Study Scheme & Syllabus of

B.Voc.

(Building Construction and Technology)

(1st-4th semester)

Batch 2020 onwards

By

Board of Study CIVIL AND ENVIRONMENTAL SCIENCE

Department of Academics

IKG Punjab Technical University

Study Scheme for B Voc. (Building Construction and Technology)

Bridge courses for candidates with NSQF certification in other trades or NSQF non-certified candidates: Category-2 and 3

Level-4

S. No.	Course Code	Course Title	Marks			Credits		
			Int	Ext	Total	Th.	Pra.	Total
1	BVBG001	Building Construction and Technology	100	---	100	4	2	6
2	BVBG002	Bridge Workshop	100	---	100	0	6	6
3	BVBG003	Information Technology Workshop	100	---	100	2	4	6
4	BVBG004	Basic Engineering Drawing	100	---	100	2	4	6
5	BVBG005	Engineering Drawing with AutoCAD	100	---	100	2	4	6
			500	**---**	**500**	**10**	**20**	**30**

- The students are advised to complete the bridge course along with regular course(s). The credits earned are of qualifying nature and should be completed for obtaining Diploma/Advanced Diploma / B.Voc. Degree, as a pre-requisite. The evaluation of bridge course will be done at institute level (internal) only. After completion of the bridge courses NSQF LEVEL-4 certification may be done through the respective agencies/sector skill council involved.
- Category-2 students to take Level-4 course on Building construction and technology, and Engineering Drawing with Autocad which they have not studied during their vocational course.
- Category-3 students to take all the courses for completing the requirements of level- 4 certification.

Study Scheme for B Voc. (Building Construction and Technology)

Regular courses for all categories of candidates

Semester- 1 / Level-5

S. No.	Course Code	Course Title	Hours per week			Marks			Credits
			L	T	P	Int	Ext	Total	
1	BVBCT-101-20	Applied Physics	3	0	0	**40**	60	100	3
2	BVBCT-102-20	Applied Mathematics	3	0	0	**40**	60	100	3
3	BVBCT-103-20	Applied Chemistry	3	0	0	**40**	60	100	3
4	BVBCT-104-20	Communication Skills	3	0	0	**40**	60	100	3
5	BVBCT-105-20	Applied Physics Lab	0	0	3	**60**	40	100	1.5
6	BVBCT-106-20	Applied Chemistry Lab	0	0	3	**60**	40	100	1.5
7	BVBCT-107-20	Communication Lab	0	0	3	**60**	40	100	1.5
8	BVBCT-108-20	Civil Workshop Training	0	0	3	**60**	40	100	1.5
9	BVBCT-109-20	On Site Training*	180 hrs			--	200	200	12
			12	**0**	**12**	**420**	**680**	**1000**	**30**

*The students are advised to undergo 180 hrs training in house/ industry/ Skill Knowledge Provider (SKP)/ Sector Skill Council (SSC) during the progress of the semester on week-ends or winter Vacation and submit a training report on completion of training.

B.Voc . Building Construction and Technology

Semester- 2 / Level-5

S. No.	Course Code	Course Title	Hours per week			Marks			Credits
			L	T	P	Int	Ext	Total	
1	BVBCT-201-20	Building Planning and design	3	0	0	**40**	60	100	3
2	BVBCT-202-20	Estimating & Costing	3	0	0	**40**	60	100	3
3	BVBCT-203-20	Construction materials and Technology	3	0	0	**40**	60	100	3
4	BVBCT-204-20	Construction planning, machines and equipment	3	0	0	**40**	60	100	3
5	BVBCT-205-20	Building drawing Lab.	0	0	4	**60**	40	100	2
6	BVBCT-206-20	Estimating and costing Lab.	0	0	4	**60**	40	100	2
7	BVBCT-207-20	Construction materials Lab.	0	0	4	**60**	40	100	2
8	BVBCT-208-20	Sector skill training*	6 weeks			---	200	200	12
			12	**0**	**12**	**340**	**560**	**900**	**30**

*Students will undergo 6 weeks training at Industry/Skill Knowledge Provider (SKP)/ Sector Skill Council (SSC) pertaining to any one Level-4/5 Quality Packs (QP) prescribed by Construction skill development council of India (CSDC) and submit a training report on completion of training.

B.Voc . Building Construction and Technology

Semester- 3

S. No.	Course Code	Course Title	Hours per week			Marks			Credits
			L	T	P	Int	Ext	Total	
1	BVBCT-301-20	Applied Mechanics	3	0	0	**40**	60	100	3
2	BVBCT-302-20	Surveying-I	3	0	0	**40**	60	100	3
3	BVBCT-303-20	Building Construction	3	0	0	**40**	60	100	3
4	BVBCT-304-20	Human Values and Professional Ethics	3	0	0	**40**	60	100	3
5	BVBCT-305-20	Applied Mechanics Lab	0	0	4	**60**	40	100	2
6	BVBCT-306-20	Surveying-I Lab	0	0	4	**60**	40	100	2
7	BVBCT-307-20	Building Construction Drawing	0	0	4	**60**	40	100	2
8	BVBCT-308-20	On Site Training*	180 hrs			--	200	200	12
			12	**0**	**12**	**340**	**560**	**900**	**30**

*The students are advised to undergo 180 hrs training in house/ industry/ Skill Knowledge Provider (SKP)/ Sector Skill Council (SSC) during the progress of the semester on week-ends or winter Vacation and submit a training report on completion of training.

Semester- 4

S. No.	Course Code	Course Title	Hours per week			Marks			Credits
			L	T	P	Int	Ext	Total	
1	BVBCT-401-20	Water Supply & Waste Water Engineering	3	0	0	**40**	60	100	3
2	BVBCT-402-20	Surveying-II	3	0	0	**40**	60	100	3
3	BVBCT-403-20	Strength of Material	3	0	0	**40**	60	100	3
4	BVBCT-404-20	Soil Mechanics	3	0	0	**40**	60	100	3
5	BVBCT-405-20	Survey-II Lab	0	0	4	**60**	40	100	2
6	BVBCT-406-20	Strength of Material Lab	0	0	4	**60**	40	100	2
7	BVBCT-407-20	Water Supply & Waste Water Engineering Drawing Lab	0	0	4	**60**	40	100	2
8	BVBCT-408-20	Sector skill Training*	6 weeks			--	200	200	12
			12	**0**	**12**	**340**	**560**	**900**	**30**

*Students will undergo 6 weeks training at Industry/Skill Knowledge Provider (SKP)/ Sector Skill Council (SSC) pertaining to any Quality Packs (QP) prescribed by Construction skill development council of India (CSDC) and submit a training report on completion of training.

Bridge courses - Level-4 (Semester-I)

(BVBG001) Building Construction and Technology

Theory

UNIT 1. Building Construction: Site Selection for construction, various components of a building (sub structure and super structure with elaboration of technical terms). Foundations: Need and function of foundation, different types of foundations and their uses. Masonry: General principles of bricks masonry, types of bonds. Floors: Types of flooring and their uses. Stairs: Need and types of stairs. Doors and Windows, Purpose of each and their classification.

UNIT 2. Concrete Technology: Definition of concrete, different types of concrete and their uses, Ingredients of Concrete. Preparation of concrete: Batching, Mixing, Transportation, Placement, Compaction, Curing, Finishing. Properties of Concrete: Properties in plastic stage: workability, segregation, bleeding. Properties of hardened concrete: strength, durability. Introduction to standard concrete mixes.

UNIT 3. Formwork, Scaffolding and Steel Fixing: Introduction and purpose of formwork. Timber joints, cutting and drilling of plywood. Shuttering for beam, column and slab floor. Codal provisions on formwork. Introduction and purpose of scaffolding, Component parts, Types of scaffolding. Types of ties and their uses. Making and placing reinforcement for slab & foundation. Codal provision on steel fixing.

