "Applied Hydrology", McGraw-Hill, New Delhi
5. Bharat Singh, "Fundamentals of Irrigation Engineering", Nem Chand and Brothers, Roorkee

# PRE-STRESSED CONCRETE (BVBCT603B)

## OBJECTIVES AND PRE-REQUISITES:

Basic knowledge of concrete technology is a pre requisite to learn this subject. To introduce the need for pre-stressing as well as the methods, types and advantages of pre-stressing to the students. Students will be introduced to the design of pre-stressed concrete structures subjected to flexure and shear. Learning Outcomes: Clarity in the concepts of Pre stressed

concrete, better understanding of material used & systems of pre-stressing, able to perform design for flexure & design of anchor zone and analysis and design of composite beams.

#### **UNIT-I**

Basic concepts – Advantages – Materials required – Systems and methods of pre-stressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons – Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections – Losses of pre-stress – Estimation of crack width.

#### **UNIT-II**

##### **Design for Flexure and Shear:**

Basic assumptions for calculating flexural stresses – Permissible stresses in steel and concrete as per I.S.1343 Code – Design of sections of Type I and Type II post-tensioned and pre-tensioned beams – Check for strength limit based on I.S. 1343 Code – Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams – Design for shear based on I.S. 1343 Code.

#### **UNIT-III**

##### **Deflection and Design of Anchorage Zone:**

**Factors influencing deflections** – Short term deflections of uncracked members – Prediction of long term deflections due to creep and shrinkage – Check for serviceability limit state of deflection. Determination of anchorage zone stresses in post-tensioned beams by Magnel's method, Guyon's method and IS1343 code – design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams.

#### **UNIT-IV**

Analysis and design of composite beams – Methods of achieving continuity in continuous beams – Analysis for secondary moments – Concordant cable and linear transformation – Calculation of stresses – Principles of design.

##### **Text Book(s):**

1. Krishna Raju N., "Pre-stressed Concrete", 5th Edition, Tata McGraw Hill Company, New Delhi, 2012.
2. Pandit. G. S. and Gupta.S.P., "Pre-stressed Concrete", CBS Publishers and Distributors Pvt. Ltd, 2012.

##### **Reference Book(s):**

1. Rajagopalan. N., "Pre-stressed Concrete", Narosa Publishing House, 2002.
2. Dayaratnam. P., "Pre-stressed Concrete Structures", Oxford and IBH, 2013.
3. Lin T.Y. and Ned. H. Burns, "Design of Pre-stressed Concrete Structures", Third Edition, Wiley India Pvt. Ltd., New Delhi, 2013.
4. IS1343:1980, Code of Practice for Pre-stressed Concrete, Bureau of Indian Standards, New Delhi, 2012.

# **CONSTRUCTION MANAGEMENT STUDY**

## **(BVBCT604P)**

- Based on PERT and CPM a minimum of 2 case studies/ projects/ construction & other work shall be prepared.
- A report on existing project management software has to be prepared.
- Field visit to construction project should be conducted and studied in the management point of view
- Software training/workshop should be conducted (such as PRIMAVERA or MS Project)

# MATLAB/OPEN SOURCE SOFTWARE (SUCH AS R-PACKAGE) (BVBCT605P)

Students have to undergo training with emphasis on rigorous practice of computational software such as MATLAB/ SCI LAB/ R-Pack/ Any such software during Semester. Student shall be trained for utilizing this in his/her project works. Importance must be given in organizing workshops during the session by various organizations. Practice sessions shall be designed by the respective faculty per requirements. Students are instructed to prepare algorithms/ procedures/ programs pertaining to various Construction/ Civil engineering problems. More experiments may be designed by the respective institutes as per their choice.

# INDUSTRIAL TRAINING-V (BVBCT606P) MAJOR PROJECT (BVBCT607P)

## OBJECTIVES:

**The main aim of the major project shall be to:**

- Develop understanding regarding the size and scale of operations and nature of field work in which students are going to play their role after completing the courses of study.
- Develop understanding of subject based knowledge given in the class room in the context of its application at work places.
- Develop first-hand experience and confidence amongst the students to enable them to use and apply polytechnic/ institute based knowledge and skills to solve practical problems in the world of work.
- Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values. This should be considered as ritual for the fulfilment of above objectives.

This should be considered as sacred ritual for the fulfilment of above objectives. Institutes have to establish close linkage with relevant organizations for providing such an experience with the use of its training placement division. Projects selected should not be too complex which is beyond the level of the students. The placement of the students for such a practical cum project work should match with the competency profile of students and the project work assigned to them.

Students may choose a project based on any subject of Construction /Civil Engineering. The students will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format.

The project work may be based on development of designs, site/ field work, Programming/ CAD based, case studies, market survey based on topics of Construction/ Civil engineering interest etc. It will be a group project.





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