| SYLLABUS FOR KARYA NIRIKSHAK | |
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| **1. SURVEYOR - 20 Marks** | |
| Concept of drawing & sheet layout following safety precautions. | Importance of safety and general precautions related to the trade. Allnecessary guidance to be provided to the newcomers to become familiarwith the working of ITI system.<br>Importance of survey or trade Job after completion of training.<br>Introduction of First aid.<br>Job responsibility of the trade.<br>● Overview the subject to be taught.<br>● List of the instrument equipments to be used during training.<br>● Layout of drawing sheet.<br>● Dimensions of drawing sheet. |
| Draw lettering & numbering applying drawing instruments. | Details layout of lettering, lines & dimensioning system. |
| Draw plain geometrical figures, curves & coincs | Introduction of surveying, types of surveying, use, application principal. |
| Construct plain scale, diagonal scale, comparative scale, vernier scale. | Knowledge of different types of scales, determine of R.F & uses of scales. |
| Draw orthographic projections of different objects with proper dimensioning & lettering. | Different types of projection views orthographic, sectional, isometric view. |
| Draw conventional signs & symbols used in surveying. | Use & application of conventional signs & symbols. |
| Perform site survey using chain / tape & prepare a site plan. | Uses of Chain/ tape, testing of a chain & correction. Ranging (direct & indirect), Principle of chain survey, application. Terms used in chain survey, Offset, types of offsets, limit of offset, field book, types of field book,entry of field book method of chaining in slopping ground.<br>Field procedure of chain survey errors in chain survey, plotting procedure.<br>Calculation of area (regular & irregular figure) Knowledge of site plan. |
| Perform the site survey using prismatic compass. | Basic terms used in compass survey.<br>Instrument & it setting up. Conversion of bearing web to R.B. Calculation of included angle from bearing local attraction, magnetic declination and true bearing, closing error. Adjustment of closing error, precaution in using prismatic compass. |
| Perform Auto CAD drawing | Introduction to Auto CAD. Use AutoCAD command. (06 hrs.) |
| Perform the site survey using the plane table. | Plane table survey, principle, merits & demerits Instrument used in plane table. |
| | survey setting up the plane table. (centering, levelling, orientation)<br>Methods of plane table survey (radiation, intersection, resection, traversing) |

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| | Error in plane table survey. |
| Perform Theodolite survey. | Introduction to Theodolite.<br>Types of Theodolite, parts of Theodolite, Terms used in Theodolite survey. Temporary adjustment of Theodolite. Anglemeasurement process. Reading of angles, field book entry of measured angles. Permanent adjustment of Theodolite. |
| Perform traverse survey by Theodolite & prepare a site map. | Traversing using theodolite, (closed & open), traverse computation, determination of consecutive coordinates, independent co-ordinate, checking & balancing of traverse, preparation of gales traverse table, computation of area using co-ordinates, calculation of omitted measurement. |
| Determine of RL and heights of different points by levelling instruments. | Introduction to levelling. Types of levelling instrument.<br>Technical terms used in levelling<br>Temporary & permanent adjustment.<br>Different types of levelling Entry of level book.<br>(Reduced level calculation method)<br>Curvature & refraction effect sensitivity of bubble tube.<br>Common error and their elimination.<br>Degree of accuracy. |
| Performing tachometric survey using tacheometer. | Introduction of tachometry & terms use advantages and disadvantages.<br>Tachometric constants & its determination.<br>Determination of horizontal &<br>vertical distances by various methods. |
| Perform AutoCAD drawing<br>(single story building) | Use AutoCAD command for drawings. |
| Make topography map<br>using level instrument<br>with contours. | Contouring, contour interval selection of contour interval, characteristics of contour, uses of contour contouring by various method. Interpolation of contour by various methods, drawing of contours, computation of volume establishment of gradient by abney level. |
| Concept & set out of curves. | Curves, Purpose, Types ot curves - Simple, compound, reverse,transition, vertical. Elements of simple curve, computation of elements of simple curve. Various methods for setting out simple, compound, reverse, transition & vertical curve. |
| Perform survey work using modern survey instruments (Total station) for prepare a map. | Familiarization with modern survey instruments. Parts of Total station, temporary adjustment of T.S, working procedure of T.S. |
| Concept of cadastral survey & make a site plan | Familiarization with cadastral map,term used in cadastral survey, preliminary knowledge for prepare a site plan. Calculation of planimeter. |
| Perform a road project survey. | Types of surveys for location of a road. Points to be considered during reconnaissance survey. Classification of roads and terms used in roads engineering, alignment of roads relative importance of length of road, height of embankment depth of cutting & filling, road gradients super elevation etc. |
| Perform survey work for prepare a | Details knowledge for preparation of topographical map. |

