



# **DIPLOMA IN ENGINEERING AND TECHNOLOGY**

**1010, 2010 & 3010**

**DIPLOMA IN CIVIL ENGINEERING**

**SEMESTER PATTERN**

**N - SCHEME**

IMPLEMENTED FROM 2020-2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION  
CHENNAI - 600 025, TAMIL NADU**

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**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING AND TECHNOLOGY SYLLABUS (II & III YEAR)**  
**N- SCHEME**

(To be implemented for the students from the year 2020-21 onwards)

**Syllabus Revision Committee**

**Chairperson**

**Tmt. G.Laxmi Priya, I.A.S.,**  
Director of Technical Education  
Directorate of Technical Education  
Chennai – 600025

**Co-ordinator & Convener**

**Dr.V.Karthikeyan, M.E., Ph.D., MCMI(UK)., FIE.,**  
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<b>DIPLOMA IN CIVIL ENGINEERING (1010, 2010 &amp; 3010)</b>	
<b>Members</b>	
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## DIPLOMA COURSES IN ENGINEERING/TECHNOLOGY

(SEMESTER SYSTEM)

### N – SCHEME

(Implemented from 2020 - 2021)

### REGULATIONS\*

*\*Applicable to the Diploma Courses other than Diploma in Hotel Management & Catering Technology.*

#### **1. Description of the Course:**

##### **a. Full Time (3 years)**

The Course for the Full Time Diploma in Engineering shall extend over a period of three academic years, consisting of 6 semesters\* and the First Year is common to all Engineering Branches.

##### **b. Sandwich (3½ years)**

The Course for the Sandwich Diploma in Engineering shall extend over a period of three and half academic years, consisting of 7 semesters\* and the First Year is common to all Engineering Branches. The subjects of three years full time diploma course being regrouped for academic convenience.

During 4<sup>th</sup> and/or during 7<sup>th</sup> semester the students undergo industrial training for six months / one year. Industrial training examination will be conducted after completion of every 6 months of industrial training.

##### **c. Part Time (4 years)**

The course for the Part Time Diploma in Engineering shall extend over a period of 4 academic years containing of 8 semesters\*. The subjects of 3 years full time diploma courses being regrouped for academic convenience.

***\* Each Semester will have 16 weeks duration of study with 35 hrs. / Week for Regular Diploma Courses and 18 hrs. / Week for Part Time Diploma Courses.***

The Curriculum for all the 6 Semesters of Diploma courses (Engineering & Special Diploma Courses viz. Textile Technology, Leather Technology, Printing Technology, Chemical Technology etc.) have been revised and revised curriculum is applicable for the candidates admitted from 2020 — 2021 academic year onwards.

## **2. Conditions for Admission:**

Condition for admission to the Diploma courses shall be required to have passed in The S.S.L.C Examination of the Board of Secondary Education, Tamil Nadu.

(Or)

The Anglo Indian High School Examination with eligibility for Higher Secondary Course in Tamil Nadu.

(Or)

The Matriculation Examination of Tamil Nadu.

(Or)

Any other Examinations recognized as equivalent to the above by the Board of Secondary Education, Tamil Nadu.

Note: In addition, at the time of admission the candidate will have to satisfy certain minimum requirements, which may be prescribed from time to time.

## **3. Admission to Second year (Lateral Entry):**

A pass in HSC (academic) or (vocational) courses mentioned in the Higher Secondary Schools in Tamil Nadu affiliated to the Tamil Nadu Higher Secondary Board with eligibility for University Courses of study or equivalent examination & Should have studied the following subjects.

A pass in 2 Years ITI with appropriate Trade or Equivalent examination.

Sl. No	Courses	H.Sc Academic		H.Sc Vocational		Industrial Training Institutes Courses
		Subjects Studied	Subjects Studied			
			Related subjects	Vocational subjects		
1	All the Regular and Sandwich Diploma Courses	Physics and Chemistry as compulsory along with Mathematics / Biology	Maths / Physics / Chemistry	Related Vocational Subjects Theory & Practical	2 years course to be passed with appropriate Trade	
2	Diploma Course in Commercial Practice	English & Accountancy English & Elements of Economics English & Elements of Commerce	English & Accountancy, English & Elements of Economics, English & Management Principles & Techniques, English & Typewriting	Accountancy & Auditing, Banking, Business Management, Co-operative Management, International Trade, Marketing & Salesmanship, Insurance & Material Management, Office Secretaryship		

- For the Diploma Courses related with Engineering/Technology, the related/equivalent subjects prescribed along with Practicals may also be taken for arriving the eligibility.
- Branch will be allotted according to merit through counseling by the respective Principal as per communal reservation.
- For admission to the Textile Technology, Leather Technology, Printing Technology, Chemical Technology and Commercial Practice Diploma courses the candidates studied the related subjects will be given first preference.

- Candidates who have studied Commerce Subjects are not eligible for Engineering Diploma Courses.

