**TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (AUTONOMOUS), MADURAI- 11**

**DIPLOMA IN CIVIL ENGINEERING**

**N - 20-SCHEME**

(Implemented from the Academic year 2021-2022 onwards)

CURRICULUM OUTLINE

**THIRD SEMESTER (FULL TIME)**

| Subject Code | Subject Name | Hours Per Week | | | |
|---|---|---|---|---|---|
| | | Theory | Drawing | Practical | Total |
| 4010310 | Mechanics of Solids | 6 | - | - | 6 |
| 4010320 | Construction Materials and Construction Practice | 5 | - | - | 5 |
| 4010330 | Surveying | 6 | - | - | 6 |
| 4010340 | Building Planning and Drawing | - | 4 | - | 4 |
| 4010350 | Civil Engineering Drawing and CAD Practical – I | - | - | 4 | 4 |
| 4010360 | Material Testing Laboratory- I | - | - | 3 | 3 |
| 4010370 | Surveying Practice –I | - | - | 4 | 4 |
| Co-curricular activities | Physical Education | - | - | - | 2 |
| | Library | - | - | - | 1 |
| | **TOTAL** | **17** | **4** | **11** | **35** |

**TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (AUTONOMOUS), MADURAI- 11**

**DIPLOMA IN CIVIL ENGINEERING**

**N - 20-SCHEME**

(Implemented from the Academic year 2021-2022 onwards)

**CURRICULUM OUTLINE**

**THIRD SEMESTER (PART TIME)**

| Subject Code | Subject Name | Hours Per Week | | | |
|---|---|---|---|---|---|
| | | Theory | Drawing | Practical | Total |
| 4010310 | Mechanics of Solids | 6 | - | - | 6 |
| 4010320 | Construction Materials and Construction Practice | 4 | - | - | 4 |
| 4010340 | Building Planning and Drawing | - | 3 | - | 3 |
| 40001 | Communication Skill Practical | - | - | 2 | 2 |
| 40015 | Engineering Graphics - I | - | 3 | - | 3 |
| | **TOTAL** | **10** | **6** | **2** | **18** |

# III SEMESTER

**TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11**

**N - 20 SCHEME**

**DIPLOMA IN CIVIL ENGINEERING**

**(Implemented from the Academic Year 2021 – 2022 onwards)**

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING

Subject Code : 4010310

Semester : III Semester

Subject Title : **MECHANICS OF SOLIDS**

## TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 16 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | | | Marks | | | Duration |
| | Hours / Week | Hours / Semester | Internal Assessment | End Semester Examination | Total | |
| **MECHANICS OF SOLIDS** | **6 Hrs** | **96 Hrs** | **25** | **100*** | **100** | **3 Hrs** |

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks

### Topics and Allocation of Hours

| Unit | Topics | Hours |
|---|---|---|
| I | Simple Stresses and Strains | 20 |
| II | Shear Force and Bending Moment | 17 |
| III | Geometrical Properties of Sections | 18 |
| IV | Stresses in Beams and Shafts | 17 |
| V | Pin Jointed Frames | 17 |
| | Test & Model Exam | 7 |
| **TOTAL** | | **96** |

# DETAILED SYLLABUS
# 4010310 - MECHANICS OF SOLIDS

Contents: Theory

| Unit | Name of the Topics | Hours |
|---|---|---|
| I | **SIMPLE STRESSES AND STRAINS**<br>**1.1 INTRODUCTION TO STRESSES AND STRAINS**<br>Definitions of: Force, Moment of force, Actions and reactions, Statics, Static equilibrium of bodies, Mechanics, Engineering Mechanics - Conditions of static equilibrium - Types of forces on structural members - Study of strength of material - Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability - Definitions of stress and strain - Types of stresses - Tensile, Compressive and Shear stresses - Types of strains - Tensile, Compressive and Shear strains - Elongation and Contraction - Longitudinal and Lateral strains - Poisson‟s Ratio - Volumetric strain - Simple problems in computation of stress, strain, Poisson‟s ratio, change in dimensions and volume etc- Hooke‟s law - Elastic Constants - Definitions of: Young‟s Modulus of Elasticity – Shear modulus (or) Modulus of Rigidity - Bulk Modulus - Relationship between elastic constants **(Derivations not necessary)-** Simple problems .<br>**1.2 APPLICATION OF STRESS AND STRAIN IN ENGINEERING FIELD**<br>Behaviour of ductile and brittle materials under direct loads - Load Extension curve (or) Stress Strain curve of a ductile material - Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress, Actual / Nominal stresses - Working stress - Factor of safety - Percentage elongation - Percentage reduction in area - Significance of percentage elongation and reduction in area of cross section - Deformation of prismatic and stepped bars due to uniaxial load - Deformation of prismatic bars due to its self weight - Numerical problems. Composite Sections – Examples of composite sections in Engineering field- Advantages - Assumptions made – Principles of analysis of Composite sections - Modular ratio - Equivalent area (No problems). | **10**<br><br>**10** |