UNIT 4. Services & Utilities: Introduction to plumbing, plumbing tools and their uses. Water distribution system, material for service pipes, service connection, valves. Aim and principles of house drainage, Pipes and traps. Sanitary fittings. House wiring: Types of wires used, tools used for house wiring, Circuit diagram for tube light, bulb, fan and switches & sockets. Fire protection: Fire hazards, characteristics of fire resisting materials, general fire safety requirements for buildings, fire alarms, fire extinguishing equipment.

UNIT 5. Construction Work Supervision: Roles and responsibilities of construction work supervisor. Record keeping: Muster roll, measurement book, quantities estimation, register for material receipt and issue, logbook for construction equipment. Site Registers: site diary, site order book, inspection register, cement register, steel register, register for approval of other materials, material requisition and issue records. Register for scrap material, POL records, register for construction equipment. Check list (Dos and Dont's) for construction work supervision.

Practical

1. Laying of bricks in different layer using English bond.
2. Laying of bricks in different layer using Flemish bond.
3. To determine workability of concrete by slump test.
4. Test for compressive strength of concrete cubes.
5. To make T-joint and dove tail joint in timber.

6. Cutting of plywood in different patterns.
7. Drilling in plywood.
8. T- joint in service pipes.
9. Wiring from MCB to switch board having a three pin socket, switches for fan and tube light.
10. Making entries in the measurement book for small piece of construction work.

Reference Books:

1. Building Construction by Sushil Kumar, Standard Publisher and Distributors.
2. Building Construction by B.C.Punima, Laxmi Publisher House
3. A Text Book of Building Construction by Sharma and Kaul
4. Masonry & timber structures including earthquake resistant design, A S Arya, Nem Chand & Bros.
5. Concrete Technology, by M.L. Gambhir, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
6. Indian Practical Civil Engg. Handbook, P N Khanna, Engineers Publishers, 2000.
7. National Building Code, B. I. S.
8. Handbook of Building Construction, M M Goel, Amrindia Consultancy.

(BVBG002) Bridge Workshop

Practical

UNIT 1 FITTING SHOP

1. Demonstration, function and use of commonly used tools.
2. Care, maintenance of tools and safety measures to be observed in fitting shop.
3. Introduction to common materials used in fitting shop
4. Identification of materials. Such as Steel, Brass, Copper, Aluminium etc.
5. Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z- Section, etc.
6. Demonstration of various types of work benches, holding devices.

UNIT 2 WELDING SHOP

1. Demonstration, function and use of commonly used tools.
2. Care, maintenance of tools and safety measures to be observed in welding shop.
3. Introduction to welding and its importance in engineering practice
4. Introduction to welding equipment and safety precautions during hazards of welding and its remedies.
5. Practice in setting current and voltage for striking proper arc. Earthing of welding machine.

UNIT 3 SHEET METAL SHOP

1. Demonstration, function and use of commonly used tools.
2. Care, maintenance of tools and safety measures to be observed in sheet metal shop.
3. Demonstration of various machines and equipment used in sheet metal shop.
4. Demonstration of various raw materials used in sheet metal.

UNIT 4 SMITHY SHOP

1. Demonstration, function and use of commonly used tools.
2. Care, maintenance of tools and safety measures to be observed in smithy shop.
3. Forging operations in smithy shop. Safety measures to be observed in the smithy shop.
4. Demonstration and description of bending operation, upsetting operation.
5. Description and specification of anvils, swage blocks, hammers etc.
6. Demonstration and description of tongs, fullers, swages etc.

References Books:

1 Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary; Media Promoters and Publishers Pvt. Ltd., Bombay

2 Workshop Technology by Manchanda Vol. I,II,III; India Publishing House, Jalandhar.

3 Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi

4 Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi [R5] Workshop Technology by B.S. Raghuwansh;,Dhanpat Rai and Co., New Delhi.

5 Workshop Technology by HS Bawa; Tata McGraw Hill Publishers, New Delhi.

B.Voc . Building Construction and Technology

(BVBG003) Information Technology Workshop

Theory & Practical

Note: Explanation of Introductory part and theory should be merged with practical work. Following topics may be explained in the laboratory along with the practical exercises.

UNIT 1. Computer Organization & OS: User perspective.

- Concept and scope, applications of IT, ethics and future with information technology
- Impact of computer and IT in society
- Understanding of Hardware.
- Basics of Operating System.

UNIT 2. Networking and Internet.

- Practice of Internet surfing and its Applications
- Log-in to internet, introduction to search engine
- Browsing and down loading of information from internet
- Creating e-Mail Account, Log in to e-mail account and Log out from e-mail account
- Managing e-Mail- Creating, Sending, receiving, forwarding, deleting, attaching a file
- Network Security tools and services.
- Cyber Security.
- Safe practices on Social networking.

UNIT 3. Office automation tools:

- Spreadsheet.
- Word processing.
- Presentation.

UNIT 4. Antivirus

- Antivirus- installation & scanning of corrupted files
- What is virus and its types
- Problems due to virus
- Installation and updation of antivirus (anyone out of Kaspersky,
- Mcafee, Norton, Quickheal etc).
- How to scan and remove the virus

UNIT 5. Introduction to programming

- Introduction to programming- "C/C++
- Development of C, starting with C- alphabets, digits, special symbols
- Constants, variables and special symbols, Instructions
- Study of C- pre-processor features

  Study of structures- case control structures, loops control structures and decision control structures
- Study of input output functions, types of functions
- Study of file concept- opening, reading, closing, writing etc
- Study and use of concept of pointers
- Study the concept of arrays

References Books:

1. Fundamentals of Computer by E. Balagurusamy, Tata McGraw Hill Education Pvt. Ltd, New Delhi
2. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
3. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
4. MS Office by BPB Publications, New Delhi
5. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
6. C by Byron Gottfried, Schaum's outline series, McGraw Hill Education series.
7. Programming in ANSI C by E. Balaguswamy, McGraw Hill Education series

(BVBG004) Basic Engineering Drawing

Theory & Practical

Note: Explanation of Introductory part and theory should be merged with practical work. Following topics may be explained in the laboratory along with the practical exercises.

UNIT 1: Introduction to Engineering Drawing

Principles of Engineering Drawing and their significance, usage of Drawing instruments, Sizes and layout of standard drawing sheets, Sizes of drawing boards, drafting table/board, Different types of Lines and Free Hand Sketching, Different types of lines in engineering drawing as per BIS specifications, Lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

UNIT 2: Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

UNIT 3: Projections of Regular Solids

those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

UNIT 4: Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only).

UNIT 5: Isometric Projections

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

References Books:

1. ND Bhatt, V.M. Panchal, Engineering Drawing-Planes & Solid Geometry", Charotar publishing house Principles of Building Drawing by MG Shah and CM Kale, MacMillan, Delhi
2. Zaidi, SKA and Siddiqui, Suhail; "Drawing and Design of Residential and Commercial Buildings", Standard Publishers and Distributors, Delhi.
3. Surjit Singh, "Engineering Drawing: A Text Book of Engineering Drawing, Dhanpat Rai & Co.

(BVBG005) Engineering Drawing with AutoCAD

Theory and Practical

Note: Explanation of Introductory part and theory should be merged with practical work. Following topics may be explained in the laboratory along with the practical exercises.

UNIT 1: Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids.

UNIT 2: Customisation & CAD Drawing

Set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles.

UNIT 3: Annotations & layering

Applying dimensions to objects, applying annotations to drawings; Setting up and use of layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation,

UNIT 4: Computer-aided design (CAD) software modeling

Modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;

UNIT 5: Demonstration of a simple team design project that illustrates

Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling.

References:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

5. (Corresponding set of) CAD Software Theory and User Manuals.

Level-5 (Semester-I)

(BVBCT-101-20) Applied Physics

Theory

UNIT 1 Units & Dimensions:

M.K.S. fundamentals & derived units, S.I. base units supplementary units and derived units, Dimensions of various physical quantities, uses of dimensional analysis.