**4. Age Limit: No Age limit.**

**5. Medium of Instruction: English**

**6. Eligibility for the Award of Diploma:**

No candidate shall be eligible for the Diploma unless he/she has undergone the prescribed course of study for a period of not less than 3 academic years in any institution affiliated to the State Board of Technical Education and Training, Tamil Nadu, when joined in First Year and two years if joined under Lateral Entry scheme in the second year and passed the prescribed examination.

The minimum and maximum period for completion of Diploma Courses are as given below:

<b>Diploma Course</b>	<b>Minimum Period</b>	<b>Maximum Period</b>
Full Time	3 Years	6 Years
Full Time (Lateral Entry)	2 Years	5 Years
Sandwich	3½ Years	6½ Years
Part Time	4 Years	7 Years

This will come into effect from N Scheme onwards i.e. from the academic year 2020-2021.

**7. Subjects of Study and Curriculum outline:**

The subjects of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical subjects.

The curriculum outline is given in Annexure — I.

**8. Examinations:**

Board Examinations in all subjects of all the semesters under the scheme of examinations will be conducted at the end of each semester.



The internal assessment marks for all the subjects will be awarded on the basis of continuous internal assessment earned during the semester concerned. For each subject 25 marks are allotted for internal assessment. Board Examinations are conducted for 100 marks and reduced to 75.

The total marks for result are  $75 + 25 = 100$  Marks.

## 9. Continuous Internal Assessment:

### A. For Theory Subjects:

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

#### **i) Subject Attendance**

**5 Marks**

(Award of marks for subject attendance to each subject Theory/Practical will be as per the range given below)

80%	-	83%	1 Mark
84%	-	87%	2 Marks
88%	-	91%	3 Marks
92%	-	95%	4 Marks
96%	-	100%	5 Marks

#### **ii) Test #**

**10 Marks**

2 Tests each of 2 hours duration for a total of 50 marks are to be conducted. Average of these two test marks will be taken and the marks to be reduced to: 5 Marks

The Test-III is to be the Model Examination covering all the five units and the marks obtained will be reduced to: 5 Marks

TEST	UNITS	WHEN TO CONDUCT	MARKS	DURATION
Test I	Unit _ I & II	End of 6 <sup>th</sup> week	50	2 Hrs
Test II	Unit _ III & IV	End of 12 <sup>th</sup> week	50	2 Hrs
Test III	Model Examination: Covering all the Units. (Board Examinations- question paper-pattern).	End of 16 <sup>th</sup> week	100	3 Hrs

# From the Academic Year 2020—2021 onwards.

Question Paper Pattern for the Test - I and Test — II is as follows. The tests should be conducted by proper schedule. Retest marks should not be considered for internal assessment.

**Without Choice:**

Part A Type questions:	6 Questions x 1 mark	06 Marks
Part B Type questions:	7 Questions x 2 marks	14 Marks
Part C Type questions:	2 Questions x 15 marks	30 Marks
<b>Total</b>		<b>50 Marks</b>

**iii) Assignment**

**5 Marks**

For each subject Three Assignments are to be given each for 20 marks and the average marks scored should be reduced for 5 marks.

**iv) Seminar Presentation**

**5 Marks**

The students have to select the topics either from their subjects or general subjects which will help to improve their grasping capacity as well as their capacity to express the subject in hand. The students will be allowed to prepare the material for the given topic using the library hour and they will be permitted to present seminar (For First and Second Year, the students will be permitted to present the seminar as a group not exceeding six members and each member of the group should participate in the presentation. For the Third Year, the students should present the seminar individually.) The seminar presentation is mandatory for all theory subjects and carries 5 marks for each theory subject. The respective subject faculty may suggest topics to the students and will evaluate the submitted materials and seminar presentation. (2½ marks for the material submitted in writing and 2½ marks for the seminar presentation). For each subject minimum of two seminars are to be given and the average marks scored should be reduced to 5 marks.

All Test Papers, Assignment Papers / Notebooks and the seminar presentation written material after getting the signature with date from the students must be kept in safe custody in the department for verification and audit. It should be preserved for one semester after publication of Board Exam results and produced to the flying squad and the inspection team at the time of inspection/verification.

### **B. For Practical Subjects:**

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:-

a) Attendance	: 5 Marks (Award of marks as theory subjects)
b) Procedure/ observation and tabulation/ Other Practical related Work	: 10 Marks
c) Record writing	: 10 Marks
<b>TOTAL</b>	<b>: 25 Marks</b>

- All the Experiments/Exercises indicated in the syllabus should be completed and the same to be given for final Board examination.
- The observation note book / manual should be maintained for 10 marks. The observation note book / manual with sketches, circuits, programme, reading and calculation written by the students manually depends upon the practical subject during practical classes should be evaluated properly during the practical class hours with date.
- The Record work for every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 10 marks for each exercise as per the above allocation.
- At the end of the Semester, the average marks of all the exercises should be calculated for 20 marks (including Observation and Record writing) and the marks awarded for attendance is to be added to arrive at the internal assessment mark for Practical. (20+5=25 marks)

- Only regular students, appearing first time have to submit the duly signed bonafide record note book/file during the Practical Board Examinations.

