



Chhattisgarh Swami Vivekanand Technical University, Bhilai (CG)
Diploma in Civil Engineering (NEP)
Semester - III

Subject: SURVEYING- I

S N	Board of Studies (BOS)	Courses (Subject)	Subject Code	Period Per Week			Scheme of Examination			Total Marks	Credits	Teach ing Hrs	Assessm ent Hours
				L	T	P	Theory/ Lab						
							ESE	CT	TA				
1	Civil Engg.	Surveying- I	2020C01CT020	2	1	-	100	20	20	140	3	45	15
2	Civil Engg.	Surveying- I (Lab)	2020C01CL020	-	-	2	40	-	20	60	1	30	15

UNIT-1: INTRODUCTION AND CHAIN SURVEYING

INTRODUCTION- Introduction to surveying, Plane and Geodetic surveying. Principles of surveying. **CHAIN SURVEY-** Instrument used in chain survey, Types of chain and tapes, recording in field book. Obstacles in chaining, Instruments used to take offsets. **Chain Triangulation-** Principle of Chain Triangulation, Survey Stations, and Survey lines Arrangement of survey lines, chain traversing, Errors in chain surveying and their corrections. Symbols and signs to indicate ground features.(9 Hours)

UNIT-2: COMPASS SURVEYING

Traverse Survey – Traversing, Closed and Open Traverse, Name of instruments used for measurement of directions and angles. Bearings and Angles – Bearing, Meridian, Types of meridian and bearing, Systems of bearing, Conversion of bearings from one system to other, Fore and Back Bearing, Calculation of angles from bearings and bearings from angles. Magnetic Compass, Prismatic Compass, Surveyor's Compass, Temporary adjustment of prismatic compass and taking observation, 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, Graphical adjustment of closing error.(9 Hours)

UNIT-3: LEVELLING

Levelling, Level surfaces, Level Line, Horizontal Plane, Horizontal Line, Vertical Line, Datum, Bench Marks, Reduced Level, Mean Sea Level. Levelling Instruments –Dumpy Level, Tilting Level, Auto Level, Digital Level Levelling Staff, Temporary adjustment of Dumpy Level. Terms used in levelling - Line of collimation, Axis of Telescope, Axis of bubble tube, Station, Height of instruments, Back sight, Fore sight, intermediate sight, Change point, Rise, Fall. Classification of Levelling – Simple Levelling, Differential Levelling, Fly Levelling, Profile Levelling, Cross-Sectioning, Reciprocal Levelling and Precise Levelling. Examples & methods of finding out the R. L. in Level Book by H.I. Methods and Rise & Fall Methods with necessary check. Correction for Curvature and refraction and related examples, Balancing of backsight and foresight. Errors in Levelling, Degree of Precision.(9 Hours)

UNIT-4: CONTURING

Contour, Contour interval, horizontal equivalent. Uses of contours, Characteristics of contours. Methods of Contouring. Interpolation of contours. Preparation of contour map. Uses of Contour Map- Drawing of Sections, Determination of inter visibility between two points, Tracing of contour gradient and location of route, measurement of drainage areas, calculation of capacity of reservoirs & related examples. Use of Toposheet.(9 Hours)

UNIT-5: PLANE TABLE SURVEY& MINOR INSTRUMENTS

Principles of plane table surveying, Advantages and disadvantages of plane table survey. Setting of a plane table: Methods of plane table surveying Errors in plane table survey and precautions to control them. **Minor instruments:-**Construction and use of Hand Level, Pentagraph and, Planimeter.(9 Hours)



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SURVEYING- I (LAB)

1. Chain surveying:
 - 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
 - e) Chaining a line involving obstacles to ranging
2. To fix station points and to measure length of a line by direct ranging with the help of chain and tape and plot it.
3. To perform a chain survey of closed traverse fixing the angle between two chain lines by tie lines and to plot them and adjusting the closing error by graphical method.
4. To perform a chain survey of an area by chain triangulation and plot.
5. Study the parts of the prismatic compass and to measure the bearings of lines joining different station points.
6. To take the fore bearing and back bearing of sides of a regular polygon and to calculate the included angle and check them.
7. To perform a chain and compass survey of an area by open traverse and prepare a map.
8. To perform a chain and compass survey of an area by close traverse and prepare a map.
9. To learn temporary adjustment of levelling instruments and to find the R.L. of the given point.
10. To find the difference of R.L. of two given point by shifting of instrument on change points and applying arithmetical checks.
11. To take the longitudinal and cross-section levels of an existing road.
12. To take the block leveling of an undulated site and to draw the contours using a method of interpolation.
13. Preparing a contour map of a small area by direct method of contouring.
14. To draw a contour map of a small pond and to calculate its capacity.
15. To study a Toposheet of a certain area and to mark on it watershed line and find out catchments area of a stream at a place.
16. To study the accessories of plane table surveying and to plot the objects by radial method.
17. To perform the plan table survey of small area by intersection method.
18. Study of minor instruments.