| Unit | Name of the Topics | Hours |
|---|---|---|
| II | **SHEAR FORCE AND BENDING MOMENT**<br>**TYPES OF LOADS AND BEAMS**<br>Definitions of: Axial load, Transverse load, Concentrated (or) Point load, Uniformly Distributed load (UDL), Varying load – Types of Supports and Reactions: Simple support, Roller support, Hinged support, Fixed support; Vertical reaction, Horizontal reaction, Moment reaction- Types of Beams based on support conditions- Diagrammatic representation of beams, loads and supports- Static equilibrium equations – Determinate and indeterminate beams.<br><br>**SHEAR FORCE AND BENDING MOMENT IN BEAMS**<br>Definitions of Shear Force and Bending Moment – Conventional signs used for S.F. and B.M – S.F and B.M of general cases of determinate beams – S.F and B.M diagrams for Cantilevers, Simply supported beams- Position of maximum BM - Derivation of Relation between intensity of load , S.F and B.M. – Numerical problems on S.F and B.M. (Determinate beams with concentrated loads udl and couple). | **8**<br><br>**9** |
| III | **GEOMETRICAL PROPERTIES OF SECTIONS**<br>**3.1 CENTROID**<br>Geometrical properties – Definitions and examples of Symmetrical, Anti Symmetrical, Asymmetrical shapes - Definitions of centre of gravity and centroid - Centroid of Symmetrical shapes (solid / hollow square, rectangular, circular, I Sections) - Centroid of Asymmetrical shapes ( triangular, semi circular, quadrant, trapezoidal, parabolic sections ) - Centroid of Anti Symmetric shapes (S, Z sections) – Built up structural sections – Problems. | **8** |

| Unit | Name of the Topics | Hours |
|---|---|---|
| **III** | **3.2 MOMENT OF INERTIA**<br>Definitions of: Inertia, Moment of Inertia, Polar moment of inertia, Radius of gyration, Section Modulus, Polar modulus - Parallel and perpendicular axes theorems - Derivation of expressions for M.I / Polar M I, Section modulus and Radius of gyration of regular geometrical plane sections ( rectangle and circle only ) – M.I about centroidal axis / base, Section modulus, Radius of gyration of symmetric, asymmetric, anti symmetric and built up symmetrical sections – Numerical problems. | **10** |
| **IV** | **STRESSES IN BEAMS AND SHAFTS**<br>**4.1 STRESSES IN BEAMS DUE TO BENDING**<br>Types of Bending stresses – Neutral axis – Theory of simple bending – Assumptions – Moment of resistance – Derivation of flexure/bending equation M / I = E / R = σ/y – Bending stress distribution – Curvature of beam – Position of N.A and centroidal axis – Stiffness equation – Flexural rigidity – Strength equation – Significance of Section modulus – Numerical problems.<br><br>**4.2 STRESS IN SHAFTS DUE TO TORSION**<br>Definitions of: Shaft, Couple, Torque (or) Twisting moment - Types of Shafts (one end fixed and the other rotating, both ends rotating at different speeds ) - Theory of Pure Torsion – Assumptions -Derivation of Torsion equation, T / Ip = $\sigma_{max}$ / R = GΘ / *l* - Shear stress distribution in circular section due to torsion - Strength and Stiffness of shafts – Torsional rigidity - Torsional modulus - Power transmitted by a shaft - Numerical problems. | **8**<br><br>**9** |

| Unit | Name of the Topics | Hours |
|---|---|---|
| V | **PIN JOINTED FRAMES**<br>**ANALYSIS BY ANALYTICAL METHOD (METHOD OF JOINTS)**<br>Definitions of: Frame / Truss, Pin Joint, Nodes, Rafters, Ties, Struts, Slings - Determinate and indeterminate frames - Classification of frames - Perfect and imperfect frames – Deficient / Instable and redundant frames - Formulation of a perfect frame - Common types of trusses - Support conditions - Resolution ofa force - Designation of a force - Nature of forces in the framemembers - Analysis of Symmetrical Frames – Assumptions - Methodsof analysis - Analytical methods - Method of Joints and Method ofSections - Problems on Analysis of cantilever and simply supportedperfect frames ( with not more than ten members ) with vertical nodalloads by method of joints only. Identification of members with nil forcein a determinate truss.<br>**ANALYSIS BY GRAPHICAL METHOD**<br>Graphic statics - Advantages - Space diagram - Bow‟s notation- Resultant force (or) Equivalent force -Equilibrant force - Vector diagram - Determination of magnitude and nature of forces in the members of a cantilever / simply supported determinate trusses (with not more than eight members) with vertical nodal loads only. | **10**<br>**7** |
| | **Test & Model Exam** | **7 Hrs.** |

**TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11**

**N - 20 SCHEME**

**DIPLOMA IN CIVIL ENGINEERING**

**(Implemented from the Academic Year 2021 – 2022 onwards)**

Course Name : 1010 : DIPLOMA CIVIL ENGINEERING

Subject Code 4010320

Semester : IIISemester

Subject Title : **CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE**

## TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 16 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours / Week | Hours / Semester | Marks | | | Duration |
| CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE | 5 Hrs. | 80 Hrs. | Internal Assessment | End Semester Examination | Total | |
| | | | 25 | 100* | 100 | 3 Hrs. |

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks

### Topics and Allocation of Hours

| Unit | Topics | Hours |
|---|---|---|
| I | Building Materials | 15 |
| II | Building Materials ( Contd. ) | 15 |
| III | Foundations And Masonries | 15 |
| IV | Doors,Floors,Roofs, etc., | 14 |
| V | Pointing, Plastering, Painting, Form Work, etc., | 14 |
| | Test & Model Exam | 7 |
| | **TOTAL** | **80** |

# DETAILED SYLLABUS

## 4010320-CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE

Contents: Theory

| Unit | Name of the Topics | Hours |
|---|---|---|
| I | **INTRODUCTION**<br><br>Physical properties of materials - Density, Bulk density, Specific gravity, porosity, water absorption, permeability, chemical resistance, fire resistance, weathering resistance, thermal conductivity, Durability. (Definitions only).<br><br>**ROCKS AND STONES**<br><br>Rocks - Classification of Rocks - Geological, Physical and Chemical classification - Uses of stones - Requirements of a good building stone - Natural and Artificial stones for flooring - Examples (Detailed description not required).<br><br>**BRICKS**<br><br>Definition - Brick earth - Composition of good brick earth - Manufacturing process - classification of bricks - properties of bricks - special types of bricks and their uses - compressive strength of bricks - Tests on bricks(Names only) - grades and corresponding requirements of bricks as per BIS.<br><br>**LIME AND POZZOLANAS**<br><br>Sources of lime - classification of lime - Fat, Hydraulic and Poor lime - uses of lime - Pozzolanic materials - Surki, Flyash, Ground blast furnace slag, Rice husk ash - Advantages of adding pozzolanas to cement. | **2**<br><br>**2**<br><br>**2**<br><br>**2** |

| Unit | Name of the Topics | Hours |
|---|---|---|
| I | **1.5 CEMENT**<br>Definition - Composition of ordinary Portland cement - Functions of cement ingredients - Different types of cements - Grades of cement (33,43 and 53) - Storage of cement - Tests on cement (Names only) - objects of each test - Test requirements/ BIS specifications of OPC – Admixtures - Definition, types and uses. | **3** |
| | **WATER**<br>General requirement of water used in construction works - Use of sea water in construction works- Permissible limits of deleterious materials in construction water as per BIS- Effects of Sulphates and Chlorides in ground water - Minimum pH value. | **2** |
| | **GLASS**<br>Definition - Constituents of glass - Classification of glass - Functions and Utility - Types of glass, sizes and thickness used in buildings. | **2** |
| II | **MORTAR**<br>Definition - Properties and uses of mortar - M sand for mortar - Types of mortar - Cement and Lime mortar - Mix ratio of cement mortars for different works. | **1** |
| | **CONCRETE**<br>Definition - Constituents of concrete and their requirements - uses of concrete - Types of concrete: Lime concrete, cement concrete and light weight concrete, Self compacting concrete and ready mixed concrete - Definitions only. | **2** |
| | **PAINTS AND VARNISHES**<br>Definition - Functions of paint Types of paints and their uses - Oil, Enamel, Emulsion, Distemper, Cement, Aluminium, Bituminous and Plastic paints - Varnishes, Definition Characteristics of a good varnish -Types of varnish and their uses Oil, Turpentine, Spirit and water varnish. | **3** |

| Unit | Name of the Topics | Hours |
|---|---|---|
| II | **METALS AND PLASTICS**<br><br>Types of metals used in construction - Cast Iron, Steel, Aluminium, GI, Stainless steel - Market forms of steel Steel for reinforced concrete - steel for pre stressed concrete - Plastics Characteristics and Uses of plastics -Types - Thermoplastics and Thermosetting plastics - Various plastic products: pipes, taps, tubs, basins, doors, windows, water tanks, partitions sizes, capacity and uses - Advantages and disadvantages of plastic products- Asbestos - uses of asbestos. | **3** |
| | **TIMBER AND TIMBER PRODUCTS**<br><br>Types of Timber -Teak, Sal, Rosewood, Mango, and Jack - Defects in timber seasoning of timber- objectives - Timber Products - Veneers, Ply woods, Particle Board, Fibre board, Hard board, Block board, Laminated board Uses. | **2** |
| | **ROOF COVERINGS**<br><br>Definition - objectives and uses - AC Sheets - FRP Sheets - G.I. sheets- Steel sheets- Polycarbonate sheets- Shell roof - R C C roof Advantages - Types**.** | **2** |
| | **DAMP PROOFING MATERIALS**<br>Materials used for damp proofing - Properties and functions of various types of water proofing materials - commonly available chemicals used for grouting / Coating porous concrete surfaces - Admixtures for cement mortar and cement concrete - Functions of Admixtures, Accelerators, Retarders, Air repelling chemicals. | **2** |