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| topographical map, cadastral map (mouza map), road project (survey camp in a suitable hilly/undulated area). | Details knowledge for preparation of cadastral map. Details knowledge for preparation of a road project. |
| PerformAuto CAD drawing from field survey data. | Use auto cad command survey software for survey drawing. |
| Concept & draw cartographic projection. | Importance of cartographic projection. Uses of various types of cartographic projection for mapping. |
| Plan and prepare setting of GIS &GPS, techniques in various fields. | Introduction of GIS& GPS.Elements ofGPS/DGPS. Observation principles. Sources of error & handling of error in GPS. Various type of GPS application. Concept & use of survey software. |
| Perform the hydrographic srvey(cross section &velocity determination) using the hydrographic survey instruments. | Introduction to hydrographic survey, practice various methods of water depth measurement process, floe velocity measurement & determination of cross- sectional area of a river. Handling of eco sounder, current meter. |
| Perform transmission line site survey & prepare a site plan. | Basic terms used in transmission line survey, justification criteria for constructing new line, marking process of tentative alignment, selection process of a good alignment. Process of detail survey & final location survey. Use of sag template, Various type of tower, construction of tower foundation. |
| Perform the railway line site survey using modern survey instruments. | Basic terms used in railway line project survey, justification criteria for constructing new line, marking process of tentative alignment, selection process of a good alignment. Process of detail survey & final location survey. |
| Draw a double storied building by AutoCAD & prepare a detailed estimate of building. | Specification & uses of various types of building materials, types of foundation, knowledge of R.C.C. works, & other construction related items. Procedure of prepare a detail estimate. |
| **2.DRAUGHTSMAN (CIVIL)- 20 Marks** | |
| Draw free hand sketches of hand tools used in civil work following safety precautions. | Importance of safety and general precautions observed in the industry/shop floor.All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures. Soft Skills: its importance and Job area after completion of training. Introduction of First aid, Introduction of PPEs, Introduction to 5S concept & its application. Response to emergencies e.g.; power failure, fire alarm,etc. |
| | • Familiarisation & information about rules and regulations of Institute and Trade.<br>• Overview of the subjects to be taught for each year.<br>• List of the Instruments, equipments and materials to be used during training. |
| Draw plane figures applying drawing instruments with proper layout and folding of drawing sheets. | • Importance of B.I.S.<br>• Introduction of Code for practice of Architectural and<br>• Building Drawing (IS: 962-1989, SP-46:2003)<br>• Layout of drawing. Lines, Lettering, Dimensioning. |
| Construct plain scale, comparative | • Knowledge of different types of scale. Principle of R.F. |

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| scale, diagonal scale and vernier scale. | Materials:-<br>• Stones :- characteristics, types&uses.<br>• Bricks - Manufacturing, characteristics of good bricks, types, uses and hollow bricks.<br>• Lime- characteristics, types, manufacturing & its uses. |
| | • Pozzolanic :- characteristics, types & uses.<br>• Cement :- Manufacturing, characteristics, types, uses and test of good cement. (06 hrs.) |
| Draw orthographic projections of different objects with proper lines, lettering and dimensioning. Draw Isometric, oblique and perspective views of different solid, hollow and cut sections with proper lines and dimensions as per standard convension. | • Different types of projection views: Orthographic, Isometric, Oblique and Perspective.<br>Building materials:-<br>• Sand:-Characteristics, types & uses.<br>• Clay Products :- types, earthenware, stoneware, porcelain, terracotta, glazing.<br>• Mortar&Concrete :- Types, uses, preparation, proportion, admixtures and applications. |
| Draw component parts of a single stroried residential building with suitable symbols and scales. | Building materials:-<br>• Timber:- Types, Structure, disease & defects, characterstic, seasoning, preservation and utility.<br>• Alternative material to Timber<br>• Plywood, Block board, Particle board, Fireproof reinforced plastic(FRP), Medium density fireboard(MDF) etc.<br>• Tar, bitumen,asphalt:-<br>• Properties, application and uses. |
| Draw different types of stone and brick masonry. | Protective materials:-<br>?Paints:- characteristic, types, uses.<br>?Varnishes:- characteristics and uses.<br>?Metal:- characteristic , types, uses.<br>?Plastics:- characteristic, types, uses.<br>Building Construction:-<br>?Sequence of construction of a building.<br>?Name of different parts of building.<br>Stone mansory:-<br>?Terms, use and classification.<br>?Principle of construction, composite masonry.<br>?Strength of walls.<br>?Strength of masonry.<br>?Brick masonry:- principles of construction of bonds. Tools and equipments used. |
| Draw different types of shallow and deep foundation. | Building Construction:- Foundation:-<br>• Purpose of foundation<br>• Causes of failure of foundation<br>• Bearing capacity of soils<br>• Dead and live loads<br>• Examination of ground<br>• Types of foundation<br>• Drawing of footing foundation setting out of building on ground excaution Simple machine foundation |
| Draw different types of shoring, | Building Construction:- |

