

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

**N - 20 SCHEME**

**DIPLOMA IN CIVIL ENGINEERING**

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

**CURRICULUM OUTLINE**

**FIFTH SEMESTER (FULL TIME)**

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010510	Structural Engineering	6	-	-	6
4010520	Environmental Engineering	5	-	-	5
	<b>Elective Theory-I</b>				
4010531	Remote Sensing and Geoinformatics	5	-	-	5
4010532	Concrete Technology				
4010533	Geotechnical Engineering				
4010540	Civil Engineering Drawing and CAD Practical - II	-	3	3	6
4010550	Environmental Engineering Laboratory	-	-	3	3
	<b>Elective Practical -I</b>				
4010561	Advanced Surveying and Basic GIS Practical	-	-	3	3
4010562	Concrete Technology Practical				
4010563	Geotechnical Engineering Laboratory				
4010570	Entrepreneurship and Startups	-	-	4	4
Co-curricular activities	Physical Education	-	-	-	2
	Library	-	-	-	1
	<b>TOTAL</b>	<b>16</b>	<b>3</b>	<b>13</b>	<b>35</b>

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

**N - 20 SCHEME**

**DIPLOMA IN CIVIL ENGINEERING**

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

**CURRICULUM OUTLINE**

**FIFTH SEMESTER (PART TIME)**

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010420	Hydraulics	5	-	-	5
4010520	Environmental Engineering	4	-	-	4
4010350	Civil Engineering Drawing and CAD Practical-I	-	-	3	3
4010440	Hydraulics Laboratory	-	-	3	3
4010470	Surveying Practice-II	-	-	3	3
	<b>TOTAL</b>	<b>9</b>	<b>-</b>	<b>9</b>	<b>18</b>

**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 : 4010510  
Semester : V Semester  
Subject Title : **STRUCTURAL ENGINEERING**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
<b>STRUCTURAL ENGINEERING</b>	6 Hrs.	96 Hrs.	Internal Assessment	End Semester Examination	Total	3 Hrs.
			25	100*	100	

\*Examinations will be conducted for 100 Marks and converted to 75 Marks.

**Topics and Allocation of Hours**

Unit	Topics	Hours
I	Reinforced cement concrete structures	18
II	Design of T-beams and lintels for flexure by LSM Design of Continuous Beams for flexure and shear by LSM	17
III	Design of one way Slabs and Stair cases by LSM Design of two way Slabs by LSM	20
IV	Design of columns by LSM Design of Column Footings	16
V	Steel Structures	18
	Test & Model Exam	7
	<b>Total</b>	<b>96</b>

**RATIONALE:**

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise RCC construction. They may also be required to design simple structural elements, make changes in design depending upon the availability of materials (bars of different diameters). This subject thus deals with elementary design principles as per BIS code of practice BIS: 456 – 2000 by limit state method.

**OBJECTIVES:**

On completion of the course the students should be able to:

- Analyse and design simple RCC elements like singly / doubly reinforced rectangular beams, and singly reinforced T-beams (Cantilevers, Simply supported/ Continuous beams, Lintels etc.) for shear and flexure by limit state method;
- Design One way/ Two way slabs and Staircases by limit state method;
- Design Axially loaded Columns and Footings by limit state method;
- Design simple Steel members like Laterally supported Beams, Tension members, Compression members and Welded connections by limit state method.

## DETAILED SYLLABUS

### 4010510-STRUCTURAL ENGINEERING

Contents: Theory

Unit	Name of the Topics	Hours
I	<p><b>REINFORCED CEMENT CONCRETE STRUCTURES</b></p> <p><b>INTRODUCTION TO WORKING STRESS AND LIMIT STATE</b></p> <p><b>METHOD</b></p> <p>Reinforced Cement Concrete- Materials used in R.C.C and their basic requirements - Purpose of providing reinforcement - Different types and grades of cement and steel – Characteristic strength and grades of concrete – Behaviour of R.C members in bending-Modular ratio and Equivalent area of R.C.Sections - Different types of loads on structures as per IS: 875-1987 - Different methods of design.</p> <p>Working Stress Method-Assumptions made in the W.S.M- Singly reinforced rectangular sections - Strain and stress distribution due to bending - Actual and Critical neutral axes - Under / Over reinforced sections- Balanced sections - Lever arm - Moment of resistance of singly reinforced rectangular sections (No problems).</p> <p>Limit State Method - Concept -Advantages- Different limit states- Characteristic strength and design strength of materials - Characteristic loads and design loads - Partial safety factors for loads and material strength - Limit state of collapse in flexure - Assumptions - Stress Strain curves for concrete and steel – Stress block – Maximum strain in concrete - Limiting values of neutral axis of singly reinforced section for different grades of steel -Design stress in tension and compression steel- Moment of resistance of singly and doubly reinforced rectangular sections- Problems.</p> <p><b>DESIGN OF RECTANGULAR BEAMS FOR FLEXURE BY L.S.M</b></p> <p>Design requirements-Effective spans of cantilever and simply supported</p>	8

	<p>beams – Breadth and depth requirements of beams – Control of deflection – Minimum depth requirement for stiffness – Minimum concrete cover to reinforcement steel for durability and fire resistance – Minimum and maximum areas/ spacing for main reinforcement and side face reinforcement as per IS 456 -2000 - Development Length- Anchorage values of bends and hooks - Curtailment of reinforcements- Design bending moments – Design of singly and doubly reinforced rectangular beams (Cantilevers and Simply supported beams carrying udl only)- Problems- Practice on using Design Aids, SP16 (Description only).</p>	<b>10</b>
<b>II</b>	<p style="text-align: center;"><b>DESIGN OF T-BEAMS AND LINTELS FOR FLEXURE BY L.S.M</b></p> <p>Cross sections of Tee and L-beams- Effective width of flange- Neutral Axis and M.R of Singly Reinforced T-Sections- Design of singly reinforced T-beams for flexure-Problems on Simply supported T- beams carrying udl only – Loads on Isolated Lintels over openings of masonry walls - Design B.M for isolated lintels carrying rectangular/triangular loads- Design of Lintel- Simple problems</p> <p style="text-align: center;"><b>DESIGN OF CONTINUOUS BEAMS FOR FLEXURE AND SHEAR BY L.S.M</b></p> <p>Methods of analysis of continuous beams- Effective Span- Arrangement of Loading for Critical Bending Moments- B.M coefficients specified by IS:456-200-Design of rectangular continuous beams (Singly and Doubly Reinforced) using B.M. coefficients (equal spans &amp; u.d.l only) for sagging and hogging moments.</p> <p>Limit state of collapse in shear – Design shear strength of concrete – Design shear strengths of vertical / inclined stirrups and bent up bars – Principle of shear design – Critical sections for shear- S.F Coefficients specified by IS:456- 2000- Nominal shear stress -Minimum shear reinforcement- Design of vertical stirrups for rectangular beams using limit state method -Simple problems- Practice on use of Design Aids (Description only).</p>	<p><b>8</b></p> <p><b>9</b></p>

<b>III</b>	<p><b>3.1 DESIGN OF ONE WAY SLABS AND STAIRCASES BY L.S.M</b></p> <p>Classification of Slabs – Effective spans – Loads (DL and IL) on floor/roof slabs and stairs (IS: 875-1987) – Strength and Stiffness requirements -Minimum and maximum permitted size, spacing and area of main and secondary reinforcements as per IS 456 - 2000- Cover requirement to reinforcements in slabs- Design of cantilever/simple supported one way slabs and sunshades by limit state method - Design of continuous slabs using B.M coefficients- Check for shear and stiffness – Curtailment of tension reinforcement -Anchoring of reinforcement- Practice in designing slabs using design aids (Description only).</p> <p>Types of stairs according to structural behaviour- Requirements of Stairs- Planning a staircase – Effective span of stairs – Effective breadth of flight slab- Distribution of loads on flights – Design of cantilever steps – Design of doglegged stairs spanning parallel to the flight - Planning of open well staircase.</p> <p><b>3.2 DESIGN OF TWO WAY SLABS BY L.S.M</b></p> <p>Introduction -Effective spans -Thickness of slab for strength and stiffness requirements - Middle and Edge strips - B.M coefficients as per IS:456 - Design B.Ms for Simply supported, Restrained and Continuous slabs - Tension and Torsion reinforcement requirement- Design of two way slabs using B.M. coefficients - Curtailment of reinforcement - Check for stiffness only.</p>	<p><b>12</b></p> <p><b>8</b></p>
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<p><b>IV</b></p>	<p><b>DESIGN OF COLUMNS BY L.S.M</b></p> <p>Limit state of collapse in compression - Assumptions - Limiting strength of short axially loaded compression members - Effective length of compression members - Slenderness limits for columns - Classification of columns -Minimum eccentricity for column loads – Longitudinal and Transverse reinforcement requirements as per I S 456-2000 – Cover requirement - Design of axially loaded short columns with lateral ties / helical reinforcement – Practice on use of Design Aids (Description only).</p> <p><b>DESIGN OF COLUMN FOOTINGS</b></p> <p>Basic requirements of Footings-Types of R.C footings -Minimum depth below GL- Footings with uniform thickness and varying thickness (sloped footing) - Critical sections for BM, Transverse/Punching Shears – Minimum reinforcement, Distribution of reinforcement, Development length, Anchorage, Cover, Minimum edge thickness requirements as per IS 456- 2000 – Design of Isolated footing (square and rectangular) with uniform/ varying thickness by limit state method- For Examination : Problem either on (i) Designing Size of Footing and Area of tension steel for flexure only for the given Column load and SBC of soil, or on (ii) Checking the footing for Punching shear and Transverse shear only, for the given sizes and other required details of the footing.</p>	<p><b>8</b></p> <p><b>8</b></p>
<p><b>V</b></p>	<p><b>STEEL STRUCTURES</b></p> <p><b>5.1 DESIGN OF TENSION AND COMPRESSION MEMBERS BY L.S.M</b></p> <p>General- Characteristic Actions, Partial Safety Factors for Loads, Design Actions- Ultimate Strength, Partial Safety Factors for Materials, Design Strengths of Materials - Rolled Steel Sections - Different forms of Tension members – Gross area, Net area and Net Effective sectional area of Tension members- Maximum permitted values of Effective Slenderness Ratio -Design Strength of single angle Tension members against Yielding of Gross section and Rupture of Critical section - Block Shear (Description only) - Design of ties using single angles and channel sections.</p>	<p><b>9</b></p>