| Unit | Name of the Topics | Hours |
|---|---|---|
| III | **INTRODUCTION TO STRUCTURES**<br>Permanent and temporary structures - Life of structures - Sub structure - super structure - load bearing structure - framed structure - concept of framed structure - advantages of framed structure. | 2 |
| | **FOUNDATION**<br>Definition - objectives of foundation - Bearing capacity of soil – Definition - maximum/ultimate and safe bearing capacity - Bearing capacity of different types of soils - Requirements of a good foundation - Types of foundations - Shallow foundation: Spread foundation, Isolated column footing, combined footing, continuous footing, Raft foundation - Deep foundation: Pile, Stone columns Types of piles : Bearing pile, Friction pile, under reamed pile - Causes of failure of foundation - Remedial measures. | 3 |
| | **STONE MASONRY**<br>Definition - Common terms used : Natural bed, sill, corbel, course, cornice, coping, weathering, throat, spalls, quoins, string course, lacing course, through stone, plinth, jambs Classification of stone masonry - Rubble masonry : Coursed, un coursed & Random rubble masonry - Ashlar masonry - points to be considered in the construction of stone masonry - Tools used(Names only). | 2 |
| | **BRICK MASONRY**<br>Definition - Common terms used - Header, stretcher, bed joint, lap, perpend, closer, king, queen & bevelled, bat permissible loads in brick masonry - Bond - Types Header, stretcher, English bond & Flemish bond one brick thick and one and a half brick thick - „T" junction in English bond - Points to be considered in the construction of brick masonry - Cavity bond masonry - Defects in brick masonry - Maintenance of brick masonry - Reinforced brick masonry - purpose - Its Advantage with respect to strength and Earthquake resistance. | 3 |

| Unit | Name of the Topics | Hours |
|---|---|---|
| III | **PARTITION**<br>Definition - Requirements of good partition wall - Types Brick, Concrete, glass, Aluminium frame with Glass sheet, timber, straw board, wood wool, Asbestos Cement board and plastic board partitions. | **2** |
| | **WATER PROOFING AND DAMP PROOFING**<br>Dampness - Causes of dampness - Effects of dampness - Damp proofing - Damp proof courses (DPC) - Method of mixing - Bad effects of excessive Admixtures in RCC - Water proofing coats for sump / overhead tank wall - Methods of grouting. | **3** |
| **IV** | **DOORS, WINDOWS AND VENTILATORS**<br>Standard sizes of doors and windows - Location of doors and windows - Different materials used - Doors Component parts Types - Framed and panelled, glazed, flush, louvered, collapsible, rolling shutter and sliding doors - Windows Types - Casement, Glazed, Bay, Corner, Pivoted, Circular and Dormer windows- Ventilators – Definition, purpose,Types - Ventilator combined with windows / doors. | **3** |
| | **HOLLOW BLOCK CONSTRUCTIONS**<br>Hollow blocks - Advantages of hollow blocks - load bearing and non load bearing hollow blocks - Open cavity blocks - face shells, web, gross area, nominal dimensions of blocks, minimum thickness of face shells and web, grades of hollow concrete blocks - Materials used, admixtures added - mixing, moulding, placing and compacting, curing, drying. | **2** |
| | **4.3 STAIRS**<br>Definition - Terms used - Location of stair types - Straight, Dog legged, Open well, bifurcated and spiral stairs - Moving stairs (Escalators) - Lift components uses and advantage of lifts over stairs. | **2** |

| | | |
|---|---|---|
| | **4.4 FLOORS AND FLOORING**<br>Floors - Definition - Types - Timber, Composite, RCC floors Flooring - Definition- Materials used - Selection of flooring types - Construction Methods (As per C.P.W.D/P.W.D Specifications) - Mosaic, Granolithic, Tiled, Granite, Marble, Pre cast concrete flooring, Plastic & PVC tile flooring- Carpet tile & Rubber flooring.<br><br>**4.5 ROOFS**<br>Definition - Types of roof - Flat roof - RCC roof - Pitched roof - Tile roof - Shell roof - Technical terms - Steel roof truss Types: King post, Raised chord, Howe truss, Fan, fink, north light and Modified north light trusses.<br><br>**4.6 WEATHERING COURSE**<br>Weathering course – Purpose - Materials Required - Brick Jelly Concrete preparation - Laying procedure- Preparation of mortar with Damp Proof materials for laying pressed clay tiles- Pointing and finishing of clay tiles - Use of Thermal Resistant - Weathering Tiles. | **3**<br><br>**2**<br><br>**2** |
| **V** | **5.1 POINTING**<br>Objectives - Mortar for pointing - Methods of pointing (As per C.P.W.D. / P.W.D Specifications) - Types of pointing - Flush, recessed, weathered, keyed or grooved pointing.<br><br>**5.2 PLASTERING**<br>Definitions - Objectives - Cement mortars for Plastering - Requirements of a good plaster - Methods of Plastering - Defects in plastering - Stucco plastering - Acoustic plastering - Granites silicon – plastering – Sand faced Pebble dash - Wall paper finishing - Wall tiling. | **2**<br><br>**3** |