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| scaffolding, underpinning, form work and timbering, | • Types of shoring and scaffolding in details.<br>• Types of Underpinning and Timbering in details. |
| Drawing of different types of damp proofing in different position. | Treatment of Building structures:-<br>• DPC Sources and effects of dampness<br>• Method of prevention of dampness in building<br>• Damp proofing materials - properties, function and types.<br>• Anti-termite treatment – objectives, uses and applications/<br>• Weathering course – objectives and materials required.<br>• Fire proofing – effect and rules. |
| Drawing of different types of arches and lintels with chajja. | • Arches:- Technical terms:- types, centring<br>• Lintel:- types, wooden brick, stone, steel & RCC.<br>• Chajjahs:- characteristics, Centring & Shuttering |
| Perform site survey with chain/tape and prepare site plan. Perform site survey using prismatic compassand prepare site plan. Perform site survey with plane table and prepare a Map. | Surveying:-<br>• Introduction, History and principles of chain survey.<br>• Instrument employed.<br>• Use, care, maintenance and common terms.<br>• Classification, accuracy, |
| | Types:-<br>• Main divisions (plane & geodetic).<br>• Chaining<br>• Speed in field and office work.<br>• Knowledge of Mouza Map. Compass survey:-<br>• Bearing and each included angle of close traverse.<br>• Local attraction.<br>• Magnetic declination and its true bearing.<br>• Precaution in using prismatic compass.<br>Plane table survey:-<br>• Instrument used in plane table survey<br>• care and maintenance of plane table |
| Make tropography map by contours with leveling instruments. | Levelling:-<br>• Auto level, dumpy level, Tilting level- introduction, definition<br>• Principle of leveling.<br>• Levelling staffs, its graduation & types.<br>• Minimum equipment required<br>• Types, component/ part and function.<br>• Temporary and permanent adjust ment, procedure in setting up.<br>• Level & horizontal surface.<br>Datum Benchmark, Focussing & parallax<br>Deduction of levels/ Reduced Level.<br>Types of leveling, Application to chain and Levelling Instrument to Building construction.<br>Contouring:- Definition, Characteristic, Methods<br>Direct and Indirect methods<br>Interpolation of Contour, Contour gradient, Uses of Contour plan and Map. |

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| | Knowledge on road project. |
| Perform a site survey with Theodolite and prepare site plan. | Theodolite survery:-<br>• Introduction.<br>• Types of theodolite.<br>• Uses, Methods of Plotting.<br>• Transit vernier theodolite.<br>• Terms of transit theodolite.<br>• Fundamental line of theodolite.<br>Adjustment of theodolite.<br>Checks, Adjustment of errors.<br>Open and closed traversr and their application to Engineering Problems.<br>Vernier scale-types<br>Measurement of horizontal angle.<br>Measurement of vertical angle.<br>Adjustment of a close traverse.<br>Problems in transit theodolite-departure, latitude, northing and easting. |
| Drawing of different types of carpentry joints.<br>Draw different types of doors and windows<br>According to Manner of construction,<br>Arrangement of component, and working operation | • Carpentry joints :- terms, classification of joints, uses, types of fixtures, fastenings.<br>• Doors - Parts, Location, standard sizes, types.<br>• Windows - types.<br>• Ventilators - purpose- types. |
| Prepare the detailed drawing of electrical wiring system. | Electrical Wiring:-<br>• Safety precaution and elementary first aid.<br>• Artificial respiration and treatment of electrical shock<br>• Elementary electricity.<br>• General ideas of supply system.<br>• Wireman's tools kit. Wiring materials. Electrical fittings.<br>• System of wirings. Wiring installation for domestic lightings. |
| Draw types of ground and upper floors. | • Floors - Ground floor & upper floor-Types.<br>Flooring - materials used types. |
| Draw different types<br>of vertical movement<br>according to shape, location, materials by using stair, lift, ramp and escalator. | • Stairs :- Terms. Requirements, Planning and designing of stairs and details of construction.<br>• Basic concept of lift and Escalator. |
| Draw different types<br>of roofs, truss<br>according to shape, construction, purpose and span | Roofs & Roof coverings:-<br>• Purposes, Elements, Types, Fla, pitched.<br>• Truss-king post, queen post, mansard, bel-fast, steel, composite.<br>• Shell-types-north-light & double curved.<br>• Dome. Components parts. |