Surface Tension and Viscosity: molecular forces, molecular theory of surface tension, surface energy, capillary action, concept of viscosity, coefficient of viscosity, principle and construction of viscometers.

UNIT 2 Vibrations:

Vibration as simple spring mass system, elementary and qualitative concept of free and forced vibrations, resonance. Effects of vibrations on building bridges and machines members.

Heat: Temperature and its measurement, thermoelectric, platinum resistance thermometers and pyrometers. Conduction through compound media and laws of radiations.

UNIT 3 Optics:
Nature of light, reflection and refraction of a wave from a plane surface. Overhead projector and Epidiascope.

UNIT 4 Centroid and Moment of Inertia:

Centroid for regular lamina, centriod of composite figures. Concept of Moment of Inertia and second moment of area and Radius of gyration, theorems of parallel axes, second moment of area of common geometrical sections: rectangle, triangle, circle (without derivations). Second moment of area for I., T. and I sections,

UNIT 5 Friction:

Types of friction, Laws of static friction, Limiting friction, Angle of friction, angle of repose; motion on horizontal and inclined planes. Methods of reducing friction,

Text and Reference Books :

1. A text book of Optics – Brij Lal and Subramanyam
2. Perspectives of Modern Physics - Arthur Beiser (TMH)
3. Modern Engineering Physics – A.S. Vasudeva (S. Chand)
4. Engineering Physics by R.K. Gaur and S.L. Gupta
5. Engineering Physics by H.K Malik and A.K. Singh (Tata McGraw Hill).
7. Engineering Physics by S.P. Taneja (Chand Pub.)
8. Introduction to Mechanics - MK Verma, CRC Press Book.

(BVBCT-102-20) Applied Mathematics

Theory

UNIT 1 Algebra:

Complex Numbers, Quadratic Equations and Linear inequalities, Principle of Mathematical Induction, Permutations and Combinations, Binomial Theorem.
Matrices, Determinants, Inverse and rank of a matrix, introduction of null space and kernel, statement of rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Similar matrices; Diagonalization of matrices; Cayley-Hamilton Theorem.

UNIT 2 Calculus:
Limits and Continuity, Differentiation, Differentiation of Trigonometric functions, Differentiation of Exponential and Logarithmic functions, Application of Derivatives, Partial Differentiation & its Applications: Functions of two or more variables; partial derivatives, Euler's theorem, Taylor's series for functions of two variables, maxima-minima of function of two variables.

Integration, Definite Integrals, Differential Equations, Evaluation of definite and Improper integrals; Applications of Single & Multiple Integration: Applications of single integration to find volume of solids and surface area of solids of revolution. Double integral, change of order of integration, Double integral in polar coordinates, Applications of double integral to find area enclosed by plane curves and volume of solids of revolution.

UNIT 3 Partial Differential Equations: First order:
First order partial differential equations, solutions of first order linear and non-linear PDEs. Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method.

UNIT 4 Co-ordinate Geometry

Cartesian System of Rectangular Co-ordinates, Straight Lines, Circles, Conic Sections

UNIT 5 Statistics and Probability
Measures of Dispersion, Random Experiments and Events, Probability

Text and Reference Books:

1. Advanced Engineering Mathematics : F. Kreyszig.
2. Higher Engineering Mathematics : B.S. Grewal.
3. Engineering Mathematics Part-I : S.S. Sastry.
4. Differential and Integral Calculus : Piskunov.
5. Advanced Engineering Mathematics : R.K. Jain and S.R.K.Iyengar
6. Advanced Engg. Mathematics : Michael D. Greenberg

(BVBCT-103-20) Applied Chemistry

Theory:

UNIT 1 Structure of Atom:

Rutherford model of the structure of atom, Bohr's theory of electrons, quantum numbers and their significance, de-Broglie equation and uncertainty principle, electronic configuration of 1 to 30 elements

Periodic Properties of Elements:

Periodic law, periodic table, periodicity in properties like atomic radii and volume, ionic radii, ionization energy and electron affinity, Division of elements into s, p, d and f blocks

UNIT 2 Chemical Bonds:

Electrovalent, covalent and coordinate bond and their properties, Metallic bonding (electron cloud mode) and properties (like texture, conductance, luster, ductility and malleability).

UNIT 3 Fuel and their Classification:

Definition, characteristics, classification into solid, liquid and gaseous fuel,. Petroleum and brief idea of refining into various factions and their characteristics and uses, Calorific value of fuel, Gaseous fuels-preparation, properties, composition and use of producer gas, water and oil gas, Natural gas: Natural gas treatment processes; Natural gas liquids; Properties of natural gas.

Unit 4 Water and Corrosion:

Impurities in water, methods of their removal, hardness of water, its types, causes and removal, disadvantages of hard water in boilers, pH value and its determination by calorimetric method. alkalinity of water and its determination, water softening.

Corrosion: Its meaning, theory of corrosion, prevention of corrosion by various methods using metallic and non-metallic coatings.

UNIT 5 Plastic and Polymers:

Plastic-thermo-plastic and thermo-setting, Introduction of Polythene. P.V.C. Nylon, synthetic rubber and phenol-formal-dehyde resin, their application in industry. composite materials & their classification, constituents of composites, role of interface in composite performance and durability, fiber –Reinforced composite, advantage and applications of composites

Text and Reference Books:

1. Physical Chemistry, P.W. Atkins (ELBS, Oxford Press).
2. Physical Chemistry, W.J. Moore (Orient-Longman).
3. Instrumental methods of Chemical Analysis, MERITT & WILLARD (East-West Press).
4. Chemistry in Engineering & Tech., Vol.I& II, Rajaram, Kuriacose (TMH)
5. Engineering Chemistry, Shashi Chawla (DhanpatRai and co.)

6. Engineering Chemistry, P.C. Jain, Monica Jain (DhanpatRai& Co.).
7. Engineering chemistry , S.S Dara (S.chand&co.)
8. Sami Matar, Lewis F. Hatch, Chemistry of Petrochemical Processes, Second Edition, Gulf Publishing Company, Houston, Texas

(BVBCT-104-20) Communication Skills

Theory

UNIT 1

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 2

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

UNIT 3 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 4

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

UNIT 5

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 and reference Books:

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

(BVBCT-105-20) Applied Physics Lab

1. To determine the surface tension of a liquid by rise in capillary.
2. To determine the viscosity of a given liquid.
3. To determine the frequency of tuning fork using a sonometer.
4. To determine the frequency of AC main using sonometer.
5. To determine the time period of a cantilever.
6. To find the coefficient of thermal conductivity of a good conductor by Searle's method.
7. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton method.
8. To find the resolving power of a telescope.
9. To find the refractive index and Cauchy's constants of a prism by using spectrometer.
10. To find the wavelength of various colours of white light with the help of a plane transmission diffraction grating.

(BVBCT-106-20) Applied Chemistry Lab

1. Proximate analysis of solid fuel.
2. Experiments based on Bomb Calorimeter.
3. Determination of turbidity in a given sample.
4. To determine the flash and fire point of a given lubricating oil.
5. To determine the viscosity of a given lubricating oil by Redwood viscometer.
6. To determine cloud and pour point of a given oil.
7. Determination of Ca++ and Mg++ hardness of water sample using EDTA solution.
8. Determination of alkalinity of water sample.
9. Determination of strength of HCl solution by titrating it against NaOH solution conductometrically.
10. To determine amount of sodium and potassium in a given water sample byflame photometer

(BVBCT-107-20) Communication Lab

Listening and Speaking
The audio CD shall be played in the lab to get the students familiar with the standard spoken English. The teacher shall help them in the following:
a) With the accent of the speaker if it is unfamiliar to them.
b) The Standard English sounds and pronunciation of words.
c) With the topical vocabulary and the idiomatic expressions which are generally part of colloquial speech.
d) With the implied relationships in larger texts, if they are not stated explicitly.