| | | |
|---|---|---|
| V | **5.3 WHITE WASHING, COLOUR WASHING , DISTEMPERING, PAINTING & VARNISHING**<br>White washing - preparation of surface - Application of white wash - Colour washing - Distempering - Preparation of surfaces - Application of distemper- Painting & Varnishing - Preparation of Surface - Application of Painting & Varnishing. | **3** |
| | **5.4 ANTI-TERMITE TREATMENT**<br>Definition - objectives and uses - Methods of termite treatment. | **1** |
| | **5.5 SCAFFOLDING, SHORING AND UNDER PINNING**<br>Scaffolding – Definition - Component parts - Types Single, double & Steel scaffolding, Shoring – Definition - Types Raking, flying and dead shores - Underpinning definition - Purpose - Types - Pit Methods - Pile Method. | **3** |
| | **5.6 FORM WORK**<br>Definition - Materials used - Requirements of a good form work - Form work for column, RC beams and RC slab. | **2** |
| | **Test & Model Exam** | **7 Hrs.** |

**TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11**

**N - 20 SCHEME**

**DIPLOMA IN CIVIL ENGINEERING**

**(Implemented from the Academic Year 2021 – 2022 onwards)**

Course Name : 1010 : DIPLOMA IN CIVIL ENGINEERING

Subject Code : 4010330

Semester : III Semester

Subject Title : **SURVEYING**

## TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 16 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours / Week | Hours / Semester | Marks | | | Duration |
| | | | Internal Assessment | End Semester Examination | Total | |
| **SURVEYING** | **6 Hrs.** | **96 Hrs.** | **25** | **100*** | **100** | **3 Hrs.** |

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks

| Unit | Topics | Hours |
|---|---|---|
| I | Introduction to Surveying and Chain Surveying and campass surveying | 22 |
| II | Levelling | 17 |
| III | Theodolite Surveying | 17 |
| IV | Tacheometric Surveying & Contour Surveying | 17 |
| V | Total Station and Global Positioning system | 16 |
| | Test & Model Exam | 7 |
| | **TOTAL** | **96** |

# DETAILED SYLLABUS

## 4010330 - SURVEYING

Contents: Theory

| Unit | Name of the Topics | Hours |
|---|---|---|
| I | **INTRODUCTION TO SURVEYING AND CHAIN SURVEYING AND CAMPASS SURVEYING**<br>**SURVEYING**<br>Definition - Objectives and uses of surveying -Classification of Surveying - Principles of surveying. | **2** |
| | **CHAIN SURVEYING**<br>Introduction - Instruments used for chaining- Chains and Tapes – Types - Definitions of terms commonly used in chain surveying: Survey stations, base line, check line and tie line - Ranging: Direct and Indirect ranging Offsets: Definition, types, Instruments used - Errors in Chaining, Tape corrections and its necessity. | **10** |
| | **1.3 COMPASS SURVEYING**<br>Angular measurements-Necessity Instruments used Prismatic compass - Construction details, functions and Temporary adjustment - Types of meridians - Types of bearings - Whole circle and Reduced bearings, Fore and Back bearings- Computation of included angles from bearings - Computation of bearings from included angles - Problems. | **10** |
| II | **2.1 LEVELLING**<br>Levelling - Definition - Level Parts, Functions, Accessories- Types of levels **:** Dumpy level, Quick setting level, Automatic and Laser level Levelling staff **-** Types Component parts of Levelling instrument - Definitions of terms used **:** Level surface, Horizontal and Vertical surfaces, Datum, Bench marks, Reduced level, Rise, Fall, Line of collimation, Axis of telescope, Axis of bubble tube, Station, Back sight, Fore sight, | **17** |