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Subject: BUILDING DRAWING & CAD

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1	Civil Engg.	Building Drawing & CAD	2020C02CT020	2	1	-	100	20	20	140	3	45	15
2	Civil Engg.	CAD (Lab)	2020C02CL020	-	-	2	40	-	20	60	1	30	15

UNIT-1: Introduction to building drawing

Size of Drawing, Layout of drawing, Title block, Scale, Dimensioning. Symbols for Doors & Windows, Drains and Pipes, Sanitary and Plumbing, Electrical Fittings as per IS 962. Building Bye-laws for Residential Building, Building Bye-laws for Commercial Building. Plot area, built up area, plinth area, carpet area and Floor Area Ratio (FAR). **Principles of Planning-** General principles of architecture: Function, Economy, Safety, Aesthetics, Economy. Basic elements of planning residential building: living area, sleeping area, service area, other areas. Principles of planning of residential building: Orientation, Privacy, Grouping, Circulation, Sanitation, Flexibility, Elegance, Landscaping. Dimensions for different types of rooms, height, Size of doors and windows. **(9 Hours)**

UNIT- 2: Computer Aided Drawing (CAD)

Graphical input devices, Drawing primitives, Text and editing (move, copy, rotate, mirror) Scale, filters and round, Grouping of entities ,Layers ,Grid, Snap Ortho ,PEDIT, display and zoom, pan, fill redraw, region, QText, offset, Annotate ,Sectioning, hatching styles ,Block and its creation ,Extrude, Subtract and union ,Shading Application of Auto CAD Enquiry commands, plotting of drawing, Uses of plotters, Application of Civil Engineering. Editing and Changing Properties of Objects Filtering, Selecting, Accessing, Understand the property list. Changing property list. **(9 Hours)**

UNIT- 3: Layout plan, detailed plans of residential buildings/campus

Types of plan, Site plan, location plan, Line plan, foundation plan, layout plan. Line plan of residential building. Development of plan from line plan of residential building. Area statement and other details. Submission drawing Working drawing, Section, Elevation and other detailed drawings. Elevation of building. Sectional elevation of building. Steel truss, Lean to roof. **(9 Hours)**

UNIT- 4: Doors, Windows and Staircase

Types of doors and windows according to material. Detailed drawing of panel doors and windows. Detailed drawing of metal framed windows. Detailed drawing of aluminium framed windows, Detailed drawing of building elements. Staircase- Types of staircase. Detailed drawing of straight staircase. Detailed drawing of dog-legged staircase. Detailed drawing of open newel staircase. **(9 Hours)**

UNIT- 5: Perspective Drawing

Isometric projection- drawing an isometric view. **Perspective drawing-** Terms used in perspective drawings: Station point, picture plane, axis of vision, vertical plane, horizontal plane, ground plane, eye level, line of vision, centre of vision vanishing points. One point, two point and three point perspective, Perspective drawing of single room, Perspective drawing of two roomed building. **(9 Hours)**



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CAD (LAB)

1. Draw line plan and section of any building, showing all AutoCAD features(Dimensions, layers, grouping of entities etc)., in the drawing.
2. Draw some 3D objects using Extrude, Subtract and Union.
3. Draw submission drawing, to the scale of 1:100, of a Residential Building (2BHK) with Flat Roof using CAD and enclose Print out showing:a) Developed plan.b) Site plan (1:200) and area statement.
4. Draw submission Drawing of above Drafting in CAD showing:
 - a) Sectional Elevation of building.
5. Draw submission drawing, to the scale of 1:100 of Residential Building (2BHK) with Flat Roof and staircase showing:
 - a) Section passing through Staircase b) Position of Doors and windows
6. Draw the different components of Building such as Doors Windows, staircase in CAD in 3D.



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Subject: HYDRAULICS

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1	Civil Engg.	Hydraulics	2020C03BT020	2	1	-	100	20	20	140	3	45	15
2	Civil Engg.	Hydraulics (Lab)	2020C03BL020	-	-	2	40	-	20	60	1	30	15

UNIT-1: Introduction

Definition of liquid, Ideal liquid and Real liquid, Properties of liquid- Mass density, Specific weight, specific Gravity, Compressibility, Viscosity, Surface Tension, Capillarity, Branches of hydraulics- Hydro Statics, Hydro Kinematics and Hydro Dynamics. **(9 Hours)**

Pressure and its measurement- Pressure, Pressure intensity, Variation of pressure with depth of liquid, Pressure head, Effect of shape and size of container on pressure, PASCAL's law. Atmospheric Pressure, Gauge Pressure, Absolute Pressure, Vacuum Pressure. Measurement of pressures by different Methods- piezometer Manometer, Differential Manometer and Inverted Differential Manometer, Bourdons pressure gauge.

Hydrostatics- Total pressure and centre of pressure and pressure distribution diagram. Computation of Total pressure and centre of pressure on plane horizontal surface, vertical surface and inclined surface.

UNIT-2: Hydro kinematics and Hydrodynamics

Types of liquid flow Laminar, Turbulent, Uniform-Non uniform, Steady, Unsteady, and Compressible, Incompressible flow, Rate of flow, Law of conservation of mass, Continuity Equation. Stream line, Path line, Streak Line. Hydrodynamics- Various forms of energies present in liquid flow - potential energy, kinetic energy, pressure energy, total energy, potential head, kinetic head, pressure head, total head. Bernoulli's Equation and Limitations of Bernoulli's theorem. Simple Application of Equation of Continuity and Bernoulli's theorem. Pitot Tube. **(9 Hours)**

UNIT-3: Flow measurement

Venturimeter- Components of venturimeter, discharge through venturimeter.