*All the marks awarded for Assignments, Tests, Seminar presentation and Attendance should be entered periodically in the Personal Theory Log Book of the staff, who is handling the theory subject.*

*The marks awarded for Observation, Record work and Attendance should be entered periodically in the Personal Practical Log Book of the staff, who is handling the practical subject.*

#### **10. Communication Skill Practical, Computer Application Practical and Physical Education:**

The Communication Skill Practical and Computer Application Practical with more emphasis are being introduced in First Year. Much Stress is given to increase the Communication skill and ICT skill of students.

As per the recommendation of MHRD and under Fit India scheme, the Physical education is introduced to encourage students to remain healthy and fit by including physical activities and sports.

#### **11. Project Work and Internship:**

The students of all the Diploma Courses have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamil Nadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. **The Project work must be reviewed twice in the same semester. The project work is approved during the V semester by the properly constituted committee with guidelines.**

**a) Internal assessment mark for Project Work & Internship:**

Project Review 1	:	10 marks
Project Review II	:	10 marks
Attendance	:	05 marks (Award of marks same as theory subject pattern)

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<b>TOTAL</b>	<b>:</b>	<b>25 Marks</b>
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Proper record should be maintained for the two Project Reviews and preserved for one semester after the publication of Board Exams results. It should be produced to the flying squad and the inspection team at the time of inspection/verification.

**b) Allocation of Marks for Project Work & Internship in Board Examinations:**

Demonstration/Presentation/Viva voce	:	25 marks
Report	:	25 marks
Writtent test	:	30 marks
Internship Report	:	20 marks

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<b>TOTAL</b>	<b>:</b>	<b>100* marks</b>
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\*Examination will be conducted for 100 marks and will be converted to 75 marks.

**c) Internship Report:**

The internship training for a period of two weeks shall be undergone by every candidate at the end of IV / V semester during vacation. The certificate shall be produced along with the internship report for evaluation. The evaluation of internship training shall be done along with final year "Project Work & Internship" for 20 marks. The internship shall be undertaken in any industry / Government or Private certified agencies which are in social sector / Govt. Skill Centres / Institutions / Schemes.

**A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the Project Work & Internship Board examination.**

**12. Scheme of Examinations:**

The Scheme of examinations for subjects is given in Annexure - II.

### 13. Criteria for Pass:

1. No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed course of study successfully in an institution approved by AICTE and affiliated to the State Board of Technical Education & Training, Tamil Nadu and pass all the subjects prescribed in the curriculum.
2. A candidate shall be declared to have passed the examination in a subject if he/she secures not less than 40% in Theory subjects and 50% in practical subjects out of the total prescribed maximum marks including both the Internal Assessment and the Board Examinations marks put together, subject to the condition that he/she secures at least a minimum of 40 marks out of 100 marks in the Board Theory Examinations and a minimum of 50 marks out of 100 marks in the Board Practical Examinations.

### 14. Classification of successful candidates:

Classification of candidates who will pass out the final examinations from April 2023 onwards (Joined first year in 2020 -2021) will be done as specified below.

#### **First Class with Superlative Distinction:**

A candidate will be declared to have passed in **First Class with Superlative Distinction** if he/she secures not less than 75% of the marks in all the subjects and passes all the semesters in the first appearance itself and passes all subjects within the stipulated period of study 2 / 3 / 3½ / 4 years [Full time(lateral entry)/Full Time/Sandwich/Part Time] without any break in study.

#### **First Class with Distinction:**

A candidate will be declared to have passed in **First Class with Distinction** if he/she secures not less than 75% of the aggregate marks in all the semesters put together and passes all the semesters except the I and II semester in the first appearance itself and passes all subjects within the stipulated period of study 2 / 3 / 3½ / 4 years [Full time(lateral entry)/Full Time/Sandwich/Part Time] without any break in study.

**First Class:**

A candidate will be declared to have passed in **First Class** if he/she secures not less than 60% of the aggregate marks in all the semesters put together and passes all the subjects within the stipulated period of study 2 / 3 / 3½ / 4 years [Full time(lateral entry)/Full Time/Sandwich/Part Time] without any break in study.

**Second Class:**

All other successful candidates will be declared to have passed in Second Class.

The above classifications are also applicable for the Sandwich / Part-Time students who pass out Final Examination from October 2023 /April 2024 onwards (both joined First Year in 2020 -2021)

**15. Duration of a period in the Class Time Table:**

The duration of each period of instruction is 1 hour and the total period of instruction hours excluding interval and lunch break in a day should be uniformly maintained as 7 hours corresponding to 7 periods of instruction (Theory & Practical).