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| | • Roof & coverings - objectives, types & uses. |
| Draw single storied Building site plan layout. | Building:-<br>• Principle of planning<br>• Objectives & importance.<br>• Function & responsibility.<br>• Orientation.<br>• Local building Bye-Laws as per ISI code. |
| | • Layout plan & key plan.<br>• Submitted in composition of drawing. |
| | • Provisions for safety.<br>• Requirement of green belt and land. |
| Create objects on CAD<br>Workspace using Toolbars, Commands, Menus, formatting layer and style. | Computer aided drafting:-<br>• Operating system, Hardware & Software.<br>• Introduction of CAD.<br>• Its Graphical User Interface.<br>• Method of Installation.<br>• Basic commands of CAD.<br>• Knowledge of Tool icons and set of Toolbars.<br>• Knowledge of shortcut keyboard commands. |
| Draw a sanction plan of<br>double storied flat roof<br>residential building by using CAD. | Building Planning:-<br>• Economy & orientation.<br>• Provision for lighting and ventilation.<br>• Provision for drainage and sanitation<br>• Types of building.<br>• Planning & designing of residential, public and commercial building. |
| | Prefabricated Structure:-<br>• Preparation.<br>• Method of construction, assembling.<br>• Advantages & disadvantages. |
| Create objects on 3D modeling concept in CAD. | 3D modeling concept in CAD<br>• 3D coordinate systems to aid in the construction of 3D objects<br>• Knowledge of shortcut keyboard commands. |
| Prepare a drawing of public building detailing with roof, column by framed structure using CAD | • Parks & play ground-Types of recreation, landscaping. etc<br>• Concepts of design of earthquake resisting buildings-requirements resistance , safety, flexible building elements, special requirements, base isolation techniques. |
| Prepare detailed drawing of RCC structures using CAD and prepare bar bending schedule. | Reinforced cement concrete structure:-<br>• Introduction to RCC uses.<br>• Materials- proportions<br>• Form work<br>• Bar bending details as per IS Code.<br>• Reinforced brick work. |

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| Prepare detailed drawing of RCC structures using CAD and prepare bar bending schedule. Draw the details of a framed structure and portal frame of a residential building using CAD. | Materials used for RCC:-<br>• Construction.<br>• Selection of materials – coarse aggregate, fine aggregate , cement water and reinforcement.<br>• Characteristics.<br>• Method of mixing concrete- machine mixing and hand mixing.<br>• Slump test.<br>• Structure- Columns, beams, slabs – one- way slab & two- way slab.<br>• Innovative construction.<br>• Safety against earthquake.<br>• Grade of cement, steel- behavior and test<br>• Bar-bending schedule.<br>• Retaining wall.<br>• R.C.C Framed structure. |
| Draw the different types of steel sections , rivets and bolts using CAD.<br>Draw the details of girders, roof trusses and steel stanchions usingusing CAD. | Steel structures:-<br>• Conmen forms of steel sections.<br>• Structural fasteners , joints.<br>• Tension & Compression member.<br>• Classification , fabrication.<br>• Construction details. |
| Prepare the detailed drawing showing the different types of sanitary fittings , arrangements of manholes, details of septic tank using CAD.<br>Draw the details flow, Diagram of water, Treatment plant, (WTP) and Swerage, Treatment plant(STP) | House drainage of building :-<br>• Introduction.<br>• Terms used in PHE.<br>• Systems of sanitation.<br>• System of house drainage.<br>• Plumbing, sanitary fitting etc.<br>• Types of sewar appurtenance.<br>• Systems of plumbing.<br>• Manholes & Septic tank.<br>• Water treatment plant.<br>• Swerage treatment plant. |
| Draw the cross sectional view of different types of roads showing component parts using CAD. | Roads :-<br>• Introduction.<br>• History of highway development .<br>• General principles of alignment. |
| | • Classification and construction of different types of roads.<br>• Component parts.<br>• Road curves, gradient.<br>• Curves- types , designation of curves.<br>• Setting out simple curves by successive bisection from long chords.<br>• Simple curve by offsets from long chords.<br>• Road drainage system. |