	<p>Different forms of Compression members- Classification of Cross sections- Limiting Width to Thickness Ratio- Effective sectional area- End Conditions and Effective length of Compression members – Maximum permitted values of Slenderness ratio – Imperfection factor and Stress reduction factor- Design Strength of Compression members- Problems – Design of single angle and double angle Struts - Design of steel columns using rolled steel sections (Symmetrical sections only) without cover plates. (Lacing and battens not included).</p> <p><b>5.2 DESIGN OF SIMPLE BEAMS AND WELDED CONNECTIONS BY L.S.M</b></p> <p>Classification of Steel beams -Effective span- Design principles- Minimum thickness of Web-Design Strength in Bending/ Shear- Limiting deflection of beams - Lateral buckling of beams – Maximum permitted Slenderness Ratio- Plastic Moment of Resistance and Plastic Section Modulus of Sections- Shape Factor — Design of laterally supported Simple beams using single / double rolled steel sections (symmetrical cross sections only) (Built-up beams not included).</p> <p>Types of welds - Size, Effective area and Effective length of Fillet welds – Requirements of welds-Stresses in Welds -Design strength of fillet/ butt welds -- Lap and butt joints for angles only – Simple Problems - Procedure for design of welded connections for Plates and Angles (Theory only).</p>	<p><b>9</b></p>
	<p><b>Test &amp; Model Exam</b></p>	<p><b>7 Hrs.</b></p>

**Reference Books:**

1. S.R.Karve and V.L.Shah," Limit state Theory and Design of Reinforced Concrete",Pune Vidya Griha Prakashan.
2. P C Varghese," Limit state Design of Reinforced Concrete", PHI Learning Pvt. Ltd",2011.
3. Dr.S.Ramachandra,"Limit State Design of Concrete Structures", Scientific publishers, 2004.
4. Mallick and Rangasamy,"Reinforced Cement Concrete" Oxford-IBH.
5. N Krishnaraju, " Reinforced Concrete Design" New Age International Publications, 2012
6. B C Punmia, " Limit State Design of Reinforced Concrete", Laxmi Publications,2007
7. B C Punmia, " R C C Designs", Laxmi Publications, 2006
8. S S Bhavikatti, " Design of R C C and Structural Elements" ( RCC Vol I), New Age International Publications, 2011
9. IS 456-2000 ; I S 875-1987; I S 800 -2007.
10. 10. Explanatory hand book SP24, Design Aid SP 16, Detailing of Reinforcement, SP 34
11. M.R.Shiyekar "Limit State Design in Structural Steel", PHI Learning Pvt Ltd, 2011

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**N - 20 SCHEME**

**DIPLOMA IN CIVIL ENGINEERING**

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

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING

Subject Code : 4010520

Semester : V Semester

Subject Title : **ENVIRONMENTAL ENGINEERING**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
ENVIRONMENTAL ENGINEERING	5 Hrs.	80 Hrs.	Internal Assessment	End Semester Examination	Total	3 Hrs.
			25	100*	100	

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

**Topics and Allocation of Hours**

UNIT	Topics	Hrs.
I	Water Supply Engineering: Introduction, Quantity of Water, Source of Water, Intakes and conveyance	15
II	Quality of Water, Primary treatment of water, Filtration of water, Disinfection of water and water softening.	15
III	Distribution system and preparation of water supply scheme or project.	15
IV	Sanitary Engineering: Collection and conveyance of sewage, Seaware appurtenances.	14
V	Primary Treatment of water, Secondary treatment of water, solid waste disposal, sludge waste disposal and preparation of sanitary scheme or project.	14
	Test & Model Exam	7
	<b>Total</b>	<b>80</b>

**RATIONALE:**

Diploma holders in Civil Engineering are expected to supervise construction of water supply and waste water treatment works. They are also responsible for waste disposal activities. This subject aims at imparting skills for preparing water supply and waste water engineering drawings to develop competencies for reading the drawings, and their execution in their field.

In addition, Civil Engineering diploma holders must have the knowledge of different types of environmental aspects due to development activities so that they may help in maintaining the ecological balance and control pollution. They should also be aware of the environmental laws for effectively combating environmental pollution.

**OBJECTIVES:**

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

- Know the procedure of estimating water requirements for a water supply scheme.
- Select suitable sources of water supply and pipe materials.
- Determine the quality of water, testing procedures and standards for drinking water.
- Understand the methods of purification of water.
- Understand the systems of distribution for a water supply scheme.
- Understand the basic facts of sanitary engineering, the methods of collection and conveyance of sewage.
- Understand the primary and secondary treatment of sewage and disposal.
- Know the methods of disposal of sludge and solid wastes.
- Identify the various types of pollution and their prevention.
- Create awareness about environmental impact assessment.

## DETAILED SYLLABUS

### 4010520-ENVIRONMENTAL ENGINEERING

#### Contents: Theory

Unit	Name of the Topics	Hours
I	<b>PART I - WATER SUPPLY ENGINEERING</b>	
	<b>INTRODUCTION</b>	3
	Water Supply – Salient Features of a Water Supply Scheme – Flow Chart of a Water Supply Scheme- Agencies responsible for protected water supply.	
	<b>QUANTITY OF WATER</b>	4
	Water Supply - Need for Protected Water Supply - Objectives of Public Water Supply System Demand - Types of Demand - Per Capita Demand - Prediction of Population - Problems in Arithmetical Increase Method, Geometrical Increase Method, Incremental Increase Method.	
	<b>SOURCES OF WATER</b>	3
	Sources of Water - Surface Sources - Underground Water Sources - Selection of Source of Water.	
	<b>INTAKES AND CONVEYANCE</b>	5
	Intakes - Types of Intakes - Description of Intakes -Infiltration Galleries and Infiltration Wells in River Beds - Pipes for Conveyance of Water - Cast Iron, Steel, G.I., Cement Concrete, R.C.C., Hume and PVC Pipes - Pipe Joints - Laying and Testing of Pipe Lines.	
II	<b>QUALITY OF WATER</b>	3
	Impurities in Water - Testing of Water - Collection of Water Sample - Physical, Chemical, Bacteriological Tests - Standards of Drinking Water - Water Borne Diseases and their Causes.	
	<b>PRIMARY TREATMENT OF WATER</b>	5
	Object of Water Treatment – Flow Diagram of a Treatment Plant – Function of Units - Sedimentation - Purpose of Sedimentation - Types of Sedimentation Tank – Coagulation – Coagulants – Flocculation – Coagulation Process.	