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**ANNEXURE - I**  
**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**1010 : DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N- SCHEME**  
**(To be implemented for the students from the year 2020-21 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
	<b>TOTAL</b>	<b>17</b>	<b>4</b>	<b>11</b>	<b>35</b>

**ANNEXURE - I**  
**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**1010 : DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**  
**(To be implemented for the students from the year 2020-21 onwards)**  
**CURRICULUM OUTLINE**

**FOURTH SEMESTER (FULL TIME)**

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010410	Theory of Structures	6	-	-	6
4010420	Hydraulics	6	-	-	6
4010430	Transportation Engineering	5	-	-	5
4010440	Hydraulics Laboratory	-	-	4	4
4010450	Material Testing Laboratory-II	-	-	3	3
4010460	Construction Practice Laboratory	-	-	4	4
4010470	Surveying Practice -II	-	-	4	4
Co-curricular activities	Physical Education	-	-	-	2
	Library	-	-	-	1
	<b>TOTAL</b>	<b>17</b>	<b>-</b>	<b>15</b>	<b>35</b>

## ANNEXURE - I

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

1010 : DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N-SCHEME

(To be implemented for the students from the year 2020-21 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>

## ANNEXURE - I

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

1010 : DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N-SCHEME

(To be implemented for the students from the year 2020-21 onwards)

### CURRICULUM OUTLINE

#### SIXTH SEMESTER (FULL TIME)

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010610	Construction Management	6	-	-	6
4010620	Estimation, Costing and Valuation	6	-	-	6
	<b>Elective Theory-II</b>				
4010631	Sustainable and Green Building Technology	5	-	-	5
4010632	Urban Planning and Development				
4010633	Water Resources Engineering				
4010640	Computer Applications in Civil Engineering Practice	-	-	5	5
	<b>Elective Practical – II</b>				
4010651	Estimation and Costing Laboratory	-	-	4	4
4010652	Highway Engineering Laboratory				
4010653	Water Resources Engineering Laboratory				
4010660	Project Work and Internship	-	-	6	6
Co-curricular activities	Physical Education	-	-	-	2
	Library	-	-	-	1
	<b>TOTAL</b>	<b>17</b>	<b>-</b>	<b>15</b>	<b>35</b>

## ANNEXURE - I

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

3010:DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N-SCHEME

(To be implemented for the students from the year 2020-21 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
	<b>TOTAL</b>	<b>10</b>	<b>6</b>	<b>2</b>	<b>18</b>

## ANNEXURE - I

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

3010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N-SCHEME

(To be implemented for the students from the year 2020-21 onwards)

### CURRICULUM OUTLINE

#### FOURTH SEMESTER (PART TIME)

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010330	Surveying	4	-	-	4
4010430	Transportation Engineering	4	-	-	4
4010360	Material Testing Laboratory-I	-	-	2	2
4010370	Surveying Practice-I	-	-	2	2
40002	Computer Application Practical	-	-	3	3
40025	Engineering Graphics - II	-	3	-	3
	<b>TOTAL</b>	<b>8</b>	<b>3</b>	<b>7</b>	<b>18</b>

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STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

3010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N-SCHEME

(To be implemented for the students from the year 2020-21 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>

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STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

3010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N-SCHEME

(To be implemented for the students from the year 2020-21 onwards)

### CURRICULUM OUTLINE

#### SIXTH SEMESTER (PART TIME)

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010410	Theory of Structures	5	-	-	5
4010620	Estimation, Costing and Valuation	4	-	-	4
4010540	Civil Engineering Drawing and CAD Practical – II	-	2	2	4
4010550	Environmental Engineering Laboratory	-	-	3	3
4010450	Material Testing Laboratory–II	-	-	2	2
	<b>TOTAL</b>	<b>9</b>	<b>2</b>	<b>7</b>	<b>18</b>



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STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

3010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N-SCHEME

(To be implemented for the students from the year 2020-21 onwards)

### CURRICULUM OUTLINE

#### SEVENTH SEMESTER (PART TIME)

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010510	Structural Engineering	6	-	-	6
	<b>Elective Theory – I</b>				
4010531	Remote Sensing and Geoinformatics				
4010532	Concrete Technology	4	-	-	4
4010533	Geotechnical Engineering				
4010460	Construction Practice Laboratory	-	-	3	3
	<b>Elective Practical – I</b>				
4010561	Advanced Surveying and Basic GIS Practical				
4010562	Concrete Technology Practical	-	-	3	3
4010563	Geotechnical Engineering Laboratory				
4010570	Entrepreneurship and Startups	-	-	2	2
	<b>TOTAL</b>	<b>10</b>	<b>-</b>	<b>8</b>	<b>18</b>

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STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

3010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N-SCHEME

(To be implemented for the students from the year 2020-21 onwards)