| | | |
|---|---|---|
| | Intermediate sight, Change point, Height of instrument, Focusing and Parallax - Temporary adjustment of a level - Balancing - Back sight and Foresight- Principle of levelling - Simple levelling -Levelling field book - Reduction of levels - Height of collimation and Rise and Fall method - Comparison of methods - Problems on reduction of levels - Missing entry calculations **:** Problems. | |
| **III** | **3.1 THEODOLITE SURVEYING**<br>Introduction - Types of Theodolites: Transit and non- transit Theodolite, Vernier and Micrometer Theodolites, Electronic Theodolite (Principles and description only) - Component parts of a transit Theodolite - Functions - Technical terms used in Theodolite surveying - Temporary adjustments- Measurement of horizontal angle by method of repetition and reiteration- Measurement of vertical angle and deflection angle - Reading bearing of a line- Theodolite traversing - Methods - Field checks in closed traverse - Latitude and departure - Consecutive coordinates - independent coordinates - Problems on computation of area of closed traverse - Omitted measurements - Problems | **17** |
| **IV** | **TACHEOMETRIC SURVEYING**<br>Introduction-Instruments used in tacheometry - Systems of tacheometry: Stadia and Tangential tacheometry - Principles - Fixed hair method of tacheometry - Distance and Elevation formulae - Anallactic lens (No proof) - Advantages and uses - Direct reading tacheometers - Determination of constants of a tacheometer - Problems.<br><br>**CONTOUR SURVEYING**<br>Definition - Contour - Contouring - Characteristics of contours - Methods of contouring - Direct and Indirect methods - Tacheometric contouring - Interpolation of contours - Different methods - Contour gradient - Uses of contour plan and map. | **9**<br><br>**8** |

| | | |
|---|---|---|
| **V** | **TOTAL STATION AND GLOBAL POSITIONING SYSTEM**<br>**Total Station**<br>Introduction - Application of total station - Component parts of a Total Station - Accessories used - Summary of total station characteristics - Features of total station - Electronic display and data reading - Field procedure for co-ordinate measurement - Instrument preparation, Setting and Measurement (Distance, Angle, Bearing, Curve etc.).<br>**GLOBAL POSITIONING SYSTEM ( GPS )**<br>Introduction - Maps - Types of Maps - Various Satellites used by GPS - Differential GPS - Fundamentals of GPS - Application of GPS - GPS Receivers - Hand held GPS Receiver - Function Field procedure - Observation and processing applications in Civil Engineering. | **8**<br>**8** |
| | **Test & Model Exam** | **7 Hrs.** |

**TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11**

**N - 20 SCHEME**

**DIPLOMA IN CIVIL ENGINEERING**

**(Implemented from the Academic Year 2021 – 2022 onwards)**

Course Name : 1010 : DIPLOMA IN CIVIL ENGINEERING

Subject Code : 4010340

Semester : III Semester

Subject Title : **BUILDING PLANNING AND DRAWING**

## TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours/ Week | Hours/ Semester | Marks | | | Duration |
| **BUILDING PLANNING AND DRAWING** | **4 Hrs.** | **64 Hrs.** | **Internal Assessment** | End Semester **Examination** | **Total** | |
| | | | **25** | **100*** | **100** | **3 Hrs.** |

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks

### Topics and Allocation of Hours

| Unit | Topics | Hours |
|---|---|---|
| I | Introduction | 5 |
| II | Planning of Building | 5 |
| III | Basic Drawings | 9 |
| IV | Building Drawings | 38 |
| | Test & Model Exam | 7 |
| | **TOTAL** | **64** |

# DETAILED SYLLABUS

## 4010340-BUILDING PLANNING AND DRAWING

Contents: Theory

| Unit | Name of the Topics | Hours |
|---|---|---|
| I | **INTRODUCTION**<br>**CONVENTIONS, SYMBOLS :**<br>General – Conventions- Title block- Scales- Line work- Lettering - Symbols - Abbreviations<br><br>**BUILDING BYE-LAWS AND SUBMISSION OF DRAWINGS** Objects of bye-laws- Importance of bye-laws- Function of local authority-Set backs- Plot Coverage- Number of floors- Height of building- Built up Area- Floor space index (FSI) - Views and details necessary for the preparation of a civil engineering drawing- Site Plan – Necessity for Approval of plans from local body- Layout plan and key plan- Requirements for submission of drawing for approval- Rules and bye-laws of sanctioning authorities for construction work. | 5 |
| II | **PLANNING OF BUILDINGS**<br>**PLANNING OF RESIDENTIAL BUILDINGS**<br>Types of residential buildings- Usual requirements-Types of Rooms – Minimum Size requirement for each type of rooms - Furniture arrangement in each room- Position of stairs / lifts- Position of Doors/ Windows House drainage and Sanitary fittings – Sump/Water tanks- Plumbing Pipes -Preparation of line drawing for given requirements with dimensions, not to scale.<br>**PLANNING OF INDUSTRIAL STRUCTURES**<br>Planning aspects - Requirements of industrial units - Sheets for pitched roof coverings – Rolling Shutters - Ramps- Stores- Public Toilets/ Bath rooms- Dining / Resting halls- Ventilation and Lighting - Preparation of line drawing for given requirement with measurements (not to scale). | 5 |