In addition to the above, extended listening sessions shall be arranged to promote speaking activities among students. The teachers shall play the CDs selectively in the lab and involve the students in the practice work based on them. While taking up lessons, the teacher must promote the use of dictionaries for correct pronunciation and give ample practice on word stress and weak forms.

The students are also supposed to supplement their listening practice by regularly viewing news/knowledge channels on the TV or lecture videos on the internet.

The teacher may use following different classroom techniques to give practice and monitor the progress of the students:
Role play, question-answer discussion, presentation of papers, seminars, Telephonic Conversation, Exchange of Greetings, Interview, Group Discussion, Extempore, Listening Practice Skills

Tools: A set of twin books K. Sadanand and S. Punitha Spoken English Part I and II, A Foundation Course (with audio CD), Orient Blackswan, is prescribed for use.

(BVBCT-108-20) Civil Workshop training

Practical

MASONRY SHOP

1. Demonstration, function and use of commonly used tools.
2. Care, maintenance of tools and safety measures to be observed in Plumbing shop.
3. Preparation of mortar and cement concrete
4. Importance of form work and material used in form work
5. Slab, lintel & sunshade, column & footing and beam reinforcement
6. Differentiate and demonstrate steel reinforcement bars of different diameters (plain bar, ribbed, tor steel etc.)

PLUMBING & SANITATION

1. Demonstration, function and use of commonly used tools. Necessity of plumbing, Technical terms used
2. Care, maintenance of tools and safety measures to be observed in Plumbing shop.
3. GI pipe marking, threading, cutting and jointing
4. PVC pipe marking, cutting, threading and jointing
5. Use of PPR and their jointing
6. Building services, types of valves and uses
7. Water meter connection, water closets, flush tanks
8. Field visit

CARPENTRY SHOP

1. Demonstration, function and use of commonly used hand tools.
2. Care, maintenance of tools and safety measures to be observed in carpentry shop.
3. Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Mango, Sheesham, etc. (Demonstration and their identification).
4. Marking, sawing, planning and chiseling & their practice (size should be mentioned)
5. Introduction to various types of wooden joints, their relative advantages and uses.

PAINTING SHOP

1. Demonstration, function and use of commonly used tools.
2. Care, maintenance of tools and safety measures to be observed in painting shop.
3. Demonstration of various types of paints used
4. Methods of painting walls, wooden items
5. Preparation of walls, wooden surface before painting including primer coating.

ELECTRICAL SHOP

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

References Books:

1. Workshop Technology I, II,III, by S K Hajra, Choudhary and A K Chaoudhary; Media Promoters and Publishers Pvt. Ltd., Bombay
2. Workshop Technology by Manchanda Vol. I, II, III; India Publishing House, Jalandhar.
3. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi
4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
5. Workshop Technology by B.S. Raghuwansh;,Dhanpat Rai and Co., New Delhi
6. Workshop Technology by HS Bawa; Tata McGraw Hill Publishers, New Delhi

Level-5 (Semester-II)

(BVBCT-201-20) Building Planning and Design

Theory

UNIT 1

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 2

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. Introduction to Building Drawing and Brief History of Building Drawing, planning of residential buildings and public buildings.

UNIT 3

Functional Planning of Buildings: Strategies for the basic planning, for various functions of various types of buildings such as Residential Buildings, Commercial Buildings, Institutional Buildings and Hospital Buildings.

UNIT 4

Spatial planning of buildings: Allocation of spaces for various functions, planning for location of doors and windows in the building, Design of window for natural day-light consideration, window-wall ratio, surface-volume ratio.

UNIT 5

Drawing & Detailing of Residential Buildings: Drawing of Layout Plans, Elevations and Sections of single storeyed and double storeyed Residential Buildings.

Text and Reference Books

1. Moore F., Environmental Control System McGraw Hill, Inc., 1994.
2. Brown, G Z, Sun, Wind and Light: Architectural design strategies, John Wiley, 1985.
3. Cook, J, Award - Winning passive Solar Design, McGraw Hill, 1984.

4. Kumara swamy and Kameswara Rao, Building Panning and Drawing, Charotar Publishing House Pvt. Ltd.
5. Dr. H. J. Shah, Building Panning and Drawing, Charotar Publishing House Pvt. Ltd.
6. Malik, R. S., "Civil Engineering Drawing", Asia Publishing House
7. Shah, M. G. and Kale, C. M., "Principles of Building Drawing", MacMillan, Delhi

(BVBCT-202-20) Estimating and costing

Theory

UNIT 1

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. 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 2

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

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

(ii). 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.

(iii). Analysis of Rates- Steps involved in the analysis of rates. Requirement of material, labour, sundries, contractor's profit and overheads.

(iv). Running and maintenance cost of construction equipment.

UNIT 3

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; 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 4

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 5

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 and Reference Books:

1 B. N. Dutta- Estimating and costing in Civil Engg, UPSPD.
2 M .Chakraborty, "Estimating costing and Specifications in Civil Engg", Jain Book Depot
3 D.S.R. [Detailed Schedule Rates] C.P.W.D
4 PWD Account Code
5 Samuelson and Nardhaus-Economics, Mc Graw Hill
6 'Text book of Estimating and Costing' by G.S.Birdie
7 'Civil Engineering Building Drawing' by Gurucharan Singh

(BVBCT-203-20) Construction Materials and Technology

Theory

UNIT 1

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 2

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 3

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.

Steel: Manufacture of steel, market forms of steel e.g. mild steel and HYSD steel bars, rolled steel sections.

UNIT 4

Concrete: constituents of concrete, important properties of concrete both in plastic state and hardened state, brief idea about- various stages of preparation of concrete, workability of concrete and Methods to determine workability, Reinforced cement concrete, shotcrete, lightweight & heavyweight concrete, Ready- mixed concrete, fibre reinforced concrete and pre-stressed concrete.

UNIT 5

Miscellaneous Materials: Paints- Purpose, Types, ingredients, properties and uses of oil paints, water paints and Cement paints. Varnishes- 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, sound and heat insulating materials,

Materials used in interior decoration works like POP, Water proofing compounds, fire resisting materials.

Text and reference Book(s):

1. Surendra Singh; “Engineering Materials; “New Delhi”. Vikas Publishing House Pvt. Ltd.
2. TTTI, Chandigarh “Civil Engineering Materials; “Tata McGraw Hill.
3. M.L.Gambhir and Neha Jamwal, “Building Materials”, Tata McGraw Hill.
4. Building Materials, P.C.Varghese, PHI Publications
5. Engineering materials S.C. Rangwala, Charotar Publishing House
6. Building Materials, Duggal, New Age Publication
7. Kulkarni, GJ; “Engineering Materials; “Ahmedabad, Ahmedabad Book Depot.
8. Gambhir, M. L., “Concrete Technology” MacMillan India Ltd., New Delhi

(BVBCT-204-20) Construction Planning, Machines and Equipments

UNIT 1.
Introduction: Need for project planning & management, time, activity & event, bar chart, Milestone chart, uses & draw backs.

UNIT 2.
PERT :Construction of PERT network, time estimates, network analysis, forward pass & backward pass, slack, critical path, data reduction, suitability of PERT for research project, numerical problems.

UNIT 3.
CPM :Definitions, network construction, critical path, fundamental rules, determination of project schedule, activity time estimates, float types, their significance in project control, numerical problems.

UNIT 4.
Cost Analysis and contract :Type of costs, cost time relationships, cost slopes, conducting a crash programme, determining the minimum total cost of project, numerical problems, updating a project, when to update, time grid diagram, resource scheduling.