Orifice meter- Discharge through orifice meter, Flow through orifice, Definition and types of orifice. Vena Contracta, Various Hydraulic Coefficients C_c , C_v and C_d and relationship between them. Time required for emptying tank through orifice at the bottom of tank. (No Derivation)

Flow through Notches- Definition and Description. Computation of discharge through notches- Rectangular Notch, V – Notch and Trapezoidal Notch.

Flow through Weirs- Definition and Description. Computation of discharge through weirs, Discharge through narrow crested and broad, Crested weir (No Derivation), Discharge through Cipolletti weir. **(9 Hours)**

UNIT-4: Flow through Pipes

Characteristics of flow through pipes, Major Energy (Head) losses in pipe Flow Expression for head loss in pipes due to friction and Computation of major head by Darcy- Weisbach Equation. Minor Energy (Head) losses in pipe Flow loss of head at Sudden enlargement, contraction, entry, exit and at bend. Hydraulic Gradient Line (HGL) and Total Energy Line (TEL) in various cases. Flow of water from one tank to another by long pipe. Flow through pipes in series and parallel. **(9 Hours)**

UNIT-5: Flow through Open Channel & Pumps

Open channel flow- Comparison of pipe flow and open channel flow. Wetted perimeter, Hydraulic mean depth, Hydraulic gradient, Froude number, uniform and non uniform flow, Use of Chezy's and Manning's formulae (No Derivation). Most economical sections of channel Rectangular, Trapezoidal. Specific Energy Diagram, Critical Depth, Critical Velocity, Streaming Flow, Critical Flow, Shooting Flow, Hydraulic Jump **Pumps** (No numerical and derivations) Definition, description of Centrifugal pump, Reciprocating pump and Submersible Pump. Components and working principles of centrifugal pump and Reciprocating pump, Priming, Selection criteria for pumps. **(9 Hours)**



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HYDRAULICS (LAB)

1. Measure the pressure of water in pipe using Piezometer.
2. Measure the pressure of water in pipe using simple manometer.
3. Measure the pressure of water in pipe using differential manometer.
4. Verification of Bernoulli's theorem.
5. Determination of Hydraulic coefficients C_c , C_v and C_d of orifice and verify the relation between them.
6. Determine discharge through venturimeter.
7. Determine discharge through orifice meter.
8. To determine coefficient of discharge of a rectangular notch/triangular notch.
9. Determine friction losses through pipes.
10. To determine loss of head in pipe flow due to
 - a) Sudden enlargement
 - b) Sudden contraction
 - c) Bend
11. Determine discharge through open channel using Notch.
12. Determine discharge through open channel using weir.
13. Study the working of
 - a. Reciprocating pump
 - b. Centrifugal pump



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Subject: CONSTRUCTION MATERIAL

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1	Civil Engg.	Construction Material	2020C04 BT020	2	1	-	100	20	20	140	2	45	15
2	Civil Engg.	Construction Material (Lab)	2020C04 BL020	-	-	2	40	-	20	60	1	30	15

Unit-1: Stone, aggregate and brick

Importance of Building materials in civil engineering. Basic properties of construction materials Physical properties- bulk density, durability, porosity, water absorption, specific gravity, permeability, frost resistance. Criteria for Selection of construction material based on prescribed load, serviceability, aesthetics, economy and environment. STONE AND AGGREGATE- Geological, Physical and Chemical Classification of rocks. Properties of good building stones Methods of quarrying and dressing of stones. Common building stones of INDIA: characteristics and uses. Definition, types of aggregate coarse and fine aggregate. Grading of aggregates, fineness modulus, Bulking of sand. BRICKS- Clay Bricks: definition, shape and size, Ingredients of good brick earth, harmful substances in brick earth. Properties of good building bricks. Classification and specifications of bricks as per BIS: 1077. Defects of clay bricks. Testing of Bricks (as per BIS Code) and field test on bricks. Fly ash & Hollow bricks: properties, preparation and uses. **(9 Hours)**

Unit-2: BINDING MATERIAL

Cement, Chemical composition of cement, Composition of cement clinker: Bogue compounds, Hydration of cement and heat of hydration. Ingredients used for manufacturing of cement, Methods of manufacture of cement by (i) wet process (ii) dry process (flow chart). Laboratory test of cement as per IS consistency, setting time, fineness, soundness, compressive strength, tensile strength. Field tests on cement. Types and grades of cement and suitability- Ordinary Portland cement, rapid hardening cement, low heat cement, high alumina cement, Portland slag cement, white and coloured cement, Portland puzzolana cement, super sulphate cement, quick setting cement. Puzzolanas Introduction, effects, use and classification of puzzolanas. Cement admixtures and their applications as per requirements. Mortars- classification of mortars, characteristics of a good mortar. Cement mortar, lime mortar, surkhi mortar, Selection of mortar. **(9 Hours)**