	<p><b>2.3 FILTRATION OF WATER</b></p> <p>Theory of Filtration - Classification of Filters - Slow Sand Filter - Rapid Sand Filter - Pressure Filter - Comparison between slow sand filter and rapid sand filter.</p> <p><b>2.4 DISINFECTION OF WATER AND WATER SOFTENING</b></p> <p>Necessity of Disinfection - Methods of Disinfection - Chlorination -Action of Chlorine – Methods of Chlorine – Forms of Chlorination -Water Softening – Necessity of Water Softening – Hardness – Types of Hardness - Effects of Hardness - Removal of Hardness (names only) - Miscellaneous Water treatment (names only) – Mineral water – requirements - Treatment Process - Reverse of Osmosis (RO).</p>	<p>3</p> <p>4</p>
III	<p><b>3.1 DISTRIBUTION SYSTEM</b></p> <p>Distribution System - Methods of Distribution Gravity System, Pumping System, Combined System - Systems of Water Supply - Continuous and Intermittent Supply of Water -Layouts of Distribution - Dead End, Grid Iron, Radial and Circular Systems – Service Reservoirs - Types.</p> <p><b>3.2 PREPARATION OF WATER SUPPLY SCHEME OR PROJECT</b></p> <p>Reconnaissance of Survey - Demand of Water - Source of Water - Preparation of Topographical Map - Layout Map of the Scheme - Map and Drawing to be Prepared - Office Work - Project Report.</p>	<p>7</p> <p>8</p>
IV	<p><b>PART II – SANITARY ENGINEERING</b></p> <p><b>4.1 COLLECTION AND CONVEYANCE OF SEWAGE</b></p> <p>Sanitation Purpose Terms - Systems of Sanitation - Quantity of Sewage - Variation in Rate of Flow of Sewage -Estimation of storm water - problems - Minimum Size of Sewer – Shapes of Sewer (names only) - Materials used for Sewer - Joints in Sewer Line - Laying and Testing of Sewer Lines - Ventilation of Sewers - Cleaning of Sewers.</p>	<p>7</p>

	<p><b>4.2 SEWER APPURTENANCES</b></p> <p>Sewer Appurtenances Manhole - Lamp Hole - Catch Basin - Street - Inlet - Grease and Oil Trap - Flushing Tanks Drainage Arrangements in Buildings - Sanitary Fittings - Sewage Pumps Necessity - Types of Sewage Pumps (names only).</p>	7
V	<p><b>5.1 PRIMARY TREATMENT OF SEWAGE</b></p> <p>Introduction – Flow Diagram of Primary Treatment -Screens – Grit Chamber - Skimming Tank - Primary Sedimentation Tank.</p>	2
	<p><b>5.2 SECONDARY TREATMENT OF SEWAGE</b></p> <p>Introduction - Flow Diagram of Secondary Treatment - Function of the Units of Secondary Treatment - Secondary Sedimentation Tank - Filters - Types - Trickling Filters - Activated Sludge Process - Septic Tanks for isolated buildings - Construction and working of septic tanks – Soak Pits - Dispersion Trenches.</p>	3
	<p><b>5.3 ENVIRONMENTAL POLLUTION AND SOLID WASTE DISPOSAL</b></p> <p>Environment – definition - water pollution - sources of water pollution - effects of water pollution - control of water pollution - soil pollution - sources of soil pollution - effects of soil pollution - control of soil pollution - noise pollution - sources of noise pollution - effects of noise pollution - control of noise pollution - air pollution - sources of air pollution - effects of air pollution on human beings, plants, animals, materials - air pollution control equipment - control devices for particulate contaminants - environmental degradation - ozone layer depletion . Solid Waste Disposal – Necessity – Method of Solid Waste Disposal - dumping, sanitary landfill, composting - energy from waste.</p>	6
	<p><b>5.4 ENVIRONMENTAL IMPACT ASSESSMENT</b></p> <p>Environmental impact assessment (EIA) - methodology of EIA - organising the job - performing the assessment - preparation of environmental impact statement (EIS) - review of EIS - environmental risk assessment - limitation of EIA.</p>	3
	<b>Test &amp; Model Exam</b>	<b>7 Hrs.</b>

**Reference Books:**

1. S.K. Garg, "Water Supply and Sanitary Engineering", PHI Kanna publishers, New Delhi".
2. S.C. Rangwala, Water Supply and Sanitary Engineering, Charotar Publishing House, New Delhi, 2007
3. G.S. Birdie and J.S. Birdie, Water Supply and Sanitary Engineering, Dhanpat Rai Publishers, New Delhi, 2010.
4. N.N. BASAK, Environmental Engineering, Tata McGraw hill publishing Company Ltd., New Delhi, 2010
5. A.Kamala D.I.kanthrao, Environmental Engineering, Tata McGraw hill publishing Company Ltd., New Delhi, 1985
6. Gurcharan Singh, Water supply and Sanitary Engineering vol.I & II, Standard publishers & distributors, New Delhi, 2007.
7. Dr.Suresh K.Dhameja, Environmental Engineering and Management, S.K.Kataria & Sons, New Delhi. 2005.
8. B C Punmia, Environmental Engineering, Laxmi Publications, New Delhi, 2010
9. Dr.Suresh, K.Dhamija, Environmental Studies, S.K.Katarial Sons, Delhi, 2010



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**N - 20 SCHEME**

**DIPLOMA IN CIVIL ENGINEERING**

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

Course Name : 1010 : DIPLOMA IN CIVIL ENGINEERING  
Subject Code : 4010531  
Semester : V Semester  
Subject Title : **REMOTE SENSING AND GEOINFORMATICS**  
(Elective Theory I)

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours/ week	Hours/ Semester	Marks			
REMOTE SENSING AND GEOINFORMATICS	5 Hrs.	80 Hrs.	Internal Assessment	End Semester Examination	Total	3 Hrs.
			25	100*	100	

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

**Topics and Allocation of Hours**

Unit	Topics	Hours
I	Fundamentals of Remote Sensing	15
II	Photogrammetry	15
III	Image Interpretation and Analysis	15
IV	Fundamentals of GIS	14
V	GIS - Data entry, Storage and Analysis	14
	Test & Model Exam	7
	<b>Total</b>	<b>80</b>

**RATIONALE:**

In civil engineering projects, RS and GIS techniques can become potential and indispensable tools. Various civil engineering application areas include regional planning and site investigation, terrain mapping and analysis, water resources engineering, town planning and urban infrastructure development, transportation network analysis, landslide analysis, etc.

**OBJECTIVES:**

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

- Understand the basic concepts of remote sensing
- Know the applications of Geographic information systems in Civil Engineering
- Identify the basic remote sensing concepts and its characteristics
- Implement the photogrammetry concepts and fundamentals of Air photo interpretation
- Use various analysis and interpretation of GIS results

## DETAILED SYLLABUS

### **4010531- REMOTE SENSING AND GEOINFORMATICS (ELECTIVE THEORY I)**

Contents: Theory

<b>Unit</b>	<b>Name of the Topics</b>	<b>Hours</b>
<b>I</b>	<b>FUNDAMENTALS OF REMOTE SENSING</b> Basics of Remote Sensing: Definitions and its components - Energy Sources and Radiation principles - electromagnetic radiation (EMR) - spectrum – wavelength regions important to remote sensing – Atmospheric scattering, absorption - Atmospheric windows - spectral signature concepts - typical spectral reflective characteristics of water, vegetation and soil. characteristic of real remote sensing system, platforms, orbit types, sensors, resolution concept satellite,-Pay load description of important Indian Earth Resources and Meteorological satellites.	<b>15</b>
<b>II</b>	<b>PHOTOGRAMMETRY</b> Geometric elements of a vertical photograph – Stereoscopic plotting instruments, Ortho photos, Flight planning	<b>15</b>
<b>III</b>	<b>IMAGE INTERPRETATION AND ANALYSIS</b> Fundamentals of Air-photo interpretation - Elements of image-interpretation, concepts of digital image processing image Rectification and Restoration, Image enhancement, Image classification, Application of Remote sensing in Civil Engineering	<b>15</b>
<b>IV</b>	<b>FUNDAMENTALS OF GIS</b> Basic Concepts of GIS - Basic spatial concepts -Coordinate Systems: Definitions - History of development of GIS - Components of GIS: Hardware, Software, Data, People and Methods – Proprietary and open source Software - Types of data – Spatial, Attribute data-types of attributes – scales/ levels of measurements -Data Base Management Systems (DBMS).	<b>14</b>

<b>V</b>	<b>GIS - DATA ENTRY, STORAGE AND ANALYSIS</b> Data models - Vector and raster data - data compression - data input by digitization and scanning, data storage – attribute data analysis – integrated data analysis- mapping concept - development of map overlay, overlay operation - Errors and quality control. Land Information System (LIS)- Various GIS applications in Civil Engineering-Regional Planning and Site investigations, Hydrology and Water Resources Engineering, Transportation network analysis - Highway Alignments.	<b>14</b>
	<b>Test &amp; Model Exam</b>	<b>7 Hrs.</b>

### Reference Books

- Lo & Yeung (2005), Geographic Information Systems, Prentice of India.
- Anji Reddy.M. (1998), Remote Sensing and Geographical information systems.
- Lillesand, T.M. & Kiefer R.W. (1998), Remote Sensing and image interpretation, John Wiley & Sons, Newyork.
- Burrough P.A. (2000), Principle of Geographical Information Systems for land resources assessment, Clarendon Press, Oxford.
- Clarke Parks & Crane (2005), Geographic Information Systems & Environmental Modelling, Prentice-Hall of India.
- Wolf Paul (1998), Elements of Photogrammetry, McGraw Hill, New Delhi.
- Shahab Fazal,"G I S Basics", New Age International Publications, Chennai.