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| Draw the details of different types culverts using CAD prepare detailed drawing a bridge using CAD | Bridges & Culvert:-<br>• Introduction to bridges.<br>• Component parts of bridge.<br>• Classification of culverts.<br>• IRC loading.<br>• Selection of type and location.<br>• Factors governing the ideal site .<br>• Alignment of bridge.<br>• Foundation selection caisson.<br>• Coffer dam- types.<br>• Types of super structure.<br>• Sub structure-piers<br>Abutments , wing walls.<br>• Classification of bridge.<br>• Tunnels- rules used for the sizes of different members. |
| Draw the typical cross Section of rail sections,Railway tracks in cutting and embankment using CAD. | Railways:-<br>• Permanent way<br>• Rail gauses , functions , Requirements , types , sections, Length of rail.<br>• Welding of rail, wear of rail.<br>• Coning of wheels, hogged rail, bending of rail. Creep of rail.<br>• Causes and prevention of creep.<br>• Sleeper and ballast- function, types , requirement , material, rail.<br>• Fixtures , Fastenings and plate laying in rail.<br>• Joints – types , fish plate, fish bolt-spikes, chairs and keys-bearing plate, block elastic, base plate.<br>• Anchors and anti-creepers.<br>• Construction of permanent ways.<br>• Railway station and yard. |
| Prepare detailed drawing Of typical cross sectionsOf Dam, barrages, weir and Cross drainage works using CAD, Draw the schematic, Diagram of different, Structures of Hydro, Electric project usingCAD. | Irrigation Engineering :-<br>• Terms used in irrigation.<br>• Hydrology like duty , delta, base period, intensity of irrigation.<br>• Hydrograph , peak flow , run off, catchment area, CCA, corps like, rabi, kharitetc.<br>• Storage , diversion head work – characteristics and types. |
| | • Reservoir -types of reservoirs, i.e., single purpose and multi -purpose, area, capacity and curves of reservoir.<br>• Dams, weir & barrages- types purposes.<br>• Hydro electric project like Forebay, Penstock, Turbines, Powder house, etc.<br>• **Canals**- classification and distribution system, canal structures. |

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| | • Types of cross drainage work like Aquaduct, super passage,Syphon, Level crossing inlet and outlet, etc. |
| Prepare detailed<br>Estimate and cost<br>Analysis of different types of building and other structures using application software.<br>Prepare rate analysis of<br>Different itmes of work.<br>Problems on preparing<br>Preliminary/Approximate<br>Estimates for building<br>Project. | **Estimating and Costing:-**<br>• Introduction.<br>• Purpose and common techniques.<br>• Drawing of construction.<br>• Measurement techniques.<br>• Estimate-necessity, importance types-approximate and detailed estimate-main and sub estimates, revised, supplementary, maintenance/repair estimate-taking off quantities-method.<br>• Rate analysis of typical items and their specifications.<br>Labour and materials.<br>Govt. Schedule of rate.<br>Estimating of irregular boundaries by trapezoidal and Simpsons formula. |
| Prepare a map using Total station. | **Total Station:-**<br>• Introduction.<br>• Components parts, accessories used.<br>• Characteristics,features.<br>• Advantages and disadvantages.<br>Principle of EMD.<br>Working and need.<br>Setting and measurement.<br>Electronic, display & Date reading.<br>Rectangular and polar co-ordinate system.<br>Terminology of open and closed traverse. |
| Locate the station point using GPS and obtain a set of co-ordinates. | GPS (Global Positioning system):-<br>• Introduction of GPS system.<br>Co- ordinate and time system.<br>Satellite and conversional geodetic system.<br>GPS. Signal, code, and biases<br>Role of TRANSIT in GPS development.<br>GPS segment organization.<br>GPS survey methods. Basic geodetic co-ordinate.<br>Ground support equipment, signals.<br>Tracking devises & system.<br>Time measurement and GPS timing.<br>Definition and application of Remote sensing, Photogrammetry, Arial photography, satellite images.<br>Pattern recognition and digital signal. |