Unit-3: Introduction to Concrete

Introduction- Concrete and its ingredients and their function. Various mixes and grades. Various types of concrete and their uses. Advantages and disadvantages of concrete. Fresh concrete- Fresh concrete and its properties - water cement ratio, Workability, hardness, Segregation and bleeding, Factors affecting workability Methods of measurement of workability Slump Test & Compaction Factor Test Vee Bee consistometer, flow table test. Recommended slumps for placement in various conditions as per IS:456- 2000/SP-23. Relation between workability and strength of concrete. Batching of materials, Methods of mixing of concrete – Hand & Machine Mixing, mixing time, Transportation and Placing of concrete. Ready mixed concrete, proportioning ready mixed concrete, production of ready mixed concrete. Methods of compaction of concrete and its suitability, Factors affecting compaction, Finishing of concrete. Curing and its importance, its methods and suitability, Effect of curing on development of strength of concrete. Admixtures and its benefits, Types of Admixtures – Accelerator and Retarder Plasticizer and Super Plasticizer and Air entraining admixture, Utility of Admixtures. **(9 Hours)**

Unit-4: Hardened Concrete and Mix Design

Hardened Concrete and its Properties. Compressive Strength, Tensile Strength, Bond Strength, Flexure strength Durability, Impermeability, Factors affecting Compressive Strength. IS Test Procedure to find Compressive & Tensile Strength of Concrete, Acceptance Criteria, Mean Strength & Standard Deviation. Durability of Concrete & factors affecting it. Economy of Concrete & factors affecting it. Methods of Non Destructive Test of Concrete, Rebound Hammer Test, Ultrasonic Pulse Velocity Test. Concrete Mix design- Factors causing variation in quality of concrete,



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Field Control , Advantages of Quality control. Statistical Quality control. Concrete Mix Design and its importance. Nominal Mix and Design Mix. Factors affecting concrete mix design. Different methods of mix Design and its suitability. 4.5 I.S. method to design a Concrete Mix As per IS 10262-2009. Example of Mix design as per I.S. method. safety precautions observed. **(9 Hours)**

Unit- 5: Miscellaneous Materials

Flooring Materials- Flag stone floor, Cement concrete floor, Mosaic flooring, Tile floors, Ceramic tile floor, vitrified tile floors , Granite Flooring, PVC tiles, Linoleum floor, Paver blocks, Wooden floor, Glass floor.

Roofing Materials- Roof covering materials bamboo mats, galvanized iron sheets, asbestos cement sheet, profiled steel and aluminium sheets, polycarbonate roofing material. Clay tiles- Allahabad tiles, flat tiles, Mangalore tiles, half round tiles, local country tiles.

Timber- Properties of timber, requirement of timber to be used for building.

Paints, Enamels and Varnishes- Composition of oil paint, Characteristics of ideal paints, Paints commonly used in building, factors affecting selection of paint. Enamel paint and Varnish and its type. Distemper, primers Water proofing materials. Fire proofing materials. Acoustic materials. Heat insulating materials. Adhesive materials. Water proofing resins and chemicals, coating materials. Termite proofing materials **(9 Hours)**.



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CONSTRUCTION MATERIAL (LAB)

1. Determine Grading of Aggregate and fineness modulus
 - a. Fine aggregate.
 - b. Coarse aggregate.
2. Determine Bulking of sand.
3. Determine Water absorption of bricks.
4. Determine Compressive strength of bricks.
5. Determine fineness of cement.
6. Perform consistency test of cement.
7. Determine initial and final setting time of cement.
8. Determine Tensile strength of cement mortar.
9. Determine compressive strength of concrete cube.
10. Determine soundness of cement.
11. Determine flakiness index and elongation index of coarse aggregate (IS 2386- Part I)
12. Determine specific gravity and water absorption of aggregate (IS2386part III for aggregates of size 40 mm to 10 mm)
13. Test for workability (slump test): (a) To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/Cement ratio on slump (b) To test cube strength of concrete with varying water cement ratio.
14. Compaction factor test for workability (IS: 1199)
15. Conduct Split Cylinder Test.
16. conduct Non destructive test on concrete (a) Rebound hammer test (b) Ultrasonic pulse velocity test.
17. Perform Concrete Mix Design by weight batching as per I. S. Method.



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1	Civil Engg.	Building Construction	2020C05BT020	2	1	-	100	20	20	140	3	45	15

Unit-1: Introduction

Classification of building as per NBC, Components of a building, Load bearing and framed structure, comparison between Load bearing and framed structure. Foundation- Function of foundation, requirement of good foundation. Types of foundation: Shallow and deep foundation. Shallow foundation: spread footing, combined footing, strap footing, mat foundation. Deep foundation: Pile foundation, cast in situ and precast concrete piles, under reamed pile foundation. Selection of suitable foundation. Setting out of foundation. Excavation for foundation- Implements for foundation, Shoring, Excavation in ground with subsoil water. Stone Masonry-Glossary of terms, Classification of stone masonry: rubble masonry - random and coursed, Ashlar masonry. Dressing of stone, size and placing of joint and corner stones, filling joints, proper packing of internal cavities of rubble masonry wall, making of joints to receive finishes, supervision of stone masonry. Brick masonry- Definition of terms in brick masonry. Bonds, Rules for bonding, Stretcher, Header, Brick laying, supervision of brick work. Comparison between brick and stone masonry. Construction of walls of precast hollow concrete Blocks.(9 Hours)