### CURRICULUM OUTLINE

#### EIGHTH SEMESTER (PART TIME)

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010610	Construction Management	5	-	-	5
	<b>Elective Theory-II</b>				
4010631	Sustainable and Green Building Technology				
4010632	Urban Planning and Development	4	-	-	4
4010633	Water Resources Engineering				
4010640	Computer Applications in Civil Engineering Practice	-	-	3	3
	<b>Elective Practical -II</b>				
4010651	Estimation and Costing Laboratory				
4010652	Highway Engineering Laboratory	-	-	3	3
4010653	Water Resources Engineering Laboratory				
4010660	Project Work and Internship	-	-	3	3
	<b>Total</b>	<b>9</b>	<b>-</b>	<b>9</b>	<b>18</b>

**ANNEXURE – I**  
**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**2010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**  
**(To be implemented for the students admitted from the year 2020-21 onwards)**  
**CURRICULUM OUTLINE**

**THIRD SEMESTER (SANDWICH)**

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010310	Mechanics of Solids	5	-	-	5
4010320	Construction Materials and Construction Practice	4	-	-	4
4010330	Surveying	5	-	-	5
4010430	Transportation Engineering	4	-	-	4
4010340	Building Planning and Drawing	-	3	-	3
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
	<b>TOTAL</b>	<b>18</b>	<b>3</b>	<b>11</b>	<b>35</b>

## ANNEXURE – I

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

2010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

### CURRICULUM OUTLINE

#### FOURTH SEMESTER (SANDWICH)

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010410	Theory of Structures	5	-	-	5
4010450	Material Testing Laboratory–II	-	-	2	2
4010491	Industrial Training-I	-	-	-	-

**ANNEXURE – I**  
**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**2010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N - SCHEME**  
**(To be implemented for the students admitted from the year 2020-21 onwards)**  
**CURRICULUM OUTLINE**

**FIFTH SEMESTER (SANDWICH)**

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010510	Structural Engineering	5	-	-	5
4010520	Environmental Engineering	4	-	-	4
	<b>Elective Theory–I</b>				
4010531	Remote Sensing and Geoinformatics				
4010532	Concrete Technology				
4010533	Geotechnical Engineering	4	-	-	4
4010540	Civil Engineering Drawing and CAD Practical – II	-	3	3	6
4010550	Environmental Engineering Laboratory	-	-	3	3
4010460	Construction Practice Laboratory	-	-	3	3
	<b>Elective Practical –I</b>				
4010561	Advanced Surveying and Basic GIS Practical				
4010562	Concrete Technology Practical	-	-	3	3
4010563	Geotechnical Engineering Laboratory				
4010570	Entrepreneurship and Startups	-	-	4	4
Co-curricular activities	Physical Education	-	-	-	2
	Library	-	-	-	1
	<b>TOTAL</b>	<b>13</b>	<b>3</b>	<b>16</b>	<b>35</b>

**ANNEXURE – I****STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU****2010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS****N - SCHEME****(To be implemented for the students admitted from the year 2020-21 onwards)****CURRICULUM OUTLINE****SIXTH SEMESTER (SANDWICH)**

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010610	Construction Management	5	-	-	5
4010620	Estimation, Costing and Valuation	6	-	-	6
	<b>Elective Theory-II</b>				
4010631	Sustainable and Green Building Technology				
4010632	Urban Planning and Development	5	-	-	5
4010633	Water Resources Engineering				
4010420	Hydraulics	5	-	-	5
4010440	Hydraulics Laboratory	-	-	3	3
4010470	Surveying Practice-II	-	-	4	4
	<b>Elective Practical –II</b>				
4010651	Estimation and Costing Laboratory				
4010652	Highway Engineering Laboratory				
4010653	Water Resources Engineering Laboratory	-	-	4	4
Co-curricular activities	Physical Education	-	-	-	2
	Library	-	-	-	1
	<b>TOTAL</b>	<b>21</b>	<b>-</b>	<b>11</b>	<b>35</b>

## ANNEXURE – I

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

2010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N - SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

### CURRICULUM OUTLINE

#### SEVENTH SEMESTER (SANDWICH)

Subject Code	Subject Name	Hours Per Week			
		Theory	Drawing	Practical	Total
4010640	Computer Applications in Civil Engineering Practice	-	-	2	2
4010660	Project Work and Internship	-	-	5	5
4010492	Industrial Training-II	-	-	-	-

## ANNEXURE – II

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

1010 : DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N-SCHEME

(To be implemented for the students from the year 2020-21 onwards)

### SCHEME OF EXAMINATION

#### THIRD SEMESTER (FULL TIME)

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Examination Marks (Converted to 75)	Total Marks		
4010310	Mechanics of Solids	25	100	100	40	3
4010320	Construction Materials and Construction Practice	25	100	100	40	3
4010330	Surveying	25	100	100	40	3
4010340	Building Planning and Drawing	25	100	100	40	3
4010350	Civil Engineering Drawing and CAD Practical – I	25	100	100	50	3
4010360	Material Testing Laboratory– I	25	100	100	50	3
4010370	Surveying Practice –I	25	100	100	50	3
<b>TOTAL</b>			<b>700</b>	<b>700</b>		