| **3. Plumber-20 Marks** | |
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| Plan and organize the work to make job as per specification applying different type of basic fitting operation and Check for dimensional accuracy following safety precautions.(Basic fitting operation-marking, Hacksawing, Chiseling, Filing, Drilling, Taping, Threading and Grinding etc. | • Importance of safety and general precautions required for the trade.<br>•Importance of the trade.<br>• Type of work to be done by trainees in the institute.<br>• Scope of a plumbing work.<br>• Types of services have to plan.<br>• Basic Bench fitting.<br>Plumber's common hand tools -names, description and material from which they are made. |

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| Accuracy:±0.25mm) | ▯ Description, types and uses of holding device, hammers &cold chisels, cutting tools.(14 hrs)<br>▯ Description of simple fitting operations hack sawing, punching and filling.<br>▯ Type of files used commonly.<br>▯ Marking instruments and their use of simple drilling machine.<br>▯ Method of using drills.<br>▯ Description of simple bench drilling machine.<br>▯ Description of Grinding and chisel.<br>▯ Description of different types of locking and fastening devices.(21 hrs) |
| Perform Inner & Outer Thread cutting on Metal & Studs and thread cutting on Different types of Pipes & fitting accessories. | • About different types of pipes- GI, CI, DI, PVC/CPVC, PPR,AC and HDPE etc.<br>• About different Types of pipe Fittings:- Socket, Elbow, Tee, Union, Bend, Cap, Plug, Cross, Ferrule etc.<br>▯ About different types of Thread cutting. |
| Join wood with carpenter's tools | Carpenter Works:-<br>• Description and uses of Carpenter's hand tools used for simple operations such as marking, sawing, planning and making simple joints.<br>▯ Common types of wood- their description and use. |
| Carry out cutting of Pipes of Different Dia in different angle and Joining of pipes by gas welding, Soldering and Brazing. | Gas Welding:-<br>• Purpose of Gas welding.<br>• Method of gas welding<br>• Safety precautions to be observed -Methods of soldering and brazing - fluxes used & Types of fluxes precautions to be observed.<br>• Hard & soft solders -their properties, composition and uses. |
| Construct Masonry brick wall and RCC casting. Brick wall cutting for concealing pipe line. | Mason's Works:-<br>• Names and description of Mason's hand tools and their uses.<br>• Method of making holes in walls and floors.<br>• Types of tools used and various Processes.<br>• Concept of bricks, lime and cement.<br>• Preparation of mortars with various materials of varying composition.<br>• Common brick joints.<br>• Description of bonds.<br>• Scaffolding & plastering.<br>• Define Plain cement concrete, RCC and its proportion.<br>• Grades of coarse aggregate and fine aggregate.<br>• Knowledge of waterproofing compound.<br>• Knowledge of Building Plan and Cross section of Wall.<br>• Identify plumbing services required for each type of building according to usage. (14 hrs) |