UNIT 5.
Construction Machinery and Equipment :Tractors, bull dozers, rippers, scrappers, power shovels, dragline, hoes. Line diagram of each, sizes, output, uses, factors affecting selection of each equipment.
Hoisting & Transporting Equipments: Hosts, Winches, Cranes, Belt conveyors, Ropeways, trucks & Wagons.
Other Equipments: Plants for grading, batching, mixing, types of mixers, concrete pumps, bitumen plants.

Reference Books:
1. Construction Planning and Equipment - R.L.Peurifoy - Tata McGraw Hill, New Delhi
2. PERT and CPM - L.S.Srinath, East West Press
3. Management Guide to PERT & CPM - Wiest & levy; Prentice Hall
4. Construction Equipment & Planning and Application. - Mahesh Verma Artec Publication.
5. Construction Planning and Management by U. K. Shrivastava; Galgotia Publications Pvt. Ltd.

(BVBCT-205-20) Building Drawing Lab.

1. Sectional views:
a. cutting planes methods of representing sections
b. conventional sections of various material
c. classification of sections
d. conventions in sectioning
2. Drawing of full section, half section, partial or broken out section, offset sections, revolved sections & removed sections. Exercise on sectional views of different objects.
3. Drawing of different conventions for materials in sections. Conventional breaks for shafts, pipes: Rectangular /square/circular, angle, channel and Rolled sections.
4. Symbols, Conventions and simple drawing of sanitary fitting symbols
5. Draw the Electrical fittings Symbols for domestic interior installations
6. Building plan drawing with Electrical and Civil Engineering symbols.
7. Drawing of Layout Plans,
8. Drawing of Elevations of single storeyed and double storeyed Residential Buildings
9.Drawing of Sections single storeyed and double storeyed Residential Buildings
10.Isometric drawing of Residential buildings.

Note: Students should be encouraged to use drawing and drafting software like AutoCAD, FreeCAD, etc

(BVBCT-206-20) Estimating and Costing Lab

List of Activities:

A. Detailed estimate for building taking of quantities for all items of works in the following types of building:

1) A small residential building with two / three rooms with RCC roofs.
2) Two storied building (frame structure) with RCC roofs.
3) Cottages with sloped RCC roofs.
4) Industrial buildings with AC / GI sheet roof with steel trusses.
5) Community hall with columns and T-Beams.
6) Open well with masonry steining.
7) Septic tanks with dispersion trench / soak pit.
8) R.C.C. slab culvert.
9) Water bound Macadam Road

B. Rate analysis for following item of works.

1. Brick work for super structures.
2. PCC work for footing.
3. RCC work for beam, Column and slabs.
4. Plaster work
5. White/ Color washing

C. Taking out quantities for embankment and canals

(BVBCT-207-20) Construction Materials Lab.

1. Students will do the market survey of below mentioned construction materials and products and prepare a report on types, rates, use, measurement and other specifications, etc.
    - Bricks. Hollow blocks, etc., Tiles- Flooring tiles and clay roofing tiles, Terra Cotta-earthen ware, stone ware, S.W. pipes, water closets gully traps & glazed earthen tiles.
    - Cement - ordinary Portland, quick setting cement & other special cement, Lime: Hydraulic lime, & limes.
    - Stones - Coarse aggregate and fine aggregate, Brick ballast & surkhi, marble, granite, etc
    - Marketable forms of various types timber available in market, Various preservatives of timber available in market, Timber allied products such as plywood, hard board, block board, and sunmica.
    - Hardware - such as screws, nails, bolts & nuts, hinges for door fitting, door closer and stoppers.
    - Sound insulating material available in the local Market, Fire proofing materials available in the local market, Dam proofing materials available in the local market, use of damp proofing chemical.
2. Brick – Stacking of bricks, counting of bricks
3. Field tests of bricks such as for texture, dimensions, water absorption, colour & efflorescence, etc
4. Field tests of cement - texture, touch and feel, colour, etc.
5. Field tests of steel - unit weight, dimensions, visual inspection, etc
6. Field visits for demonstration of application or use of construction materials.

SEMESTER 3rd

(BVBCT-301-20) Applied Mechanics

1. Introduction

Concept of engineering mechanics definition of mechanics, statics, dynamics, application of engineering mechanics in practical fields. Definition of Applied Mechanics. Definition, basic quantities and derived quantities of basic units and derived units .Different systems of units (FPS, CGS, MKS and SI) and their conversion from one to another for density, force, pressure, work, power, velocity, acceleration .Concept of rigid body, scalar and vector quantities

2. Laws of forces

Definition of force, measurement of force in SI units, its representation, types of force: Point force/concentrated force & Uniformly distributed force, effects of force, characteristics of a force .Different force systems (coplanar and non-coplanar), principle of transmissibility of forces, law of super-position .Composition and resolution of coplanar concurrent forces, resultant force, method of composition of forces, laws of forces, triangle law of forces, polygon law of forces - graphically, analytically, resolution of forces, resolving a force into two rectangular components .Free body diagram .Equilibrant force and its determination . Lami's theorem (concept only) [Simple problems on above topics]

3. Moment

Concept of moment .Moment of a force and units of moment .Varignon's theorem (definition only) . Principle of moment and its applications (Levers – simple and compound, steel yard, safety valve, reaction at support) . Parallel forces (like and unlike parallel force), calculating their resultant . Concept of couple, its properties and effects .General conditions of equilibrium of bodies under coplanar forces .Position of resultant force by moment [Simple problems on the above topics]

4. Friction

. Definition and concept of friction, types of friction, force of friction . Laws of static friction, coefficient of friction, angle of friction, angle of repose, cone of friction . Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane. Calculation of least force required to maintain equilibrium of a body on a rough inclined plane subjected to a force: a) Acting along the inclined plane Horizontally b) At some angle with the inclined plane

5. Centre of Gravity

Concept, definition of centroid of plain figures and centre of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, centroid of bodies with removed portion . Determination of center of gravity of solid bodies - cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed [Simple problems on the above topics]

References

(i)Engineering Mechanics (In SI Units) (SIE) by S. Timoshenko,D.H. Young,J.V. Rao,Sukumar Pati, McGraw Hill Education

(ii)A Textbook of Engineering Mechanics by Khurmi R.S.,Khurmi N.,S Chand publisher
(iii) Engineering Mechanics by S.S. Bhavikatti,New Age Publishers publisher

(BVBCT-302-20)SURVEYING - I

1. Introduction:

Basic principles of surveying , Concept and purpose of surveying, measurements-linear and angular, units of measurements , Instruments used for taking these measurements, classification based on surveying instruments :Introduction, advantages and disadvantages , Direct and indirect ranging offsets and recording of field notes

2. Compass surveying:

Purpose of compass surveying. Use of prismatic compass: Setting and taking observations, Concept of following with simple numerical problems: a) Meridian - Magnetic and true b) Bearing - Magnetic, True and Arbitrary c) Whole circle bearing and reduced bearing d) Fore and back bearing e) Magnetic dip and declination , Local attraction - causes, detection, errors and corrections, problems on local attraction, magnetic declination and calculation of included angles in a compass traverse

3. Levelling:

Purpose of levelling, concept of a level surface, horizontal surface, vertical surface, datum, reduced level and bench marks, Identification of various parts of Dumpy level and use of Dumpy level, Engineer' level, Auto level: advantages and disadvantages, use of auto level, Levelling staff: single piece, folding, invar precision staff, telescopic, Temporary adjustment and permanent adjustment of dumpy level by two peg method,Concept of back sight, foresight, intermediate sight, change point, to determine reduce levels, Level book and reduction of levels by Height of collimation method and Rise and fall method

problem on reduction of levels, fly levelling, check leveling and profile levelling (L-section and X-section), errors in levelling, permissible limits, reciprocal leveling. Numerical problems.