Unit- 2: Walls, arches, lintel, doors and windows

Classification of walls: load bearing, non-load bearing, dwarf wall and partition walls. Scaffolding- Purpose of scaffolding Different types of scaffolding, Merits and demerits of different types of scaffolding. Arches- Meaning and use of arches. Glossary of terms used in arches : Abutment, pier, arch ring, intrados, soffit, extrados, voussoirs, Springer, springing line, crown, key stone, skew back, span, rise, depth of an arch, haunch, spandrel, jambs, effective span. Types of Arches – Semi-circular, segmental, elliptical and parabolic. Construction of Concrete Arches. Lintels- Purpose of lintel, Materials used for lintels, Cast-in-situ and pre-cast lintels, Lintel along with sun-shade or chhajja. Doors, Windows and Ventilators- Glossary of terms with neat sketches. Classification based on materials i.e. wood, metal and plastic and their Suitability for different situations. Door and window frames: Materials and sections, door closures, hold-fasts. Different type of doors-Classification of doors, Battened and Ledged Doors, Battened, Ledged and Braced Doors, Panel Door, Flush Door, Glazed Door, Rolling Shutter, Steel Door, Sliding Door, Plastic And Aluminium Doors. Window – Fixed and Pivoted Window, Panel Window, Glazed Windows Ventilators, Sky Light Window, Louvers Shutters, Steel Windows, Aluminium Windows and Plastic Windows. Door and window frames: Materials and sections, door closures, hold-fasts.(9 Hours)

Unit- 3: floors, roofs, false ceiling and stairs

Glossary of terms- floor finish, topping, under layer, base course, rubble filling and their purpose. Types of floor- flag stone, kota stone, marble, granite flooring, glazed and vitrified tiles flooring, concrete floors, timber floor, other miscellaneous floor. Construction method of different types of floor. Roofs-Construction of flat roof, shuttering for beam and slab floor. Steel roof truss. Slopes, overlaps of roofing materials, Procedure for laying AC and GI sheet. Procedure for laying false ceiling.Stairs-Glossary of terms: Staircase, landing, riser, tread, nosing, width of staircase, hand-rail, Types of Stairs - straight flight, dog legged, open well, quarter turn, half turn, geometrical stairs, bifurcated stair, spiral stair. Construction of RCC stair. Escalators and Elevators.(9 Hours)

Unit- 4: Damp Proofing, Water Proofing, Plastering and Painting, Distempering and White-Washing

Damp Proofing and Water Proofing- Causes of dampness, its ill effects. Methods of Damp proofing, water proofing materials and their specifications, Rich concrete and mortar, bitumen, bitumen mastic, polymer coating, use of chemicals. Damp Proof Course treatments in buildings treatment to foundation against gravitational water, treatment to basements, treatment to floors, treatment to walls, treatment to roofs. Plastering – objects of plastering, requirements of good plaster, cement mortar mixes for plastering, number of coats of plaster, method of plastering with cement mortar, types of plaster finishes, special materials used in plastering, defects in plastering. Painting,



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Distempering and White-Washing- Painting method of painting on new and old wood work, iron and steel work, plastered surfaces, defects in painting, Method of distempering, white washing, colour washing. **(9 Hours)**

Unit-5: Building Services, maintenance work and safety

Anti Termite Measures Introduction, preconstruction treatment, post construction treatment, chemicals used in anti-termite treatment. Fire Protection – Fire hazard, general fire safety requirements for buildings as per IS1641-1988, Fire resistant construction, fire alarm, fire extinguishing equipment. Ventilation and Air conditioning- natural ventilation, mechanical ventilation, air conditioning. Machinery & Equipment:

List of machines and equipments required during building construction and their use. Building maintenance and safety measures: Causes and types of defects in buildings, Preparation of report on maintenance work, Remedial measures and execution procedure of any one type of building maintenance work, Safety precautions to be observed during the construction work. **(9 Hours)**



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1	Humanities	Indian Traditional Knowledge : Science and Practices	2020C06ET046	3	1	-	-	-	20	20	1	15	30

Course Objectives:

1. Creating awareness amongst the youths about the true history and rich culture of the country;
2. Understanding the scientific value of the traditional knowledge of Bhārata;
3. To familiarize learners with major sequential development in Indian science, engineering and technology.
4. To review & strengthen the ancient discovery and research in physics, chemistry, maths, metallurgy, astronomy, architecture, textile, transport, agriculture and Ayurveda etc.
5. To understand the importance of functional, aesthetic, psychological, culture and socio religious concepts of ancient India architecture.

Course Outcomes:

1. Students understand the various traditional practices of ancient India.
2. They have been introduced to some concepts of Ancient Indian Physics and Chemistry.
3. They have been introduced to some concepts of Ancient Indian Science (Metallurgy, Astronomy & Astrology).
4. They have been introduced to some fields of IKS like Ancient Architecture and Engineering.

UNIT I: Bhāratīya Civilization and Development of Knowledge System

(4 Hours)

Genesis of the land, Antiquity of civilization, On the Trail of the Lost River, Discovery of the Saraswatī River, the Saraswatī-Sindhu Civilization, Traditional Knowledge System, Introduction to Vedas, A synopsis of the four Vedas, Sub-classification of Vedas, Vedic Life: A Distinctive Features, Ancient Education System, the Takṣaśilā University, the Nālandā University, Knowledge Export from Bhārata.

UNIT II: ANCIENT INDIAN SCIENCE

(4 Hours)

Physics in India: Vaisheshika darshan Atomic theory & law of motion, theory of panchmahabhoota, Brihath Shathaka (divisions of the time, unit of distance), bhaskaracharya (Theory of gravity, surya siddhanta & sidhanta shriomani), Lilavati (gurutvakashan Shakti).