**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  
Semester : V SEMESTER  
Subject Code : 4010532  
Subject Title : **CONCRETE TECHNOLOGY**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours/ week	Hours/ Semester	Marks			
<b>CONCRETE TECHNOLOGY</b>	<b>5 Hrs.</b>	<b>80 Hrs.</b>	<b>Internal Assessment</b>	<b>End Semester Examination</b>	<b>Total</b>	<b>3 Hrs.</b>
			<b>25</b>	<b>100*</b>	<b>100</b>	

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

**Topics and Allocation of Hours**

Unit	Topics	Hours
I	Concrete: Introduction, Cement, Aggregates and water	15
II	Admixtures , Mix Design for Concrete	15
III	Special Concrete, Pre-stressed Concrete	15
IV	Light Weight Concrete, Formwork	14
V	Cracks in Concrete Structure and their Prevention, Joints, Repairs and Maintenance of Concrete	14
	Test & Model Exam	7
	<b>Total</b>	<b>80</b>

**RATIONALE:**

Diploma students in Civil Engineering requires to know more about the concrete, which is one of the most important construction materials. This subject aims to improve the knowledge in the mix design and special types of concrete, to have the exposure of cracks in concrete structure and repairing, etc.

**OBJECTIVES:**

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

- Materials used
- Admixtures used in concrete
- Mix design method
- Special and prestressed concrete
- Forms works
- Cracks and maintenance of concrete

# **DETAILED SYLLABUS**

## **4010532 - CONCRETE TECHNOLOGY**

Contents: Theory

<b>Unit</b>	<b>Name of the Topics</b>	<b>Hours</b>
<b>I</b>	<b>1.1 CONCRETE</b> Introduction of Concrete Technology and Concrete - Ingredients of Concrete.  Cement: Composition of Cement - Function of Cement Ingredients - Types of Cements (Names Only) - Uses of Cement.  Aggregates: Fine Aggregate - Sand - Types of Sand based on the purpose of use - Types of sand based on the Grain size - Properties of good Sand. Coarse Aggregates – Functions – Properties – Requirements - Classification of Aggregates.  Water - Functions - Water for Curing of Concrete.  Properties of Concrete - Production of Concrete - Types of Concrete and its uses - Test on Concrete (Names only).	<b>15</b>
<b>II</b>	<b>ADMIXTURES</b> Definition - Functions of Admixtures - Classification of Admixtures: Accelerating admixtures – Retarding admixtures – Grouting admixtures – Air entraining admixtures – Pozzolanic or mineral admixtures – Air detraining admixtures – Plasticizers – Super plasticizers.  <b>Mix Design for Concrete</b> Mix design - purpose of Mix design - object of Mix design - Factors influencing the choice of Mix design - variables in proportioning - Mix design methods - Mix design procedure I.S. Code method - Mix proportions for weigh batching and volume batching.	<b>5</b>  <b>10</b>

III	<p><b>3.1 Special Concrete</b>  Polymer concrete - Fiber reinforced concrete - Light weight concrete - Shot crete or guniting concrete (Applications and Advantages).</p> <p><b>3.2 Light Weight Concrete</b>  Classification of light weight concrete - Characteristics of light weight concrete - Applications of light concrete - Advantages of light weight concrete.</p>	<p>7</p> <p>8</p>
IV	<p><b>3.1 Pre-stressed concrete</b>  General principle of stressing – advantages of pre stressed – Concrete - Need for High strength steel and concrete- terminology - tendon - anchorage - pre tensioning-post tensioning - bonded pre stressed concrete - non bonded pre stressed concrete - methods of pre stressing - pretension method - post tension method - system of pre stressing - freyssinet system - Magnet blaton system - Lee-mc - call system - application of pre stressing elements - causes for losses in pre stress and remedial measures.</p> <p><b>4.2 Formwork</b>  Requirements of formwork - materials used for formwork -cleaning and treatments of forms - points to be kept in mind before placing concrete in form work.</p>	<p>10</p> <p>4</p>
V	<p><b>Cracks in Concrete Structure and their Prevention</b>  Cracks in concrete structures - assessment of cracks - types of cracking – preventive measures.</p> <p><b>Joints, Repairs and Maintenance of Concrete</b>  Types of joints - construction joints - contraction joints - expansion joints - isolation joints - methods of repairing concrete works</p>	<p>6</p> <p>8</p>
	<b>Test &amp; Model Exam</b>	<b>7 Hrs.</b>



**Reference Books :**

1. M.S.Shetty - Concrete Technology (Theory and Practice) - S.Chand & Company Pvt. Ltd. New Delhi.
2. M L GAMBHIR - Concrete Technology - TATA McGraw-Hill Publishing Company Limited, New Delhi
3. Vineet Kumar (Edited)- Concrete Technology - Khanna Publishers, New Delhi.
4. A.R.Santhakumar, Concrete Technology , Oxford University press.
5. A.M.Neville, Concrete Technology, Pearson Education.

**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 : 4010533  
Semester : V Semester  
Subject Title : **GEOTECHNICAL ENGINEERING**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examinations			Duration
	Hours / Week	Hours / Semester	Marks			
			Internal Assessment	End Semester Examination	Total	
<b>GEOTECHNICAL ENGINEERING</b>	<b>5 Hrs.</b>	<b>80 Hrs.</b>	<b>25</b>	<b>100*</b>	<b>100</b>	<b>3 Hrs.</b>

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

**Topics and Allocation of Hours**

Unit	Topics	Hours
I	Index properties and Hydraulic Properties of Soil	15
II	Classification and Strength of Soil, Stabilization of Soil and Sub-soil Sampling	15
III	Seepage Analysis and Seepage below Hydraulic Structures, Bearing Capacity and Settlement of foundations	15
IV	Foundations and Foundations in Expansive Soil	14
V	Machine Foundation and Foundations of Transmission Line Towers	14
	Test & Model Exam	7
	<b>Total</b>	<b>80</b>

**RATIONALE:**

Civil Engineering diploma engineers are required to supervise the construction of roads and pavements, dams, embankments, and other Civil Engineering structures. As such, the knowledge of basic soil engineering is a pre-requisite for these engineers for effective discharge of their duties. This necessitates the introduction of Soil Engineering subject in the curriculum for Diploma Course in Civil Engineering. The subject covers only such topics as will enable the diploma engineers to identify and classify the different types of soils, their selection and proper use in the field for various types of engineering structures. The emphasis will be more on teaching practical aspects rather than theoretical concepts.

**OBJECTIVES:**

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

- Learn the Properties of Soil, Classification and Strength of soils
- Describe the Sub-soil Sampling
- Understand the Seepage analysis, Bearing Capacity of soil and Settlement of Foundations
- Learn the types of Foundations, Pile foundations and Pile Groups
- Understand the Foundations on Expansive soil and Machine Foundations
- Know about the Foundations of Transmission Line Towers

**DETAILED SYLLABUS**  
**4010533 - GEOTECHNICAL ENGINEERING**

Contents:Theory

Unit	Name of the Topics	Hours
I	<p><b>GEOTECHNICAL ENGINEERING:</b>  <b>Soil Mechanics and Index Properties</b>            Introduction - Development of Soil Mechanics - Fields of application of Soil Mechanics - Soil formation - Cohesive and Cohesion less soil - Soil Properties -Three phase system - General, Index and Engineering properties - Detailed description - Atter Berg"s limits - Simple problems - Soil map of India.</p> <p><b>Hydraulic Properties of Soil :</b>            Introduction - Permeability - Co-efficient of permeability - Darcy"s law - Factors affecting permeability - Permeability tests - Simple problems - Quick sand conditions.</p>	<p style="text-align: center;"><b>10</b></p> <p style="text-align: center;"><b>5</b></p>
II	<p><b>CLASSIFICATION AND STRENGTH OF SOIL, STABILIZATION OF SOIL AND SUB-SOIL SAMPLING</b></p> <p><b>Classification and Strength of Soil</b>            Classification of soil - Introduction - Necessity - Systems of soil classification - Field identification of soil - Shear strength of soil - Introduction - Shear strength - Mohr"s stress circle - Mohr- Coulomb failure theory - Shear strength test - Unconfined compression test - Mohr"s circle for unconfined compression test - Compaction - Consolidation - Consolidometer - Optimum moisture content - Proctor"s Compaction test - Methods of compaction - Degree of compaction - Field density of soil - Tests - Compaction and Consolidation - Comparison.</p> <p><b>Stabilization of Soil and Sub-Soil Sampling :</b>            Stabilization of soil - Introduction - Objects of stabilization - Methods of stabilization - Soil exploration - Introduction - Objects of soil exploration - Methods of soil exploration - Direct , Semi-direct and Indirect methods - Spacing and depth of test borings - Boring log - Sounding and Penetration tests-Standard Penetration Test (SPT)- Geophysical methods - Sub-soil Sampling - Disturbed and Undisturbed samples - Types of samplers - Split spoon sampler - Thin-walled sampler - Chunk sampling.</p>	<p style="text-align: center;"><b>8</b></p> <p style="text-align: center;"><b>7</b></p>