4. Plane Table Surveying

Purpose of plane table surveying, equipment used in plane table survey, Setting of a plane table: (a) Centering (b) Levelling (c) Orientation ;

Methods of plane table surveying (a) Radiation, (b) Intersection (c) Traversing (d) Resection

Concept of Two point and Three point problems (Concept only); Errors in plane table survey and precautions to control them. Testing and adjustment of plane table and alidade

References

(i)Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S.V.Kulkarni , Pune Vidyarthi Griha Prakashan.
(ii)Surveying and Levelling by Subramanian, Oxford University Press.
(iii)Textbook of Surveying by C. Venkatramaiah , University Press.

(BVBCT-303-20)BUILDING CONSTRUCTION

1. Introduction: 1.1 Definition of a building, classification of buildings based on occupancy

1.2 Different parts of a building

2. Foundations: 2.1 Concept of foundation and its purpose

2.2 Types of foundation-shallow and deep

2.2.1 Shallow foundation - constructional details of: Spread foundations for walls, min. depth criteria, thumb rules for depth and width of foundation and thickness of concrete block, stepped foundation for masonry pillars and concrete columns

2.2.2 Introduction to deep foundation and their types

2.3 Earthwork

2.3.1 Layout/setting out for surface excavation, cutting and filling

2.3.2 Excavation of foundation, trenches, shoring, timbering and dewatering

3. Masonry

4.1 Brick Masonry: Definition of terms like header, stretcher, queen closer, king closer, frog and quoin, course, bond, facing, backing, hearting, jambs, reveals, soffit, plinth, pillars and pilasters

4.1.1 Bond – meaning and necessity; English, flemish bond and other types of bonds

4.1.2 Construction of brick walls –methods of laying bricks in walls, precautions observed in the construction of walls, methods of bonding new brick work with old (toothing, raking, back and block bonding), Expansion and contraction joints

4.1.3 Mortars: types, selection of mortar and its preparation

4.2 Stone Masonry

4.2.1 Glossary of terms – natural bed, bedding planes, string course, corbel, cornice, block in course grouting, moulding, templates, corner stone, bond stone, throating, through stone, parapet, coping, pilasters and buttress

4.2.2 Types of stone masonry: rubble masonry - random and coursed; Ashlar masonry, principles to be observed in construction of stone masonry walls

5. Arches and Lintels:

5.1 Meaning and use of arches and lintels:

5.2 Glossary of terms used in arches and lintels - abutment, pier, arch ring, intrados, soffit, extrados, voussoirs, springer, springing line, crown, key stone, skew back, span, rise, depth of an arch, haunch, spandril, jambs, bearing, thickness of lintel, effective span

5.3 Arches:

5.3.1 Types of Arches - Semi circular, segmental, elliptical and parabolic, flat, inverted and relieving

5.3.2 Stone arches and their construction

5.3.3 Brick arches and their construction

5.4 Lintels

5.4.1 Purpose of lintel

5.4.2 Materials used for lintels

5.4.3 Cast-in-situ and pre-cast lintels

5.4.4 Lintel along with sun-shade or chhajja

6. Doors, Windows and Ventilators:

6.1 Glossary of terms with neat sketches

6.2 Classification based on materials i.e. wood, metal and plastic and their suitability for different situations. Different type of doors- panel door, flush door, glazed door, rolling shutter, steel door, sliding door, plastic and alumininium doors

6.3 Window – Panel window, glazed windows (fixed and openable) ventilators, sky light window, Louveres shutters, plastic and aluminium windows.

6.4 Door and window frames – materials and sections, fixtures and fasteners, hold fasts

7. Damp Proofing and Water Proofing

7.1 Dampness and its ill effects on bricks, plaster, wooden fixtures, metal fixtures and reinforcement, damage to aesthetic appearance, damage to heat insulating materials, damage to stored articles and health

7.2 Sources of dampness - moisture penetrating the building from outside e.g. rainwater, surface water, ground moisture. Moisture entrapped during construction i.e. moisture in concrete, masonry construction and plastering work etc. Moisture which originates in the building itself i.e. water in kitchen and bathrooms etc.

7.3 Damp proofing materials and their specifications: rich concrete and mortar, bitumen, bitumen mastic, polymer coating, use of chemicals

8. Floors

8.1 Glossary of terms-floor finish, topping, under layer, base course, rubble filling and their purpose

8.2 Types of floor finishes - concrete flooring, tile flooring, stone (marble and kota) flooring. Timber flooring, timber floor finish and their brief description

8.3 Special emphasis on level/slope/reverse slope in bathrooms, toilets, kitchen, balcony and staircase

9. Roofs

9.1 Types of roofs, concept of flat, pitched and arched roofs

9.2 Glossary of terms for pitched roofs - batten, eaves, facia board, gable, hip, lap, purlin, rafter, rag bolt, valley, ridge, rain water gutter, anchoring bolts

9.3 False ceilings using gypsum, plaster boards, cellotex, fibre boards

10. Stairs

10.1 Glossary of terms: Staircase, winders, landing, stringer, newel, baluster, riser, tread, width of staircase, hand-rail, nosing

10.2 Classification of staircase on the basis of material – RCC, timber, steel, Aluminium

10.3 Planning and layout of staircase: Relations between rise and tread, determination of width of stair, landing etc

10.4 Various types of layout - straight flight, dog legged, open well, quarter turn, half turn (newel and geometrical stairs), bifurcated stair, spiral stair

11. Surface Finishes

11.1 Plastering - classification according to use and finishes like plain plaster, grit finish, rough cast, pebble dashed, concrete and stone cladding etc., dubbing, proportion of mortars used for different plasters, techniques of plastering and curing

11.2 Pointing - different types of pointing and their methods

11.3 Painting - preparation of surface, primer coat and application of paints on wooden, steel and plastered wall surfaces

11.4 Application of white washing, colour washing and distempering, polishing, application of cement and plastic paints

11.5 Selection of appropriate paints/finishes for interior and exterior surfaces

11.6 Importance of preparation of surfaces such as hacking, grooving etc before application of surface finishes

References

1.Rangwala, Engineering Materials, Charotar Publishing House Pvt. Ltd.

2.Ashok Kumar Jain, Dr. B.C. Punmia, Arun Kumar Jain, Building Construction, Laxmi Publications Pvt. Ltd.

3.M.L.Gambhir, Concrete Technology, Tata McGraw Hill Education.

(BVBCT-304-20)Human Values and Professional Ethics

1. Course Introduction -

Need, Basic Guidelines, Content and Process for Value Education Understanding the need, basic guidelines, content and process for Value Education. Self Exploration-what is it?- its content and process; Natural Acceptance and Experiential Validation- as the mechanism for self exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfill the above human aspirations: understanding and living in harmony at various levels

2. Understanding Harmony in the Human Being –

Harmony in Myself! Understanding human being as a co-existence of the sentient and the material Understanding the needs of Self and Body - Sukh and Suvidha Understanding the Body as an instrument of (I being the doer, seer and enjoyer) Understanding the characteristics and activities of and harmony in Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Swasthya

3. Understanding Harmony in the Family and Society-

Harmony in HumanHuman Relationship Understanding harmony in the Family- the basic unit of human interaction Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship Understanding the meaning of Vishwas; Difference between intention and competence Understanding the meaning of Samman, Difference

between respect and differentiation; the other salient values in relationship Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals

4. Understanding Harmony in the Nature and Existence –

Whole existence as Co-existence Understanding the harmony in the Nature Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space Holistic perception of harmony at all levels of existence

5. Implications of the above Holistic Understanding of Harmony on Professional Ethics –

Natural acceptance of human values Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Competence in professional ethics: . Ability to utilize the professional competence for augmenting universal human order . Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems o Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order: o At the level of individual: as socially and ecologically responsible engineers, technologists and managers o At the level of society: as mutually enriching institutions and organizations

(BVBCT-305-20)Applied Mechanics Lab

LIST OF PRACTICALS

1. Verification of the polygon law of forces using gravesend apparatus.
2. To verify the forces in different members of jib crane.
3. To verify the reaction at the supports of a simply supported beam.
4. To find the mechanical advantage, velocity ratio and efficiency in case of an inclined plane.
5. To find the mechanical advantage, velocity ratio and efficiency of a screw jack.
6. To find the mechanical advantage, velocity ratio and efficiency of worm and worm wheel.
7. To find mechanical advantage, velocity ratio and efficiency of single purchase crab.
8. To find out center of gravity of regular lamina.
9. To find out center of gravity of irregular lamina.
10. To determine coefficient of friction between three pairs of given surface.