Chemistry in India: Vatsyayana, Nagarjuna, Khanda, Al-Biruni, Vagbhaṭa –building of the ras-shala (laboratory), working arrangements of ras-shala, material and equipment, Yaśodhara Bhaṭṭa-process of distillation, apparatus, saranasamskara, saranataila



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UNIT III: ANCIENT INDIAN TECHNOLOGY

(4 Hours)

Metallurgy in India: Engineering Science and Technology in the Vedic Age and Post-Vedic Records, Mining and ore extraction, Survarṇa (gold), Rajata (silver), Tamra (copper), Loha (iron), Vanga (tin), Naga / sisa (lead), Pittala (brass), and steel in ancient India, Apparatuses used for extraction of metallic components, Iron Pillar of Delhi.

Astronomy and Astrology: The Beginnings of Indian Astronomy - The Early Historical Period-The Siddhāntic Era., Ancient Indian Observational astronomy. Foundation concepts - nakṣatra, graha, time units, phenomena like meteors, eclipses., Brief notes on Astronomical instruments like sundials, water clock, time measurement. Aryabhatta - Varahamihira- Bhaskara I – Brahmagupta- Bhaskara II

UNIT IV: ARCHITECTURE AND CIVIL ENGINEERING

(3 Hours)

Perspective of Arthaśāstra on town planning, Vāstu-śāstra – The science of architecture, Eight limbs of Vāstu, Town planning, Temple architecture in India, Iconography, Architecture in India: Nagara (northern style), Vesara (mixed style), and Dravida (southern style), Indian vernacular architecture, Temple style, cave architecture, rock cut architecture, kalinga architecture, chandela architecture, rajput architecture, jain architecture, sikh architecture, Maratha architecture.

Text Books: (Hindi and English language as per availability)

1. Textbook on “The Knowledge System of Bhārata by Bhag Chand Chauhan.
2. वास्तविक आईना सनातन विज्ञान का, परम कुमार, वैभव प्रकाशन रायपुर
3. SCIENTIFIC BASIS OF INDIAN KNOWLEDGE SYSTEM Saroj Sharma, Bal Krishna Rai, Sunita Joshi Kathuria, SHIPRA PUBLICATIONS
4. R P Kulkarni, Glimpse of Indian Engineering and Technology (Ancient & Medieval period, Munshiram Manoharlal Publishers Pvt. Ltd. 2018.
5. Sen, S. N., and Shukla, K. S. (Ed.) (2000). History of Astronomy in India, 2nd Revised Edition. New Delhi: Indian National Science Academy.
6. D N Shukla Civil Architecture in Ancient India (Part-I) Meharchand lakshmidas publication, 2016.

Reference Books: (Hindi and English language both)

1. Iyengar, R. N. (2016) Astronomy in Vedic texts, History of Indian Astronomy, A Handbook - Volume brought out on the occasion of IX International Conference on Oriental Astronomy November 14–18.
2. Pride of India- A Glimpse of India’s Scientific Heritage edited by Pradeep Kohle et al. Samskrit Bharati (2006).
3. Vedic Physics by Keshav Dev Verma, Motilal Banarsidass Publishers (2012). 3. India’s Glorious Scientific Tradition by Suresh Soni, Ocean Books Pvt. Ltd. (2010).
4. AK Pathak, Science and Technology in India, Anshika prakashan pratapgarh, 2016.



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5. AR vasudev Murty, Science and Technology in Ancient India as Reflected in the Mahabharata, Sanskrit bharati, 2019.
6. B Dagens, Mayamata: An Indian Treatise on Housing Architecture and Iconography (An Updated Edition with revised Glossary), Motilal banrsidas, 2017.
7. Dr. V. Ganapati Sthapati, Building Architecture of Sthapatya Veda.



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Sl. No	Board of Studies (BOS)	Courses (Subject)	Subject Code	Period Per Week			Scheme of Examination			Total Marks	Credits	Teaching Hrs	Assessment Hours
				L	T	P	Theory/ Lab						
							ESE	CT	TA				
1	CSE	Idea and Innovation Lab	2020C07FT022	-	-	2	-	-	30	30	1	15	30

A) Course Code : 2020C07FT022

B) Course Title : Idea and Innovation Lab

C) Pre- requisite Course Code and Title :

D) Rationale :

The Idea and Innovation Lab provides hands-on, experiential learning components in the Diploma Engineering program to nurture skills. The course aims to instill an innovation mindset among students by guiding them through the complete cycle of problem identification, idea generation, conceptual design, prototyping, testing, and pitching. It emphasizes design thinking, teamwork, and user-centric development, encouraging students to step beyond textbooks and apply their knowledge to practical, meaningful challenges.

E) Course Outcome:

CO1: Develop creative thinking, innovation skills, and problem-solving mindset.