<p>III</p>	<p><b>SEEPAGE ANALYSIS AND SEEPAGE BELOW HYDRAULIC STRUCTURES, BEARING CAPACITY AND SETTLEMENT OF FOUNDATIONS</b></p> <p><b>Seepage Analysis and Seepage Below Hydraulic Structures :</b></p> <p>Seepage analysis - Introduction - Head , Gradient and Potential - Hydraulic gradient - Seepage pressure - Upward flow (Quick condition or Quicksand ) - Types of flow lines - Types of flow (Definition only) - Twodimensional flow (Laplace equation) - Velocity potential -Properties of flownet - Uses of flow net - Seepage below Hydraulic structures - Introduction -Hydraulic gradient - Piping - Exit gradient - Khosla"s theory - Seepage flownets below hydraulic structures.</p> <p><b>Bearing Capacity and Settlement of Foundations :</b></p> <p>Bearing capacity - Introduction - Terminology - Factors affecting bearing capacity of soils - Methods of determining bearing capacity - Types of failure in soil - General , Local and Punching shear failure - Analytical methods - Rankine"s analysis - Terzaghi"s analysis - Assumption and limitations - Effect of water table - Methods of improving bearing capacity of soil -Bearing capacity of different soil as per IS Settlement of foundation - Introduction - Causes and Effect of settlement – settlement values as per BIS provisions Plate load test - Simple problems.</p>	<p>7</p> <p>8</p>
<p>IV</p>	<p><b>FOUNDATIONS AND FOUNDATIONS IN EXPANSIVE SOIL</b></p> <p><b>4. 1 Foundations :</b></p> <p>Introduction - Definitions - Objectives - Requirements of foundation - Criteria for selection of type of foundation - Types of foundations - Shallow foundation types-isolated, combined ,raft Deep foundations - Types - Foundation at different levels - Foundation on made up grounds - Deep foundation - Introduction - Pile foundation - Uses of piles - Types of piles - Caisson foundation - Types - Selection of piles - Pile Driving - Capacity of piles - Pile load test - Floating foundation - Negative skin friction - Pile groups - Bearing capacity of pile groups - BIS provision for Settlement of pile group – Design of foundation using software (Description only)</p>	<p>8</p>

	<p><b>4.2 Foundations In Expansive Soil :</b></p> <p>Introduction - Identification of expansive soil - Free Swell Test - Differential free swell test - Indian expansive soil - Swell potential and Swelling pressure - Traditional Indian practice - Methods of foundation in expansive soils - Replacement of soils and “CNS” concept - Under reamed pile foundation - Remedial measures for cracked buildings.</p>	<b>6</b>
<b>V</b>	<p><b>MACHINE FOUNDATION AND TOWER FOUNDATIONS (TRANSMISSION LINE)</b></p> <p><b>Machine Foundation :</b></p> <p>Introduction - Soil dynamics - Free vibration and Forced vibration - Definitions -Natural frequency - Barkan’s method Pauw’s method - Types of machines and machine foundation - General requirements - Design of machine foundations - Reciprocating type - Centrifugal type - Impact type - design steps- Couzen theory - In-situ dynamic investigation of soil - Methods - IS code of practice - Design criteria - Isolation of foundation - Simple problems.</p> <p><b>Foundations of Transmission Line Towers</b></p> <p>Introduction - Necessity - Forces on Tower Foundations - General design criteria - Choice and type of foundations - Design procedures - Stability conditions – Description only</p>	<b>9</b>
	<b>Test &amp; Model Exam</b>	<b>5</b>
		<b>7 Hrs.</b>

**Reference Books :**

1. Dr.Punmia.B.C.- Soil Mechanics and Foundations - S Laxmi publications(P)Ltd., New Delhi, 2005
2. Dr.K.R.Arora, Soil Mechanics and Foundations Engineering, Standard publications, New Delhi, 2011/6<sup>th</sup>
3. Gopal Ranjan &Rao : Basic and applied Soil Mechanics, New Age International, New Delhi, 2000/2nd
4. Terzaghi, Soil Mechanics in Engineering Practice, John Wiley and Sons,New Delhi
5. WAYNE C.TENG, Foundation Design, Prentice Hall of India ( P ) Ltd, New Delhi.
6. Dr S B SEHGAL, A Text Book of Soil Mechanics, CBS Publishers & Distributors, New Delhi,
7. S. Kaur and R.Singh, Soil Mechanics and Foundation Engineering S.K. Kataria & Sons, New Delhi, 2003

**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 : 4010540  
Semester : V Semester  
Subject Title : **CIVIL ENGINEERING DRAWING AND CAD  
PRACTICAL - II**

**TEACHING AND SCHEME OF EXAMINATION**

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
CIVIL ENGINEERING DRAWING AND CAD PRACTICAL - II	6 Hrs.	96 Hrs.	Internal Assessment	End Semester Examination	Total	
			25	100*	100	

\* 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 to use the computers effectively in drafting, this course offers Computer Aided Drafting of various drawings in Public Health Engineering, Bridge Engineering and Structural Engineering.

**OBJECTIVES:**

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

- Prepare Public Health Engineering drawings manually
- Know about RCC and Steel bridge structures and draw manually
- Draw the Structural Engineering drawings using CAD

## DETAILED SYLLABUS

### 4010540 - CIVIL ENGINEERING DRAWING AND CAD PRACTICAL- II

Contents: Practical

Total: 96 Hrs.

#### LIST OF EXPERIMENTS

#### PREPARATION OF DRAWINGS MANUALLY ( Part I and II ) AND USING CAD SOFTWARE ( Part III)

##### **I PUBLIC HEALTH ENGINEERING** 24 Hours

Draw plan and sectional views of the following:

1. Rapid Sand Filter
2. Septic Tank with dispersion Trench / Soak pit
3. R.C.C square overhead tank supported by four columns

##### **II BRIDGE DRAWING** 14 Hours

Draw plan and sectional views of the following:

4. Steel Foot over bridge across a highway
5. Two span Tee Beam Bridge with square returns

##### **III STRUCTURAL ENGINEERING** 58 Hours

Draw plan, cross section and longitudinal section using CAD

6. Continuous one-way slab (with three equal spans)
7. Simply supported two-way slab
8. Restrained two-way slab
9. Singly reinforced rectangular beam
10. Doubly reinforced Continuous beam (Rectangular beam with two spans)
11. Tee Beams supporting continuous slab
12. Lintel and Sunshade
13. Dog-legged staircase
14. R.C.C. Column with square isolated footings



## 4010540 - CIVIL ENGINEERING DRAWING AND CAD PRACTICAL - II

### DETAILED ALLOCATION OF MARKS

PART I & II	Manual Drawing ( Plan )	-	20 marks
	Section / Elevation	-	25 marks
PART III Using CAD	Plan/Elevation	-	25 marks
	Plan / Cross section / longitudinal section	-	25 marks
	Viva - voce	-	5 marks
	<b>Total</b>	-	<b>100 marks</b>

#### **Note:**

1. For all the drawings, detailed specifications shall be given. Designs are not to be included in the examinations. The drawings must include Layout plans, full plan, sections, etc., as applicable to each topic.
2. For all the drawings, detailed specifications shall be given and students should draw in the drawing sheet based on the given specifications. The drawings to be drawn using computer and CAD Software.

#### **LIST OF EQUIPMENTS (for a batch of 30 students):**

<b>S.No.</b>	<b>List of the Equipments</b>	<b>Quantity Required</b>
1.	Drawing table with Board	30 Nos.
2.	Computers	30 Nos.
3.	Laser printer	3 Nos.
4.	CAD software	30 Users

**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 : 4010550  
Semester : V Semester  
Subject Title : **ENVIRONMENTAL ENGINEERING LABORATORY**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours/ Week	Hours/ Semester	Marks			
<b>ENVIRONMENTAL ENGINEERING LABORATORY</b>	<b>3 Hrs.</b>	<b>48 Hrs.</b>	<b>Internal Assessment</b>	<b>End Semester Examination</b>	<b>Total</b>	<b>3 Hrs.</b>
			<b>25</b>	<b>100*</b>	<b>100</b>	

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

**RATIONALE:**

Diploma holders in Civil Engineering are expected to supervise construction of water supply and waste water treatment works. They are also responsible for waste disposal activities. This subject aims at imparting practical skills for testing of raw water, waste water and to study pollution control equipments to develop competencies for execution in their field.