## ANNEXURE – II

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

1010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N-SCHEME

(To be implemented for the students from the year 2020-21 onwards)

### SCHEME OF EXAMINATION

#### FOURTH SEMESTER (FULL TIME)

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Examination Marks (Converted to 75)	Total Mark		
4010410	Theory of Structures	25	100	100	40	3
4010420	Hydraulics	25	100	100	40	3
4010430	Transportation Engineering	25	100	100	40	3
4010440	Hydraulics Laboratory	25	100	100	50	3
4010450	Material Testing Laboratory–II	25	100	100	50	3
4010460	Construction Practice Laboratory	25	100	100	50	3
4010470	Surveying Practice –II	25	100	100	50	3
<b>TOTAL</b>			<b>700</b>	<b>700</b>		

## ANNEXURE – II

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

1010 : DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N-SCHEME

(To be implemented for the students from the year 2020-21 onwards)

### SCHEME OF EXAMINATION

#### FIFTH SEMESTER (FULL TIME)

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Examination Marks (Converted to 75)	Total Mark		
4010510	Structural Engineering	25	100	100	40	3
4010520	Environmental Engineering	25	100	100	40	3
	<b>Elective Theory – I</b>					
4010531	Remote Sensing and Geoinformatics	25	100	100	40	3
4010532	Concrete Technology					
4010533	Geotechnical Engineering					
4010540	Civil Engineering Drawing and CAD Practical – II	25	100	100	50	3
4010550	Environmental Engineering Laboratory	25	100	100	50	3
	<b>Elective Practical–I</b>					
4010561	Advanced Surveying and Basic GIS Practical	25	100	100	50	3
4010562	Concrete Technology Practical					
4010563	Geotechnical Engineering Laboratory					
4010570	Entrepreneurship and Startups	25	100	100	50	3
<b>TOTAL</b>			<b>700</b>	<b>700</b>		

**ANNEXURE – II****STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU****1010 : DIPLOMA IN CIVIL ENGINEERING SYLLABUS****N-SCHEME****(To be implemented for the students from the year 2020-21 onwards)****SCHEME OF EXAMINATION****SIXTH SEMESTER (FULL TIME)**

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Examination Marks (Converted to 75)	Total Mark		
4010610	Construction Management	25	100	100	40	3
4010620	Estimation, Costing and Valuation	25	100	100	40	3
	<b>Elective Theory – II</b>					
4010631	Sustainable and Green Building Technology					
4010632	Urban Planning and Development	25	100	100	40	3
4010633	Water Resources Engineering					
4010640	Computer Applications in Civil Engineering Practice	25	100	100	50	3
	<b>Elective Practical – II</b>					
4010651	Estimation and Costing Laboratory					
4010652	Highway Engineering Laboratory	25	100	100	50	3
4010653	Water Resources Engineering Laboratory					
4010660	Project Work and Internship	25	100	100	50	3
<b>TOTAL</b>			<b>600</b>	<b>600</b>		

**ANNEXURE – II**  
**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**3010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented for the students from the year 2020-21 onwards)

**SCHEME OF THE EXAMINATION**

**THIRD SEMESTER (PART TIME)**

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam. Marks (Converted to 75)	Total Mark		
4010310	Mechanics of Solids	25	100	100	40	3
4010320	Construction Materials and Construction Practice	25	100	100	40	3
4010340	Building Planning and Drawing	25	100	100	40	3
40001	Communication Skill Practical	25	100	100	50	3
40015	Engineering Graphics- I	25	100	100	40	3
<b>TOTAL</b>			<b>500</b>	<b>500</b>		

**ANNEXURE – II**  
**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**3010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented for the students from the year 2020-21 onwards)

**SCHEME OF THE EXAMINATION**

**FOURTH SEMESTER (PART TIME)**

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam Marks (Converted to 75)	Total Mark		
4010330	Surveying	25	100	100	40	3
4010430	Transportation Engineering	25	100	100	40	3
4010360	Material Testing Laboratory-I	25	100	100	50	3
4010370	Surveying Practice-I	25	100	100	50	3
40002	Computer Application Practical	25	100	100	50	3
40025	Engineering Graphics-II	25	100	100	40	3
<b>TOTAL</b>			<b>600</b>	<b>600</b>		

**ANNEXURE – II**  
**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**3010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented for the students from the year 2020-21 onwards)