CO2: Learn the process of taking an idea from concept to working prototype

CO3: Apply design thinking in real-world scenarios

CO4: Understand and evaluate prototype

CO5: Prepare technical report and demonstrate awareness of IPR

F) Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of Studies (Hours/Week)				
			L	P	T	Total Study Hours (L+T+P)	Total Credits(C) (L+T+P/2)
CSE	2020C07FT022	Idea and Innovation Lab	0	2	0	2	1

Legend: Lecture (L), Tutorial (T) and Practical(P)

G)

Board of Study	Course Code	Course Title	Scheme of examination					
			Total Marks					
			Theory			Practical		Total Marks
			ESE	CT	TA	ESE	TA	
CSE	2020C07FT022	Idea and Innovation Lab	0	0	0	0	30	30

Scheme of Assessment:H) Course-Curriculum Detailing:

This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Laboratory Instruction (LI) and Self Learning (SL). Students are expected to demonstrate the attainment of Session Outcomes (SOs) and finally Course Outcomes (COs) upon the completion of course.



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CO-1 Develop creative thinking, innovation skills, and problem-solving mindset

(Approx. Hrs: LI + SL = 5)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Self-Learning (SL)
SO1.1 List of real-world problems SO1.2 Shortlisted idea proposals	Unit-1.0 Ideation & Problem Identification 1.1 Introduction to Innovation & Design Thinking 1.2 Empathizing with users and identifying real-life problems 1.3 Brainstorming, Mind Mapping, SCAMPER method 1.4 Creating clear problem statements	1.1 Different creative thinking techniques. 1.2 List of Real life problems

CO-2 Learn the process of taking an idea from concept to working prototype.

(Approx. Hrs: LI + SL = 6)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Self-Learning (SL)
SO2.1 Concept document SO2.2 Wireframes, flow diagrams	Unit-2.0 Concept Development 2.1 Concept sketching, use-case creation 2.2 Wireframes, user journey mapping 2.3 Technical feasibility study 2.4 Functional requirement gathering	2.1 Basic blueprint making 2.2 Feasibility study

CO-3 Apply design thinking in real-world scenarios

(Approx. Hrs: LI + SL = 7)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Self-Learning (SL)
SO3.1 Selection of tools and technologies SO3.2 Prototype plan	Unit-3.0 Tools & Technologies for Prototyping 3.1 Web/Mobile app prototyping tools (like Figma, HTML/CSS basics) 3.2 Basics of hardware/software integration 3.3 Component selection, system design	3.1 Usage of different tools. 3.2 Hardware Software integration



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CO-4 Understand and evaluate prototype

(Approx. Hrs: CI+LI+SW+SL =7)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Self-Learning (SL)
SO4.1 Working prototype (Minimum Viable Product)	Unit-4.0 Building the Prototype 4.1 Development of the Prototype 4.2 Interface design, module integration 4.3 Testing and Evaluation 4.4 Final refinement of prototype based on feedback	4.1 Prototype models 4.2 Interface design 4.3 Prototype evaluation methods 4.4 Debugging steps

CO-5 Prepare technical report and demonstrate awareness of IPR

(Approx. Hrs: LI+ SL =5)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Self-Learning (SL)
SO5.1 Students will be able to prepare technical reports SO5.2 Students will be able to demonstrate prototypes SO5.3 Students will be able to understand IP basics.	Unit5. Reporting and IPR 5.1 Reporting of results/ demos: process of explaining the project idea, working and results. 5.2 Learning intellectual property basics: legal rights given to creations of the mind. Types of Intellectual Property 5.2.1 Patent –Protects new inventions 5.2.2 Copyright – Protects written work, software 5.2.3 Trademark –Protects logos, brand names 5.2.4 Design Rights – Protects product appearance its Importance for Students	Identify the purpose of Form 1 and Form 2 in the patent application process. List the difference between Provisional Specification and a Complete specification while filing an IPR List the specific features as per Design act that constitutes a Design

I) Suggested Learning Resources:

S. No.	Titles	Author	Publisher	Edition & Year
1	Developing Thinking Skills (The way to Success)	E Balaguruswamy	Khanna Publication, 2022	1 st Edition 2022
2	Product Design and Manufacturing	A.K. Chitale and R.C. Gupta	Prentice Hall, India	7 th edition
3	Ideas to Innovation: Creativity, Design Thinking, IPR & the Innovation	Dr Gaurav Kumar	Atlantic Publishers and Distributors (P) Ltd.	1 st edition, 2025



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	Ecosystem			
4	Startupology: Ideation to Execution for First-Time Founders	Vivek Chadha	Zebra Learn	1 st edition, 2025
5	8 Steps to Innovation	Vinay Dabholkar, Rishiksha T Krishnan	Collins	1 st edition, 2013

J) List of Suggestive Laboratory Equipment and Tools:

1.	Simulation Software	Necessary Licensed softwares with Desk top Computer with minimum processor of 3 GHz, 64 bit, Graphic Card, 16 GB RAM and SSD drive.
2.	3 D Printer	Print Technology Fused Deposition modelling, Material Supported PLA, ABS, PETG and flexible TPU, Build volume: Suitable for prototype and projects (200mmx200mmx200mm) to (300mmx300mmx300mm), Layer resolution 50-300 micron, Software: Open-source software compatibility e.g., Cura, Prusa Slicer that can import standard CAD formats like STL or OBJ
3.	Development Boards & Sensors	Example: Arduino UNO, Arduino MEGA, Arduino 8266, ESP 32 etc, RTC Module, Temperature sensors, Light sensors, Motion sensors, Pressure sensors, Humidity Sensors, Gas sensors
4.	Display Boards	Character LCDs, Graphic LCDs, OLED and TFT LCDs
5.	Tools & Measuring Instruments	Drilling Machines, Automated welding machines , CNC lathes, Soldering stations, Digital Multimeters, Waveform analyzers,