**OBJECTIVES:**

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

- Determine the quality of water, testing procedures and standards for drinking water.
- Understand the Cutting, threading and joining of G.I.Pipes / cutting and pasting of PVC pipes using solvents.
- Make suction and delivery pipe connections to a centrifugal pump (making indents, drawing a neat sketch of the connection with details).

## **DETAILED SYLLABUS**

### **4010550- ENVIRONMENTAL ENGINEERING LABORATORY**

**Contents: Practical**

**Total: 48 Hrs.**

#### **LIST OF EXPERIMENTS**

##### **PART A**

**24 Hours**

1. Collection of water samples from sources and “Estimation of Sulphate content” in water sample.
2. Determination of pH value by Electrometric method using pH meter/ Calorimetric method and comparison by paper method.
3. Determine the optimum dose of coagulant in a given raw water sample by jar test.
4. Determine the dissolved oxygen in the given sample of water .
5. Determination of suspended solids and dissolved solids present in the given sample of water / waste water.
6. Determination of “Temporary and permanent Hardness” present in the given sample of water by EDTA titration method.
7. Estimation of chlorides in the given sample of water by silver Nitrate titration method.
8. Prepare a report of a field visit to water treatment plant.

##### **PART B**

**24 Hours**

1. Study of pipe fitting used in water supply (with actual models displayed on board).
2. Study of sanitary wares (with actual models displayed on board).
3. Cutting, threading and joining of G.I.Pipes / cutting and pasting of PVC pipes using solvents.
4. Making a bathroom connection from an existing water supply main (making indents, drawing a neat sketch of the connection with details).
5. Making suction and delivery pipe connections to a centrifugal pump (making indents, drawing a neat sketch of the connection with details).
6. Study of air pollution control equipments (Gravity settling chamber, Cyclone filter with models/devices).
7. Prepare a report of a field visit to sewage treatment plant.

**SCHEME OF EXAMINATION:**

In the examination the students have to be given two experiments one from Part A and another from Part-B.

**DETAILED ALLOCATION OF MARKS**

<b>S.No</b>	<b>Description</b>	<b>Part - A Max. Marks (50)</b>	<b>Part - B Max. Marks (45)</b>
1.	Procedure	5	5
2.	Tabulation and Observation/ Execution	25	30
3.	Calculations	10	
4.	Sketch / Graph	5	5
5.	Accuracy of result/ Finish	5	5
	Viva Voce		5
	<b>Total</b>		<b>100</b>

**LIST OF EQUIPMENTS (for a batch of 30 students):**

<b>S. No</b>	<b>Name of the equipment</b>	<b>Numbers required</b>
1.	pH meter	2 nos
2.	Spectrophotometer	1 no.
3.	Magnetic stirrer	1 no.
4.	Magnetic stirring device	1 set
5.	Turbidimeter	1 no.
6.	Dissolved oxygen meter	1 no.
7.	Drying oven	1 no.
8.	Analytical balance	1 no
9.	Dessicator	1 no.
10.	Dish tongs	1 no.
11.	Evaporating dish	1 no.
12.	Filter membrane	1 no.
13.	Vacuum pump	1 no.
14.	Crucible	1 no.
15.	Whatman filter paper	Required no.
16.	Wash bottle	2 nos.
17.	Pipette, Burette, Funnel, Conical flask, Beaker, Bunsen burner, Stand, Wire gauge, Filter paper	As required

**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 : 4010561  
Semester : V Semester  
Subject Title : **ADVANCED SURVEYING AND BASIC GIS PRACTICAL**

**TEACHING AND SCHEME OF EXAMINATION**

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours/ Week	Hours/ Semester	Marks			
<b>ADVANCED SURVEYING AND BASIC GIS PRACTICAL</b>	<b>3 Hrs.</b>	<b>48 Hrs.</b>	<b>Internal Assessment</b>	<b>End Semester Examinations</b>	<b>Total</b>	<b>3 Hrs.</b>
			<b>25</b>	<b>100*</b>	<b>100</b>	

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

**RATIONALE:**

This is an applied subject in Civil Engineering for learning Advanced Surveying and Basic GIS Practical. Diploma holders in Civil Engineering are expected to survey the construction features and this course aims to teach about Surveying using Remote Sensing and GIS applications.

**OBJECTIVES:**

On the Completion of the course the students will be able to:

- Acquire practical knowledge in the use of Arc GIS and Arc Map.

## DETAILED SYLLABUS

### 4010561- ADVANCED SURVEYING AND BASIC GIS PRACTICAL

Contents: Practical

Total : 48 Hrs.

<b>Remote Sensing Exercises:</b>		
1.	Introduction to Remote Sensing and GIS and creating a map using tools.	6
2.	Introduction to ARC GIS Desktop.	6
3.	Geo referencing an image using ARC GIS.	6
4.	Creating and editing Shape files in ARC MAP.	6
5.	Editing in ARC MAP.	6
6.	Adding fields to a Shape file.	6
7.	Querying the data.	4
8.	Buffering and Clipping.	4
9.	Case study of creation of campus map using Arc GIS software	4

#### **Reference Books:**

1. Lillesand T.M., and Kiefer,R.W. Remote Sensing and Image interpretation, VI edition of John Wiley & Sons-2015.
2. John R. Jensen, Introductory Digital Image Processing: A Remote Sensing Perspective,4th Edition, 2015.
3. Paul R.Wolf, Elements of Photogrammetry, McGraw-Hill Science, 2013,ISBN0070713464, 9780070713468
4. Karl Kraus, Photogrammetry, Fundamentals and standard processes, Dümmler, 2000,ISBN 978 3 110190076
5. Mikhail Kasser and Yves Egels, "Digital Photogrammetry", Taylor and Francis, 2003, ISBN0 748 40944 0
6. Francis h. Moffitt, Edward M. Mikhail, Photogrammetry, TBS The Book Service Ltd, 1980,ISBN 13: 9780700221370
7. Edward M.Mikhail, James S.Bethel, J.Chris McGlone, Introduction on "ModernPhotogrammetry", John Wiley & Sons, Inc., 2012, ISBN 0-471-30924-9
8. Wilfried Linder, "Digital Photogrammetry"-Theory and Applications, Springer-Verlag BerlinHeidelberg New York, 3rd Edition, 2014, ISBN 3-540-00810-1
9. Digital Photogrammetry - A practical course by Wilfried Linder,3rd edition, Springer, 2009.

**4010561- ADVANCED SURVEYING AND BASIC GIS PRACTICAL**

**SCHEME OF EXAMINATION:**

**DETAILED ALLOCATION OF MARKS**

<b>S.No</b>	<b>Description</b>	<b>Max.Marks (100)</b>
1.	Procedure	10
2.	Tabulation and Observation	40
3.	Calculations	25
4.	Sketch / Graph	10
5.	Accuracy of result	10
	Viva Voce	5
	<b>Total</b>	<b>100</b>

**LIST OF EQUIPMENTS (for a batch of 30 students):**

<b>S. no</b>	<b>Name of the equipment</b>	<b>Numbers required</b>
1.	Arc GIS software	No of users as per requirement
2.	Arc Map Software	No of users as per requirement

**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 : 4010562  
Semester : V Semester  
Subject Title : **CONCRETE TECHNOLOGY PRACTICAL**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours/ Week	Hours/ Semester	Marks			
CONCRETE TECHNOLOGY PRACTICAL	3 Hrs.	48 Hrs.	Internal Assessment	End Semester Examination	Total	3 Hrs.
			25	100*	100	

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

**RATIONALE:**

Diploma holders in Civil Engineering are supposed to supervise the construction of buildings. To perform the above task, it is essential that students should have knowledge of various sub components of buildings like foundations, walls, roofs, stair cases, floors etc., and their constructional details. Therefore, the subject of concrete technology practical is very important for Civil Engineering diploma holders.

**OBJECTIVES:**

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

- Find the fineness setting time of cement.
- Know the shape tests and fineness for modulus coarse aggregate.
- Determine the bulking characteristics of sand.
- Determine the workability of concrete using slumpcone, compaction factor and Vee Bee consistometer tests.
- Know the arrangement of steel reinforcement for concrete elements
- Study the workability properties of self compacting concrete.



## DETAILED SYLLABUS

### 4010562 - CONCRETE TECHNOLOGY PRACTICAL

Contents: Practical

Total: 48 Hrs.