| | | |
|---|---|---|
| | **2.3 PLANNING OF PUBLIC BUILDINGS**<br>Types of public buildings - Miscellaneous public buildings - General requirements of Public Buildings -Landscape architecture - Preparation of line plan with dimensions for the given requirements (not to scale). | |
| **III** | **BASIC DRAWINGS**<br>Standard symbols used in Civil Engineering Drawing.<br>Draw the elevation of :<br>1. Fully panelled double leaf door.<br>2. Fully Panelled single leaf door<br>3. Flush door<br>4. Fully Panelled window with grill<br>5. Partly glazed and partly panelled window<br>6. Lean- to – roof<br>7. King post roof truss<br>8. Steel roof truss<br>9. Rain water Harvesting– Recharging into the ground<br>a. Shallow well system b. Percolation pit system. | **9** |
| **IV** | **BUILDING DRAWINGS**<br>Preparation of plan, section and elevation of buildings with specifications for the given line drawing to suitable Scale:<br>1. A Reading room with R.C.C flat roof<br>2. A House with single bed room and attached bathroom with R.C.C. flat roof.<br>3. A residential building with two bed rooms with R.C.C. flat roof<br>4. A Two roomed house with RCC slope roof with gable ends<br>5. A Small workshop with north light steel roof truss (6 to 10m Span) over R.C.C. Columns.<br>6. A Primary health center for rural area with R.C.C roof.<br>7. A Village Library building with R.C.C flat roof<br>8. A small Restaurant building with R.C.C flat roof<br>9. A Single storied School building with R.C.C flat roof<br>10. A Bank building with R.C.C flat roof. | **38** |
| | **Test & Model Exam** | **7 Hrs.** |

**TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11**

**N - 20 SCHEME**

**DIPLOMA IN CIVIL ENGINEERING**

**(Implemented from the Academic Year 2021 – 2022 onwards)**

Course Name : **1**010 **:** DIPLOMA IN CIVIL ENGINEERING

Subject Code : 4010350

Semester : III Semester

Subject Title : **CIVIL ENGINEERING DRAWING AND CAD PRACTICAL - I**

## TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 16 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours / Week | Hours / Semester | Marks | | | Duration |
| | | | Internal Assessment | End Semester Examination | Total | |
| **CIVIL ENGINEERING DRAWING AND CAD PRACTICAL - I** | **4 Hrs.** | **64 Hrs.** | **25** | **100*** | **100** | **3 Hrs.** |

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks

**RATIONALE:**

Computers play a very vital role in present day life, more so, in all the professional life of engineering. In order to enable the students, use the computers effectively in drafting, this course offers Computer Aided Drafting of various drawings in civil engineering.

**OBJECTIVES:**

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

- Know about CAD commands
- Understand building components
- Draw building drawing using CAD software
- Prepare approval drawing for submission to authority

# DETAILED SYLLABUS

## 4010350 - Civil Engineering Drawing and CAD Practical - I

Contents:Practical Total: 64 Hours

### LIST OF EXPERIMENTS

**Preparation of drawing using CAD Software**

**Introduction of CAD software for Preparation of Drawings 6 Hours**

1. Definition of various commands used in CAD software.
2. Simple Exercises for familiarizing the drawing commands in CAD software.

**PART A 14 Hours**

**Draw the given drawings in Computer and take print out of all drawings in A4 sheet using Inkjet / laser printer or plotter and produced in file forms as record.**

3. Section of semicircular Arch
4. Elevation of door, partly panelled and partly glazed
5. Preparation of Plan showing arrangement of furniture / fixtures and other features with standard sizes for the followings ( Each roomto be drawn separately - features and furniture may be pasted from the Blocks available in the packages )
   (i) Living (ii) Bed Room (iii) Kitchen (iv) Toilet
6. Steel Structures: Cross section of I, Channel, T, Angle and Tubular section, Compound Beams.
7. Section of Load bearing wall from parapet to foundation showing all the details across the section. (Single storey)

**PART B 44 Hours**

**Draw the building drawing using available CAD software**

8. Plan, Section and Elevation of a single bed roomed building (R.C.C. Roof)
9. Plan, Section and Elevation of a Double bed roomed building (R.C.C. Roof)
10. Plan, Section and Elevation of a Primary School Building
11. Plan, Section and Elevation of a Hospital Building
12. Plan, Section and Elevation of a Workshop with steel columns, Steel roof truss and Metal sheet Roofing of about 300 $m^2$ area.

13. Preparation of approval drawing to be submitted to Corporation or Municipality showing required details in one sheet such as

a) Site Plan (Land boundary, Building boundary, Car Parking, Passage, sanitary layout, septic tank location etc.

b) G.F. Plan, F.F. Plan, Section and Elevation (line diagram is enough)

c) Key Plan

d) Septic tank Plan and section (line diagram)

e) Rain water harvesting pit (with all detail)

f) Typical foundation details (Column foundation or spread footing)

g) Title block showing – joinery details, Specification, Area statement, colour Index, Title of the property, space for owners Signature and Licensed Surveyor‟s Signature with address.

**TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11**

**N - 20 SCHEME**

**DIPLOMA IN CIVIL ENGINEERING**

**(Implemented from the Academic Year 2021 – 2022 onwards)**

Course Name : 1010**:** DIPLOMA IN CIVIL ENGINEERING

Subject Code : 4010360

Semester : III Semester

Subject Title : **MATERIAL TESTING LABORATORY- I**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours/ Week | Hours/ Semester | Marks | | | Duration |
| | | | Internal Assessment | End Semester Examination | Total | |
| **MATERIAL TESTING LABORATORY- I** | **3 Hrs.** | **48 Hrs.** | **25** | **100*** | **100** | **3 Hrs.** |

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks

**RATIONALE:**

The understanding of the structural, physical and mechanical properties and behaviour of engineering materials is at the very core of engineering design. A command of this knowledge is essential for all civil engineers. This laboratory provides a hands-on experience with the testing and evaluation of civil engineering materials, including steel, wood, Cements, Aluminium, Brass and Brick.

**OBJECTIVES:**

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

- Study of UTM, Torsion testing machine, Hardness tester, Compression testing machine.
- Determine the Material Properties- test conducted on steel, wood, cement, Aluminium, Brass and Brick.

# DETAILED SYLLABUS

## 4010360 - MATERIAL TESTING LABORATORY - I

**Contents: Practical** **Total: 48 Hrs.**

| Unit | Name of the Topics | Hours |
|---|---|---|
| **PART A** | 1. Tension test on mild steel **/** deformed steel bars.<br>2. Deflection test on Simply Supported Beams of<br>a. wood and b. steel to find Young's modulus<br>3. Torsion test on mild steel bar to determine the Modulus of Rigidity.<br>4. Double shear test on M.S. bar.<br>5. Impact Test on mild steel by performing Izod / Charpytests.<br>6. Find Brinnel's hardness numbers of the following materials.<br>a. Mild steel b. Brass c. Aluminium.<br>7. Find Rockwell"s hardness numbers of the following materials.<br>a. Mild steel b. Brass c. Aluminium. | **25 Hrs.** |
| **PART B** | 8. Compression Test on Wooden cube.<br>9. Compression test on Bricks.<br>10. Compression test on Solid Blocks<br>11. Water absorption test on Bricks /pressed tiles.<br>12. Flexure test on Tiles.<br>13. Casting of Cement Mortar cubes after determining the normal consistency of cement..<br>14. Determining the compressive strength of Cement Mortor cubes. | **23 Hrs.** |

**TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11**

**N - 20 SCHEME**

**DIPLOMA IN CIVIL ENGINEERING**

**(Implemented from the Academic Year 2021 – 2022 onwards)**

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING

Subject Code : 4010370

Semester : III Semester

Subject Title : **SURVEYING PRACTICE - I**

## TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 16 weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours / Week | Hours / Semester | Marks | | | Duration |
| | | | Internal Assessment | End Semester Examination | Total | |
| SURVEYING PRACTICE-I | 4 Hrs. | 64 Hrs. | 25 | 100* | 100 | 3 Hrs. |

*Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

**RATIONALE:**

The important functions of a diploma civil engineer include the jobs of detailed surveying, plotting of survey data, preparation of survey maps and setting out works. Field work should be a selected one so that the student can check his work and have an idea of the results and the extent of error in the work done by him. As far as possible, the surveys done should be got plotted, as this will also reveal errors in the work and develop skill in plotting

**OBJECTIVES:**

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

- Handle surveying equipments
- Do practical exercises in Chain surveying, Compass surveying, Levelling and GPS.

# DETAILED SYLLABUS

## 4010370 - SURVEYING PRACTICE-I

**Contents : Practical** **Total:64 Hrs.**

| Unit | Name of the Topics | Hours |
|---|---|---|
| PART A | **1. CHAIN AND COMPASS SURVEYING**<br>Study of chain, tape and accessories used for chain survey. Study of Prismatic compass, setting up over a station and observe bearings of lines.<br>Running closed traverse and finding the included angles Use Chain / Tape and Compass. Minimum 5 points. Determination of distance between two points when their base is accessible. Use Chain / Tape and Compass. Determination of distance between two points when their base is inaccessible. Use Chain / Tape and Compass. | 8 |
| | **2. GLOBAL POSITIONING SYSTEM ( GPS )**<br>Reading of various Maps like Taluk map, District Map and Topo sheets. Study of Hand held GPS. Measurement of Latitude, Longitude and Altitude using hand held GPS. Selection and marking of routings (Way points) using hand held GPS. | 8 |
| PART B | **3. LEVELLING**<br>Study of a Level - Temporary adjustment, taking readings and booking in a field book. Fly leveling Reduction by Height of Collimation method - Minimum 6 points with two change points (Minimum Two exercises)<br>Fly leveling Reduction by Rise and Fall method - Minimum 6 points with two change points (Minimum Two exercises). Fly levelling covering minimum 6 points with 2 inverted readings (Minimum Two exercises).<br>Check levelling and reduction of levels (Minimum Two exercises) | 48 |