Course

Outcome:

- CO1- Develop creative thinking, innovation skills, and a problem-solving mindset.
 - CO2- Learn the process of taking an idea from concept to working prototype
 - CO3- Apply design thinking in real-world scenarios
 - CO4- Foster teamwork, entrepreneurship, and user-centric development
 - CO5- Evaluation of final prototype
-
- **CO-1** Develop creative thinking, innovation skills, and a problem-solving mindset

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)



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SO1.1 List of real-world problems SO1.2 Shortlisted idea proposals	Unit-1.0 Ideation & Problem Identification 1.1 Introduction to Innovation & Design Thinking 1.2 Empathizing with users and identifying real-life problems 1.3 Brainstorming, Mind Mapping, SCAMPER method 1.4 Creating clear problem statements		1.1 Different creative thinking techniques. 1.2 List of Real life problems
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- **CO-2** Learn the process of taking an idea from concept to working prototype.

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO2.1 Concept document SO2.2 wireframes, flow diagrams	Unit-2.0 Concept Development 2.1 Concept sketching, use-case creation 2.2 Wireframes, user journey mapping 2.3 Technical feasibility study 2.4 Functional requirement gathering		2.1 Basic blueprint making 2.2 Feasibility study

- **CO-3** Apply design thinking in real-world scenarios

(Approx. Hrs: CI+LI+SW+SL =26)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)



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SO3.1 Selection of tools and technologies	Unit-3.0 Tools & Technologies for Prototyping		3.1 Usage of different tools. 3.2 Hardware Software integration
SO3.2 Prototype plan	3.1 Web/mobile app prototyping tools (like Figma, HTML/CSS basics) 3.2 Basics of hardware/software integration 3.3 Component selection, system design		

- **CO-4** Foster teamwork, entrepreneurship, and user-centric development.

(Approx. Hrs: CI+LI+SW+SL =26)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO4.1 Working prototype (Minimum Viable Product)	Unit-4.0 Building the Prototype 4.1 Actual development of the prototype 4.2 Interface design, module integration		4.1 Prototype models 4.2 Interface design

- **CO-5** Prototype improvement and Evaluation .

(Approx. Hrs: CI+LI+SW+SL =26)

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)



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SO5.1 User test results SO5.2 Improved prototype	Unit-5.0 Testing & Feedback 5.1 Testing and debugging 5.2 Iterative improvements based on feedback 5.3 Conducting user testing 5.4 Collecting and analyzing feedback 5.5 Metrics for evaluating solution effectiveness 5.6 Final refinement of prototype		5.1 Prototype evaluation methods 5.2 Debugging steps.
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Suggested Learning Resources:

- *Design Thinking* by Tim Brown
- *Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days* by Jake Knapp
- *The Lean Startup* by Eric Ries
- Prototyping tools documentation (Figma, Arduino, Raspberry Pi)
- Journals, articles on innovation & entrepreneurship



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Sl. No	Board of Studies (BOS)	Courses (Subject)	Subject Code	Period Per Week			Scheme of Examination			Total Marks	Credits	Teaching Hrs	Assessment Hours
				L	T	P	Theory/ Lab						
							ESE	CT	TA				
1	Humanities	Personality Development	2020C08D T046	2	-	-	-	-	10	10	-	-	—

Course Objectives: This course aims to develop self-awareness, self-management, communication, interpersonal, and professional skills in students to enhance their personality and prepare them for career and workplace readiness.

Course Contents:

Unit I: Personality & Self-Awareness – Concept and determinants of personality, Self-awareness and SWOT analysis, Attitude and confidence building.

Unit II: Self-Management– Stress management techniques, Time management and goal setting, Body language.

Unit III: Interpersonal Skills – Interpersonal transactions and Transactional Analysis (TA) basics; Conflict – Types and resolution, Digital communication etiquette: email writing, netiquette, and professional social media presence.

Unit IV: Teamwork – Group dynamics and team building, Leadership skills, Collaboration and coordination, Problem-solving in teams.

Unit V: Professional Skills – Public speaking and presentation skills: overcoming stage fear, structuring a talk, use of visuals; Workplace etiquette: professional appearance, meeting conduct, and workplace relationship.

Course Outcomes:

CO No.	Course Outcome	Bloom's Level
CO1	Identify personality traits and perform self-assessment analysis.	Remember (L1) / Understand (L2)
CO2	Apply self-management techniques for personal and career goals.	Apply (L3)
CO3	Demonstrate effective interpersonal skills in various contexts.	Apply (L3)
CO4	Analyze group dynamics and exhibit teamwork abilities.	Analyze (L4)
CO5	Develop professional competencies and workplace etiquettes.	Create (L6)

Text Books:

S.No.	Title	Authors	Edition	Publisher
1	Personality Development and Soft Skills	Barun K. Mitra	-	Oxford University Press
2	Communication Skills and Personality Development	J.R. Kadam et al.	-	Scientific Publishers



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Reference Books:

S.No.	Title	Authors	Edition	Publisher
1	Communication Skills and Personality Development	M. Jegadeesan et al.	-	-
3	How to Win Friends and Influence People	Dale Carnegie	-	-