#### LIST OF EXPERIMENTS

##### PART A

**20 Hours**

1. Determination of the fineness of cement by Blains Permeability Apparatus or by sieve analysis.
2. Determination of Initial setting time of cement by using Vicat's Apparatus.
3. Determination of final setting time of cement by using Vicat's Apparatus.
4. Shape Test for coarse aggregate - Flakiness Index test.
5. Shape Test for coarse aggregate - Elongation Index test.
6. Shape Test for coarse aggregate - Angularity number test.
7. Determine the building characteristics of given sand sample.

##### PART B

**28 Hours**

8. Determination of workability of concrete by slump cone test.
9. Determination of workability of concrete by compaction factor test.
10. Casting of concrete cube and compression test on concrete cube.
11. Determination of Fineness Modulus of fine aggregate sample and plot a particle size distribution curve and also find the effective size and uniformity co-efficient.
12. Determination of Fineness Modulus of coarse aggregate sample by conducting sieve analysis.
13. Vee- Bee Consistometer Test on concrete test.
14. Study of workability of self compacting concrete.

## 4010562 - CONCRETE TECHNOLOGY PRACTICAL

### SCHEME OF EXAMINATION:

#### DETAILED ALLOCATION OF MARKS

S.No	Description	PART A ( 35 MARKS)	PART B (60 MARKS)
1.	Procedure	5	10
2.	Tabulation and Observation	15	25
3.	Calculations	5	15
4.	Sketch / Graph	5	5
5.	Accuracy of result	5	5
	Viva Voce	5	
	<b>Total</b>		<b>100</b>

#### LIST OF EQUIPMENTS (for a batch of 30 students):

S.No..	List of the Equipments	Quantity Required
1.	Slump cone apparatus	2 no.
2.	Compaction factor apparatus	1 no.
3.	Concrete cube mould 150*150*150 3sets	3 sets(9 no)
4.	Concrete cube mould 100*100*100 3sets	3 sets (9 no)
5.	Sieve test for fine aggregate made of brass 200mm dia complete set.	2 sets
6.	Sieve test for coarse aggregate made of brass 200mm dia complete set	2 sets
7.	Concrete mixing tray	2 no.
8.	Vee Bee Consistometer	1 no.
9	Weigh balance-digital up to 10kg capacity with 1gm accuracy battery backup with 8 hours	1no.
10.	Apparatus to find Flakiness index, Elongation index and Angularity number for Coarse Aggregate	1 no. each
11	Blaine Permeability apparatus	1 no.
12	Sieve No 9	2 nos.
13	Vicats apparatus	2 sets

**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 : 4010563  
Semester : V Semester  
Subject Title : **GEOTECHNICAL ENGINEERING LABORATORY**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examinations			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	End Semester Examination	Total	
<b>GEOTECHNICAL ENGINEERING LABORATORY</b>	<b>3 Hrs.</b>	<b>48 Hrs.</b>	<b>25</b>	<b>100*</b>	<b>100</b>	<b>3 Hrs.</b>

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

**RATIONALE:**

This subject is introduced to know the practical important of Geotechnical Engineering, the students studying this course will gain the knowledge in practical aspects which is directly linked to the construction of structures on different soil.

**OBJECTIVES:**

After completion of the course the students will be able to:

- Understand and determine physical and index properties of soil.
- Estimate the permeability and shear strength of soil.
- Compute optimum moisture content values for maximum dry density of soil through various tests.
- Know the procedure for performing CBR test.
- Learn various compaction methods for soil stabilization.
- Study the SPT at construction site.

# **DETAILED SYLLABUS**

## **4010563- GEOTECHNICAL ENGINEERING LABORATORY**

**Contents: Practical**

**Total : 48 Hrs.**

### **LIST OF EXPERIMENTS**

1. Identification of rocks from the given specimen.
2. Determine water content of given soil sample by oven drying method as per IS: 2720 (Part-II).
3. Determine Shrinkage limit of given soil sample as per IS 2720 (Part- V).
4. Determine grain size distribution of given soil sample by mechanical sieve analysis as per IS 2720 (Part- IV).
5. Use different types of soil to identify and classify soil by conducting field tests-Through Visual inspection, Dry strength test, Dilatancy test and Toughness test.
6. Determine coefficient of permeability by constant head test as per IS 2720 (Part- XVII).
7. Determine coefficient of permeability by falling head test as per IS 2720 (Part- XVII).
8. Determine shear strength of soil by triaxial shear test as per IS 2720 (Part- XIII).
9. Determine shear strength of soil by vane shear test as per IS 2720 (Part-XXX).
10. Determine the consolidation properties of given soil sample.
11. Find the unconfined compressive strength of given clay sample.
12. Study of CBR value on the field as per IS2720 (Part - XVI).
13. Study on Standard Penetration Test to find SBC of soil.

## 4010563 - GEOTECHNICAL ENGINEERING LABORATORY

### SCHEME OF EXAMINATION:

#### DETAILED ALLOCATION OF MARKS

<b>S.No</b>	<b>Description</b>	<b>Max.Marks (100)</b>
1.	Procedure	10
2.	Tabulation and Observation	40
3.	Calculations	25
4.	Sketch / Graph	10
5.	Accuracy of result	10
	Viva Voce	5
	<b>Total</b>	<b>100</b>

#### LIST OF EQUIPMENTS (for a batch of 30 students):

<b>S.No</b>	<b>Description</b>	<b>Number required</b>
1.	Glass cup, oven, Desiccator, Weighing balance and other accessories	1 set
2.	Hot air oven	1 no.
3.	Shear testing machine	1 no.
4.	Triaxial testing machine	1 no.
5.	Permeameter mould, compacting equipment. Drainage bade, cap, graduated glass jar, stop watch	1 set
6.	Vane shear test apparatus	1 no.
7.	Unconfined compressive strength apparatus	1 no.

**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 : 4010570  
Semester : V  
Subject Title : **ENTREPRENEURSHIP AND STARTUPS**

**TEACHING AND SCHEME OF EXAMINATION**

No. of Weeks per Semester: 16 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	End Semester Examinations	Total	
<b>ENTREPRENEURSHIP AND STARTUPS</b>	<b>4 Hrs.</b>	<b>64 Hrs.</b>	<b>25</b>	<b>100*</b>	<b>100</b>	<b>3 Hours</b>

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

**Topics and Allocation of Hours**

Unit	Topics	Hours
I	Entrepreneurship - Introduction and Process	10
II	Business Idea and Banking	10
III	Startups, E-cell and Success Stories	10
IV	Human Resource Management, Industrial Legislation and Micro and Small Enterprises	10
V	Preparation of Project Reports	10
	Field visits and preparation of case study report	14
<b>Total</b>		<b>64</b>

## **RATIONALE:**

Development of a diploma curriculum is a dynamic process responsive to the society and reflecting the needs and aspiration of its learners. Fast changing society deserves changes in educational curriculum particularly to establish relevance to emerging socio-economic environments; to ensure equity of opportunity and participation and finally promoting concern for excellence. In this context the course on entrepreneurship and start ups aims at instilling and stimulating human urge for excellence by realizing individual potential for generating and putting to use the inputs, relevant to social prosperity and thereby ensure good means of living for every individual, provides jobs and develop Indian economy.

## **OBJECTIVES:**

At the end of the course the students will be able to:

- Excite the students about entrepreneurship
- Acquire Entrepreneurial spirit and resourcefulness
- Understand the concept and process of entrepreneurship
- Acquire entrepreneurial quality, competency and motivation
- Learn the process and skills of creation and management of entrepreneurial venture
- Familiarize with various uses of human resource for earning dignified means of living
- Know its contribution in and role in the growth and development of individual and the nation
- Understand the formation of E-cell
- Survey and analyze the market to understand customer needs
- Understand the importance of generation of ideas and product selection
- Learn the preparation of project feasibility report
- Understand the importance of sales and turnover
- Familiarization of various financial and non financial schemes
- Aware the concept of incubation and starts ups

## DETAILED SYLLABUS

### 4010570 - ENTREPRENEURSHIP AND STARTUPS

#### Contents : Practical

Unit	Name of the Topics	Hours
<b>I</b>	<b>ENTREPRENEURSHIP – INTRODUCTION AND PROCESS</b> <ul style="list-style-type: none"><li>• Concept, Functions and Importance</li><li>• Myths about ntrepreneurship</li><li>• Pros and Cons of Entrepreneurship</li><li>• Process of Entrepreneurship</li><li>• Benefits of Entrepreneur</li><li>• Competencies and Characteristics</li><li>• Ethical Entrepreneurship</li><li>• Entrepreneurial Values and Attitudes</li><li>• Motivation</li><li>• Creativity</li><li>• Innovation</li><li>• Entrepreneurs - as problem solvers</li><li>• Mindset of an employee and an entrepreneur</li><li>• Business Failure - causes and remedies</li><li>• Role of Networking in entrepreneurship</li></ul>	<b>10</b>
<b>II</b>	<b>BUSINESS IDEA AND BANKING</b> <ul style="list-style-type: none"><li>• Types of Business: Manufacturing, Trading and Services</li><li>• Stakeholders: sellers, vendors and consumers and Competitors</li><li>• E- commerce Business Models</li><li>• Types of Resources : Human, Capital and Entrepreneurial tools</li><li>• Goals of Business; Goal Setting</li><li>• Patent, copyright and Intellectual property rights</li><li>• Negotiations - Importance and methods</li><li>• Customer Relations and Vendor Management</li></ul>	<b>10</b>