(BVBCT-306-20)Surveying - I Lab

LIST OF PRACTICALS

I. Chain surveying: i) a) Ranging a line b) Chaining a line and recording in the field book c) Taking offsets - perpendicular and oblique (with a tape only) d) Setting out right angle with a

tape ii) Chaining of a line involving reciprocal ranging iii) Chaining a line involving obstacles to ranging iv) Chain Survey of a small area.

II. Compass Surveying: i) a) Study of prismatic compass b) Setting the compass and taking observations c) Measuring angles between the lines meeting at a point

III. Levelling: i) a) Study of dumpy level and levelling staff b) Temporary adjustments of various levels c) Taking staff readings on different stations from the single setting and finding differences of level between them ii) a) To find out difference of level between two distant points by shifting the instrument iii) Longitudinal and cross sectioning of a road/railway/canal iv) Setting a gradient by dumpy and auto-level

IV. Plane Table Surveying: i) a) Study of the plane table survey equipment b) Setting the plane table c) Marking the North direction d) Plotting a few points by radiation method ii) a) Orientation by - Trough compass - Back sighting b) Plotting few points by intersection, radiation and resection method iii) Traversing an area with a plane table

V. Layout of Buildings (from given drawing of two room residential building) by use of surveying instruments.

(BVBCT-307-20)Building Construction Drawing

Drawing No.1: 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 apron have to be shown in the drawing.

Drawing No.2: Plans of 'T' and Corner junction of walls of 1 Brick, 1-1/2 Brick and 2 brick thick in English bond

Drawing No.3: Drawing plan, elevation of arches: circular arch, segmental arch

Drawing No.4 Elevation, sectional plan and sectional side elevation of flush door, glazed door, paneled door with wire gauge shutter

Note: Students are given the elementary idea ofAutocad and other software's used for construction

SEMESTER 4th

(BVBCT-401-20)Water Supply & Waste Water Engineering

1. Introduction 1.1 Necessity and brief description of water supply system. 1.2 Sources of water – surface/sub-surface sources 1.3 Purpose of sanitation 1.4 Necessity of systematic collection and disposal of waste 1.5 Definition of terms in sanitary engineering 1.6 Collection and conveyance of sewage 1.7 Conservancy and water carriage systems, their advantages and Disadvantages 1.8 (a) Surface drains (only sketches) : various types, suitability (b) Types of sewage: Domestic, industrial, storm water and its seasonal variation

2. Quantity & Quality of Water 2.1 Water requirement 2.2 Rate of demand and variation in rate of demand 2.3 Per capita consumption for domestic, industrial, public and fire fighting uses as per BIS standards (no numerical problems) 2.4 Population Forecasting 2.5 Meaning of pure water and methods of analysis of water 2.6 Physical, Chemical and bacteriological tests and their significance 2.7 Standard of potable water as per Indian Standard 2.8 Maintenance of purity of water

3. Water Treatment 3.1 Sedimentation - purpose, types of sedimentation tanks 3.2 Coagulation/floculation - usual coagulation and their feeding 3.3 Filtration - significance, types of filters, their suitability 3.4 Necessity of disinfection of water, forms of chlorination, break

point chlorine, residual chlorine, application of chlorine. 3.5 Flow diagram of different treatment units

4. Conveyance of Water 4.1 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. 4.2 Appurtenances: Sluice, air, reflux valves, relief valves, scour valves, bib cocks, stop cocks, fire hydrants, water meters their working and uses 4.3 Distribution system: Requirement of distribution, minimum head and rate, methods of layout of distribution pipes 4.3.1 Systems of water supply - Intermittent and continuous service reservoirs - types, necessity and accessories. 4.3.2 Wastage of water - preventive measures 4.3.3 Maintenance of distribution system 4.3.4 Leakage detection

5. Laying of Pipes 5.1 Setting out alignment of pipes 5.2 Excavation for laying of pipes and precautions to be taken 5.3 Handling, lowering and jointing of pipes 5.4 Testing of pipe lines 5.5 Back filling 5.6 Use of boring rods

6. Building Water Supply 6.1 Connections to water main (practical aspect only) 6.2 Water supply fittings (with sketches) and terminology related to plumbing

7. Sewerage System 7.1 Types of sewerage systems, materials for sewers, their sizes and joints 7.2 Appurtenance: Location, function and construction features. Manholes, drop manholes, tank hole, catch basin, inverted siphon, flushing tanks grease and oil traps, storm regulators, ventilating shafts

8. Laying and Construction of Sewers: 8.1 Setting out/alignment of sewers 8.2 Excavations, checking the gradient with boning rods preparation of bedding, handling and jointing testing and back filling of sewers/pipes. 8.3 Construction of surface drains and different sections required

9. Building Drainage 9.1 Aims of building drainage and its requirements 9.2 Different sanitary fittings and installations 9.3 Traps

References

1. Text Book of Water supply and sanitary Engg by Husain. S.K., Oxford and IBH publishing Co. New Delhi
2. 2. Water supply and Sanitary Engg. By Birdie G.S. and Bridie J.S. , Dhanpat Rai & Sons, Metcalf and Eddy,
3. Wastewater Engineering, 4th ed., McGraw Hill Higher Edu., 2002.

(BVBCT-402-20)Surveying-II

1. 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, use of stadia measurements in contour survey, interpolation of contours; use of contour map, Drawing cross section from a contour map; marking

alignment of a road, railway and a canal on a contour map, computation of earth work and reservoir capacity from a contour map

2. Theodolite Surveying: Working of a transit vernier theodolite, axes of a theodolite and their relation; temporary adjustments of a transit theodolite; concept of transiting, swinging, face left, face right and changing face; measurement of horizontal and vertical angles. Prolonging a line (forward and backward) measurement of bearing of a line; traversing by included angles and deflection angle method; traversing by stadia measurement, theodolite triangulation, plotting a traverse; concept of coordinate and solution of omitted measurements (one side affected), errors in theodolite survey and precautions taken to minimize them; limits of precision in theodolite traversing. Height of objects – accessible and non-accessible bases

3. Tacho-metric surveying : Tachometry, Instruments to be used in tachometry, methods of tachometry, stadia system of tachometry, general principles of stadia tachometry, examples of stadia tachometry and Numerical problems.

4. Curves: 4.1 Simple Circular Curve: Need and definition of a simple circular curve; Elements of simple circular curve - Degree of the curve, radius of the curve, tangent length, point of intersection (Apex point), tangent point, length of curve, long chord deflection angle, Apex distance and Mid-ordinate. Setting out of simple circular curve: a) By linear measurements only: - Offsets from the tangent - Successive bisection of arcs - Offsets from the chord produced b) By tangential angles using a theodolite 4.2 Transition Curve: Need (centrifugal force and super elevation) and definition of transition curve; requirements of transition curve; length of transition curve for roads; by cubic parabola; calculation of offsets for a transition curve; setting out of a transition curve by tangential offsets only 4.3 Vertical curve Setting out of a vertical curve

5. Introduction to the use of Modern Surveying equipment and techniques such as: a) EDM or Distomat b) Planimeter (Digital) c) Total station d) Introduction to remote sensing and GPS e) Auto level f) Digital theodolite

References

1. Surveying and Levelling Vol- I & II by B C Punmia
2. Surveying and Levelling by T P Kanetkar & S V Kulkarni
3. Surveying and Levelling by S S Bhavikatti
4. Surveying by Duggal
5. Surveyingby R Agor
6. Fundamentals of Surveying by S K Roy
7. Sathesh Gopi, R.Sathikumar & N.Madhu, Advanced Surveying, (Total Station, GIS, Remote Sensing), Pearson Education, Chennai, 2007

(BVBCT-403-20)Strength of Material

I: Concept of Equilibrium: Loads, supports, reactions, displacements; General equilibrium equations; Equilibrium of a point and a member; Concept of free body diagram; Statical determinacy of a problem.