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| Carry out cutting and Bending of pipes using Plumber's tools and equipment | • Description of plumber tools and Equipment- Ratchet brace, Threading die, Pipe wrench, Sliding wrench, Spanner set, Chain Wrench etc. and their safety.<br>□ Care & use of tools.<br>□ Pipes of different kinds.<br>□ Method of pipe bending in different dia.<br>□ Plumbing Symbols and Code for Tools & Materials on water line. (21 hrs) |
| Join Various type of PVC pipe by heat process or Welding. | • Equipment and tools for hot gas welding and electric hot plate for PPR pipe joints. |
| Construct Complete pipe line circuit with different types of Joints and fixing Cocks & valve on Pipe line. | • Type of fitting for different joints & different pipes. :- CI, HCI, AC, AC Pressure, DI, GI Pipes. Joint:- Flange joint, Socket joint, Socket joint with lead, Detachable joint, Socket & Spigot Joints etc.<br>• Description of pipe fittings.<br>• Methods of joining and their uses.<br>• Precautions to be taken while fixing. |
| Carry out Cutting of Different Types of PVC Pipe, joining and laying. | • Different kinds of Joints, Fittings and Materials in joining pipes :- PVC/CPVC, PPR and HDPE etc. |
| Perform Water analysis test. Water Pressure test and Water distribution system by using Pipe line. | Composition of Water:-<br>• Sources of Water<br>• Hard & Soft water, temporary hardness & permanent hardness.<br>□ Impurities of water - organic and inorganic impurities.<br>□ Water purification stages and methods.<br>□ Static water pressures and measurement of pressures. Bursting pressure.<br>□ Expansion of water on freezing and heating.<br>□ Bernoulli's principles<br>□ Pascal's law.<br>□ Pressure of water on the sides of cistern or tank.<br>□ Water hammer in pipes. |
| Align and lay humid asbestos pipe line of different dia. And fitting & maintenance of drainage pipe line. | • Use of hummed and asbestos pipes of different sizes.<br>• Method of laying out pipes alignment and joining. |
| | • Description of various pipe joints- straight, branch, Taft and blow, Expansion joints. Solders and fluxes used in joints. (07 hrs) |
| Install and maintain | • Description of Plumber's |
| Different Electric pumps. | Material Lead, tin, Zinc, solder, copper, red lead etc. and their uses.<br>• Water supply system of a small town.<br>• Description and types of pumps viz. Suction pump, Centrifugal pump etc. Contamination of water in a well. |
| Join fittings for different purposes on PVC pipe line. | • Description of pipe dies, their uses, care and precaution.<br>• Metric Specification of various pipes.<br>• Standard pipe threads.<br>• Method employed for bending, joining and fixing PVC pipe.<br>• Joining Material for Water and gas pipes. |

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| | • Use of blow lamp. |
| Construct inspection chamber, manhole, gutter, septic tank, socket etc. | • Inspection chamber, septic tank, description of drains, cesspools, soak pits etc.<br>• Types of traps<br>• Layout of drainage system |
| Test pipe line as per site drainage pipe line | • Method of bending pipes by hot and cold process. |
| Lay out. | • Method of testing drainage lines. |
| Perform removal of leakage pipe line. | • Method of dismantling and renewal of the valves and pipes. Leaks in pipes and noises in plumbing.<br>• Installation of water meters. Air lock in pipes and its removal. |
| Install, fix & maintain different valve & cock. | •Description of cocks & cocks & valves-their types, materials & advantages for particular work. |
| Install & maintain water meter and water supply for fixture. | •Erecting rain water and drainage pipe system,<br>•Installation of sanitary fittings, inspection and testing ofwater supply system. |
| | •Pipe alignment and slope. Prevention of water hammer.<br>•Storage tanks for general water supply propose.<br>•Test for water supply pipes.<br>•Description of sanitary fittings,<br>•General points to be observed when choosing sanitary. |
| Demonstrate method of bending for different materials & different pipe joint. | Method of bending galvanized mand other heavy pipes. |
| Perform fitting and maintenance of Fixture at different place. | **Domestic drainage system:** General layout, one pipe system, specifications of Materials required.<br>Method of testing leakage. Different types of traps, ventilation, antisyphonage and sinks.<br>About Fire hydrants and their fittings. |
| Carry out fitting, fixing & laying installation of hot &Cold water pipe line and symbolizing. | Concept of heat and Temperature. Method of transmission of heat.<br>Heating system by different thermal units. Domestic hot and cold water. General layout, specification of materials required and Connection of pipes to mains. Tracing leakage. Repairs to service main. Domestic boilers and Geysers.<br>Method of ventilating pipe. Precaution against air poisoning.<br>Fixing of solar water system. |
| Perform repairing & reconditioning of waste pipe line. | Plumbing and sanitary symbols and plumbing codes for all tools and materials. |
| Perform repairing & reconditioning. | Sensor system for urinals and wash basin, etc. |
| Scraping & painting of sanitary fittings pipe line. | Corrosion - causes and remedies, prevention. Corrosion due to electrolytic action.<br>Effect of water and frost on materials. Layout of pipes as per drawing.<br>Analysis quantity measurement and abstract rate of plumbing and sanitary work.<br>Bill of Quantity and Estimation:-<br>•Preparation of bill of quantity.<br>•Preparation of Estimation |

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| **4.Mathematics( Matriculation Level, BSEB)-20Marks** |
| **5. General Knowledge -20 Marks** |