**SCHEME OF THE EXAMINATION**

**FIFTH SEMESTER (PART TIME)**

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam Marks (Converted to 75)	Total Mark		
4010420	Hydraulics	25	100	100	40	3
4010520	Environmental Engineering	25	100	100	40	3
4010350	Civil Engineering Drawing and CAD Practical – I	25	100	100	50	3
4010440	Hydraulics Laboratory	25	100	100	50	3
4010470	Surveying Practice-II	25	100	100	50	3
<b>TOTAL</b>			<b>500</b>	<b>500</b>		

**ANNEXURE – II**  
**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**3010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented for the students from the year 2020-21 onwards)

**SCHEME OF THE EXAMINATION**

**SIXTH SEMESTER (PART TIME)**

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam. Marks (Converted to 75)	Total Mark		
4010410	Theory of Structures	25	100	100	40	3
4010620	Estimation, Costing and Valuation	25	100	100	40	3
4010550	Environmental Engineering Laboratory	25	100	100	50	3
4010540	Civil Engineering Drawing and CAD Practical – II	25	100	100	50	3
4010450	Material Testing Laboratory–II	25	100	100	50	3
<b>TOTAL</b>			<b>500</b>	<b>500</b>		

**ANNEXURE – II****STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU****3010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS****N-SCHEME****(To be implemented for the students from the year 2020-21 onwards)****SCHEME OF THE EXAMINATION****SEVENTH SEMESTER (PART TIME)**

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam Marks (Converted to 75)	Total Mark		
4010510	Structural Engineering	25	100	100	40	3
	<b>Elective Theory II</b>					
4010531	Remote Sensing and Geoinformatics					
4010532	Concrete Technology	25	100	100	40	3
4010533	Geotechnical Engineering					
4010460	Construction Practice Laboratory	25	100	100	50	3
	<b>Elective Practical –I</b>					
4010561	Advanced Surveying and Basic GIS Practical					
4010562	Concrete Technology Practical	25	100	100	50	3
4010563	Geotechnical Engineering Laboratory					
4010570	Entrepreneurship and Startups	25	100	100	50	3
<b>Total</b>			<b>500</b>	<b>500</b>		



**ANNEXURE – II****STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU****3010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS****N-SCHEME****(To be implemented for the students from the year 2020-21 onwards)****SCHEME OF THE EXAMINATION****EIGHTH SEMESTER (PART TIME)**

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam Marks (Converted to 75)	Total Mark		
4010610	Construction Management	25	100	100	40	3
	<b>Elective Theory-II</b>					
4010631	Sustainable and Green Building Technology	25	100	100	40	3
4010632	Urban Planning and Development					
4010633	Water Resources Engineering					
4010640	Computer Applications in Civil Engineering Practice	25	100	100	50	3
	<b>Elective Practical-II</b>					
4010651	Estimation and Costing Laboratory	25	100	100	50	3
4010652	Highway Engineering Laboratory					
4010653	Water Resources Engineering Laboratory					
4010660	Project Work and Internship	25	100	100	50	3
<b>TOTAL</b>			<b>500</b>	<b>500</b>		

## ANNEXURE – II

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

2010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N - SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

### SCHEME OF THE EXAMINATION

#### THIRD SEMESTER (SANDWICH)

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam. Marks (Converted to 75)	Total Mark		
4010310	Mechanics of Solids	25	100	100	40	3
4010320	Construction Materials and Construction Practice	25	100	100	40	3
4010330	Surveying	25	100	100	40	3
4010430	Transportation Engineering	25	100	100	40	3
4010340	Building Planning and Drawing	25	100	100	40	3
4010350	Civil Engineering Drawing and CAD Practical – I	25	100	100	50	3
4010360	Material Testing Laboratory– I	25	100	100	50	3
4010370	Surveying Practice –I	25	100	100	50	3
<b>TOTAL</b>			<b>800</b>	<b>800</b>		

## ANNEXURE – II

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

2010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS

N - SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

### SCHEME OF THE EXAMINATION

#### FOURTH SEMESTER (SANDWICH)

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam Marks (Converted to 75)	Total Mark		
4010410	Theory of Structures	25	100	100	40	3
4010450	Material Testing Laboratory–II	25	100	100	50	3
4010491	Industrial Training- I	25	100	100	50	3
<b>TOTAL</b>			<b>300</b>	<b>300</b>		

## ANNEXURE – II

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**2010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS**

**N - SCHEME**

(To be implemented for the students admitted from the year 2020-21 onwards)

### SCHEME OF EXAMINATION

#### FIFTH SEMESTER (SANDWICH)

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam. Marks (Converted to 75)	Total Mark		
4010510	Structural Engineering	25	100	100	40	3
4010520	Environmental Engineering	25	100	100	40	3
	<b>Elective Theory I</b>					
4010531	Remote Sensing and Geoinformatics		100			
4010532	Concrete Technology	25		100	40	3
4010533	Geotechnical Engineering					
4010540	Civil Engineering Drawing and CAD Practical – II	25	100	100	50	3
4010550	Environmental Engineering Laboratory	25	100	100	50	3
4010460	Construction Practice Laboratory	25	100	100	50	3
	<b>Elective Practical-I</b>					
4010561	Advanced Surveying and Basic GIS Practical					
4010562	Concrete Technology Practical	25	100	100	50	3
4010563	Geotechnical Engineering Laboratory					
4010570	Entrepreneurship and Startups	25	100	100	50	3
<b>TOTAL</b>			<b>800</b>	<b>800</b>		