II: Stresses and Strains: Concept of stress and strain; Type of stresses and strains; Stress-strain diagrams for ductile, brittle materials; Generalized Hooke's law; Concept of working stress and factor of safety; Lateral strain, Poisson's ratio and Volumetric strain; Elastic moduli and relationship between them; Bars of varying section, composite bars, thermal stresses.

III: Principal Stresses and Strains: Concept of principal stresses, principal strains and principal planes; use of Mohr circle in computation of stresses and strains; Rectangular block subjected to normal stress along and across two planes, combination of normal and tangential stress also with shear stress.

IV: Shear Force and Bending Moment Diagrams: Introduction to the concept of shear force, bending moment and the sign convention; Shear force and bending moment diagrams for cantilever, simply supported and overhang beams subjected to point loads, uniformly distributed loads, uniformly varying loads, moments or their combination, point of contra flexure.

V: Bending and Shear Stresses: Assumptions - theory of simple bending; Derivation of bending equation; Centroid and section modulus of various cross sectional shapes including rectangular, circular, I, channel, angle etc.; Determination of bending stresses, bending stress distribution across various beam sections; Determination of shear stress, shear stress distribution across various beam sections.

VI: Columns and Struts: Stability of Columns; buckling load of axially loaded columns with various end conditions; Euler's and Rankine's formula; Columns under eccentric load, lateral load.

VII: Stresses and strains in thin cylinders: spherical shells subjected to internal pressures; Normal stress, tangential stress.

References

1. Elementary Structural Analysis, Jain,A.K.,Nem Chand &Bros,Roorkee;
2. Strength of Materials, RK Rajput, S Chand.
3. Strength of Materials , S. Ramamrutham, Dhanpat Rai Publications.
4. Strength of Materials, B.C. Punmia, Laxmi Publications.
5. A Textbook of Strength of Materials, Prof. R. K Bansal, Laxmi Publications.

(BVBCT-404-20)Soil Mechanics

UNIT I SOIL CLASSIFICATION AND COMPACTION

History – formation and types of soil – composition -Index properties – clay mineralogy structural arrangement of grains – description – Classification – BIS – US – phase relationship – Compaction – theory – laboratory and field technology – field Compaction method – factors influencing compaction. **UNIT II EFFECTIVE STRESS AND PERMEABILITY**

Soil – water – Static pressure in water – Effective stress concepts in soils – Capillary phenomena— Permeability – Darcy's law – Determination of Permeability – Laboratory Determination (Constant head and falling head methods) and field measurement pumping out in unconfined and confined aquifer – Factors influencing permeability of soils – Seepage – Two dimensional flow –Laplace's equation – Introduction to flow nets – Simple problems Sheet pile and weir.

UNIT III STRESS DISTRIBUTION AND SETTLEMENT

Stress distribution in homogeneous and isotropic medium – Boussines of theory – (Point load, Line load and udl) Use of Newmarks influence chart –Components of settlement – Immediate and consolidation settlement – Factors influencing settlement – Terzaghi's one dimensional consolidation theory – Computation of rate of settlement. – √t and log t methods. e-log p relationship consolidation settlement N-C clays – O.C clays – Computation.

UNIT IV SHEAR STRENGTH

Shear strength of cohesive and cohesion less soils – Mohr-Coulomb failure theory – shear strength – Direct shear, Triaxial compression, UCC and Vane shear tests – Pore pressure parameters – Factors influences shear strength of soil.

UNIT V SLOPE STABILITY

Infinite slopes and finite slopes — Friction circle method – Use of stability number –Guidelines for location of critical slope surface in cohesive and c – soil –Slope protection measures.

Reference Books:

1) P. Purushothama Raj; Soil Mechanics and Foundation Engineering; Pearson Education.

3) B.C. Punamia; Soil Mechanics & Foundation Engineering; Laxmi Pub. Pvt. Ltd., Delhi.

5) Alamsingh; Soil Mechanics & Foundation Engineering; CBS Publishers & Distributors, Delhi

7) Taylor D.W.; Fundamentals of Soil Mechanics; Asia Publishing House, Mumbai

(BVBCT-405-20)Surveying-II lab

LIST OF PRACTICALS

I. Contouring: i) Preparing a contour plan by radial line method by the use of a Tangent Clinometer/Tachometer ii) Preparing a contour plan by method of squares iii) Preparing a contour plan of a Road/Railway track/Canal by taking cross sections.

II. Theodolite: i) Taking out the Theodilite, mounting on the tripod and placing it back in the box ii) Study of a transit vernier theodolite; temporary adjustments of theodolite iii) Reading the vernier and working out the least count, measurement of horizontal angles by repetition and reiteration methods iv) Measurement of vertical angles and use of tachometric tables v) Measurement of magnetic bearing of a line vi) Running a closed traverse with a theodolite (at least five sides) and its plotting vii) Height of objects with and without accessible bases

III. Curves i) Setting out of a simple circular curve with given data by the following methods a) Offsets from the chords produced b) One theodolite method

IV. Minor instruments: i) Demonstration and use of minor instruments like Ceylon Ghat Tracer, Tangent Clinometer, Pantagraph, Abney level etc. ii) Use of planimeter for computing areas

V. Demonstration of digital instruments through field visits to Survey of India and other government agencies.

VI. To plot an area with the help of Total Station

(BVBCT-406-20)Strength of Material Lab

LIST OF PRACTICALS

i) Determination of yield stress, ultimate stress, percentage elongation and plot the stress strain diagram and compute the value of young's modulus on mild steel

ii) Testing of HYSD Steel

iii) Determination of Young's modulus of elasticity for steel wire

iv) Determination of modulus of rupture of a concrete beam

v) Determination of maximum deflection and young's modulus of elasticity in simply supported beam with load at middle third point

vi) Verification of forces in a framed structure

(BVBCT-407-20)Water Supply & Waste Water Engineering Drawing Lab

LIST OF PRACTICALS

1. Drains and Sewers 1.1 Cross section of standard types of open drains (circular, V-shaped and U-shaped) with their foundations 1.2 Cross section of earthen ware and RCC sewer pipes 1.3 Cross sections of masonry sewers (circular and egg shaped)

2. Traps, manholes and inspection chamber 2.1 Detailed section of floor trap and gully trap 2.2 Detailed plan and section of an inspection chamber 2.3 Detailed plan and section of a manhole

3. Septic Tank and Soak Pit Detailed plan and cross sections of a domestic septic tank with soak pit for 5-10 users

4. Bath room and W.C connections: 4.1 Cross-section through the external wall of lavatories at ground and first floor showing the one and two pipe system and the connections of the

lavatory to inspection chamber 4.2. Plan of a bathroom showing positions of lavatory, bath tub, wash-basin, taps and showers 5. Draw sectional elevation of a two storeyed building showing details of one pipe and two pipes systems with sanitation system.

6. Practice of reading water supply and sanitary engineering working drawings (PWD/urban Development agencies) including hot water and cold water supply system of a two room set. To study the installation of following: a) Water meter b) Connection of water supply of building with main c) Pipe valves and bends d) Water supply and sanitary fittings

7) To study and demonstrate the joining/threading of GI Pipes, CI Pipes, SWG pipes, PVC pipes and copper pipes.

8) To demonstrate the laying of SWG pipes for sewers

9) Demonstration of plumbing tools.