	<ul style="list-style-type: none"> <li>• Size and Capital based classification of business enterprises</li> <li>• Role of financial institutions</li> <li>• Role of Government Policy</li> <li>• Entrepreneurial support systems</li> <li>• Incentive schemes for state government</li> <li>• Incentive schemes for Central governments</li> </ul>	
<b>III</b>	<p><b>STARTUPS, E-cell and SUCCESS STORIES</b></p> <ul style="list-style-type: none"> <li>• Concept of Incubation centre"s</li> <li>• Activities of DIC, financial institutions and other relevance institutions</li> <li>• Success stories of Indian and global business legends</li> <li>• Field Visit to MSME"s</li> <li>• Various sources of Information</li> <li>• Learn to earn</li> <li>• Startup and its stages</li> <li>• Role of Technology - E-commerce and Social Media</li> <li>• Role of E-Cell</li> <li>• E-Cell to Entrepreneurship</li> </ul>	<b>10</b>
<b>IV</b>	<p><b>HUMAN RESOURCE MANAGEMENT</b></p> <ul style="list-style-type: none"> <li>• Meaning of Manpower Planning</li> <li>• Recruitment and Selection procedure</li> <li>• Payment of wages, factors determining the wage</li> <li>• Methods of payment of wages - Time rate and Piece rate</li> <li>• Labour Turnover - definition, its causes, impact and remedy</li> <li>• THE BOCW ACT- The Building and Other Construction Workers (Regulation of Employment and Condition of Services) Act, 1996. The Building and Other Construction Workers (Regulation of Employment and Condition of Services) Central Rules, 1998</li> </ul>	<b>4</b>

	<p><b>INDUSTRIAL LEGISLATION:</b></p> <ul style="list-style-type: none"> <li>• Need of Industrial legislation</li> <li>• Indian Factories Act - 1948 - Definition of Factory, main provisions regarding health, Safety and Welfare of Workers</li> <li>• Industrial Dispute Act – 1947 – Definition of Industrial dispute, Machineries for settlement of Industrial dispute in India</li> </ul> <p><b>MICRO AND SMALL ENTERPRISES</b></p> <ul style="list-style-type: none"> <li>• Definition of Micro &amp; Small enterprises</li> <li>• Meaning and characteristics of Micro and Small enterprise</li> <li>• Scope of SSI with reference to self-employment</li> <li>• Procedure to start SSI – idea generation, SWOT analysis- Selection of site for factories</li> </ul>	<p><b>3</b></p> <p><b>3</b></p>
<b>V</b>	<p><b>PREPARATION OF PROJECT REPORTS FOR:</b></p> <p><b>PROJECT IDENTIFICATION AND FORMULATION REPORT:</b></p> <ul style="list-style-type: none"> <li>• <b>Introduction</b> - Collection of Data.</li> <li>• Compilation of Data.</li> <li>• Analysis and Assimilation of Data.</li> <li>• Product Selection</li> <li>• Report Finalisation and Report Writing.</li> </ul> <p><b>PROJECT PROFILE/PRE-FEASIBILITY REPORT :</b></p> <ul style="list-style-type: none"> <li>• Introduction of the product</li> <li>• Market.</li> <li>• Man Power (Personnel Required).</li> <li>• Manufacturing Process- Plant and Machinery.</li> <li>• Means of Finance</li> <li>• Cost of Production</li> <li>• Annual Turnover</li> <li>• Profit - Profit on Investment</li> </ul>	<p><b>2</b></p> <p><b>5</b></p>

	<p><b>TECHNO-ECONOMICAL FEASIBILITY REPORT (TEFR).</b></p> <ul style="list-style-type: none"> <li>• Introduction on product</li> <li>• Market Prospects and Marketing</li> <li>• Location</li> <li>• Manufacturing Programme and Annual Turnover</li> <li>• Manufacturing Process</li> <li>• Cost of Project</li> <li>• Means of Finance</li> <li>• Requirement of Raw materials, Consumables, Utilities and Working Capital</li> <li>• Organisational Structure, Management and Man Power</li> <li>• Project Implementation Schedule</li> <li>• Profitability and Cash Flow.</li> </ul> <p><b>MARKET SURVEY REPORT FOR CONSTRUCTION</b></p> <p><b>PROJECT:</b></p> <ul style="list-style-type: none"> <li>• Data Collection &amp; Processing through Primary &amp; Secondary Sources</li> <li>• Questionnaire - method, e-mail, by post, by phone -</li> <li>• Present Status - Growth of the Industry- Import and Export - Present market Demand</li> <li>• Forecast - Future Prospect/Scope - Market Segmentation.</li> </ul>	<p><b>3</b></p>
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**Reference Books:**

1. Dr. G.K. Varshney, Fundamentals of Entrepreneurship, Sahitya Bhawan Publications, Agra - 282002
2. Dr. G.K. Varshney, Business Regulatory Framework , Sahitya Bhawan Publications, Agra - 282002
3. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Entrepreneurship , McGraw Hill (India) Private Limited, Noida - 201301
4. M.Scarborough, R.Cornwell, Essentials of Entrepreneurship and small business management, Pearson Education India, Noida - 201301
5. Charantimath Poonima M. Entrepreneurship Development and Small Business Enterprises, Pearson Education, Noida - 201301

6. Trott, Innovation Management and New Product Development, Pearson Education, Noida - 201301
7. M N Arora, A Textbook of Cost and Management Accounting, Vikas Publishing House Pvt. Ltd., New Delhi-110044
8. Prasanna Chandra, Financial Management, Tata McGraw Hill education private limited, New Delhi
9. V. Trivedi, Renu Jatana, Indian Banking System, RBSA Publishers, Rajasthan
10. Simon Daniel, HOW TO START A BUSINESS IN INDIA, BUUKS, Chennai - 600018
11. Ramani Sarada, The Business Plan Write-Up Simplified - A practitioners guide to writing the Business Plan, Notion Press Media Pvt. Ltd., Chennai 600095.

### **Autonomous Examination – Evaluation Pattern Internal Mark Allocation**

Assignment (Theory portion)*	-	10
Seminar Presentation	-	10
Attendance	-	5
<b>Total</b>	-	<b>25</b>

**Note:**

\* Two assignments should be submitted. The same must be evaluated and Converted to 10 marks.

Each assignment should have five three marks questions and two five marks questions.

Guidelines for assignment:

First assignment - Unit I

Second assignment - Unit II

Guidelines for Seminar Presentation - Unit III

### **AUTONOMOUS EXAMINATION**

**Note:**

1. The students should be taught all units and proper exposure and field visit also arranged. All the portions should be completed before examinations.
2. The students should maintain theory assignment and seminar presentation. The assignment and seminar presentation should be submitted during the Autonomous Practical Examinations.

3. The question paper consists of theory and practical portions. All students should write the answers for theory questions (45 Marks) and practical portions (55 Marks) should be completed for Autonomous examinations.
4. All exercises should be given in the question paper and students are allowed to select by lot. If required the dimensions of the exercises may be varied for every batch. No fixed time allotted for each portion and students have liberty to do the examination for 3 Hrs.
5. For Written Examination: theory question and answer: 45 Marks  
 Ten questions will be asked for 3 marks each. Five questions from each unit 1 & 2. (10 X 3 = 30).  
 Three questions will be asked for 5 marks each. One question from each unit 1, 2 & 3. (3 X 5 = 15)
6. For Practical Examination: The business plan/Feasibility report or Report on Unit 4 & 5 should be submitted during the autonomous practical examinations. The same have to be evaluated for the report submission (40 marks).

#### **DETAILED ALLOCATION OF MARKS**

<b>S. No</b>	<b>Description</b>	<b>Marks</b>
Part A	Written Examination - Theory Question and answer (10 questions x 3 marks:30 marks & (3 questions x 5 marks: 15 marks)	45
Part B	Practical Examination - Submission on Business Plan/Feasibility Report or Report on Unit 4 & 5	40
Part C	Viva voce	15
	<b>TOTAL</b>	<b>100</b>