**ANNEXURE – II****STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU****2010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS****N - SCHEME****(To be implemented for the students admitted from the year 2020-21 onwards)****SCHEME OF EXAMINATION****SIXTH SEMESTER (SANDWICH)**

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam Marks (Converted to 75)	Total Mark		
4010610	Construction Management	25	100	100	40	3
4010620	Estimation, Costing and Valuation	25	100	100	40	3
	<b>Elective Theory II</b>					
4010631	Sustainable and Green Building Technology	25	100	100	40	3
4010632	Urban Planning and Development					
4010633	Water Resources Engineering					
4010420	Hydraulics	25	100	100	40	3
4010440	Hydraulics Laboratory	25	100	100	50	3
4010470	Surveying Practice-II	25	100	100	50	3
	<b>Elective Practical - II</b>					
4010651	Estimation and Costing Laboratory	25	100	100	50	3
4010652	Highway Engineering Laboratory					
4010653	Water Resources Engineering Laboratory					
<b>TOTAL</b>			<b>700</b>	<b>700</b>		

**ANNEXURE – II****STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU****2010: DIPLOMA IN CIVIL ENGINEERING SYLLABUS****N - SCHEME****(To be implemented for the students admitted from the year 2020-21 onwards)****SEVENTH SEMESTER (SANDWICH)**

Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam Marks (Converted to 75)	Total Mark		
4010640	Computer Applications in Civil Engineering Practice	25	100	100	50	3
4010660	Project Work and Internship	25	100	100	50	3
4010492	Industrial Training-II	25	100	100	50	3
<b>TOTAL</b>			<b>300</b>	<b>300</b>		

### List of Equivalent subjects for M-Scheme and N-Scheme

Sem	M Scheme		N Scheme (Implementing academic year 2020 - 21 )	
	Sub Code	Subject Name	Sub Code	Subject Name
III w.e.f. Oct 2021	31031	Engineering Mechanics	4010310	Mechanics of Solids
	31032	Construction Materials and Construction Practice	4010320	Construction Materials and Construction Practice
	31033	Surveying I	4010330	Surveying
	31034	Civil Engineering Drawing I	4010340	Building Planning and Drawing
	31035	Material Testing Lab I	4010360	Material Testing Laboratory– I
	31036	Surveying Practice I	4010370	Surveying Practice –I
	30001	Computer Application Practical**	40002	Computer Application Practical
IV w.e.f Apr 2022	31041	Theory of Structures	4010410	Theory of Structures
	31042	Transportation Engineering	4010430	Transportation Engineering
	31043	Surveying II	4010330	Surveying
	31044	Estimating and Costing I	4010620	Estimation, Costing and Valuation
	31045	Material Testing Lab II	4010450	Material Testing Laboratory–II
	31046	Surveying Practice II	4010470	Surveying Practice –II
	31047	CAD in Civil Engineering Drawing I	4010350	Civil Engineering Drawing and CAD Practical – I

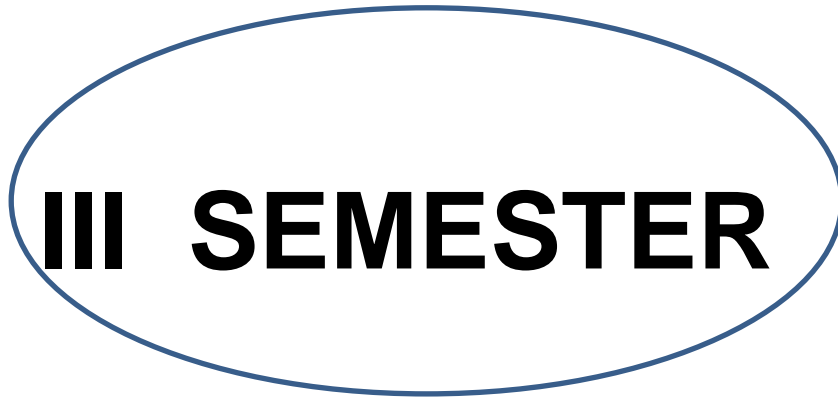
### List of Equivalent subjects for M-Scheme and N-Scheme

Sem	M-Scheme		N-Scheme (Implementing academic year 2020 - 21 )	
	Sub Code	Subject Name	Sub Code	Subject Name
V  w.e.f Oct 2022	31051	Structural Engineering	4010510	Structural Engineering
	31052	Environmental Engineering and Pollution Control	4010520	Environmental Engineering
	<b>Elective Theory – I</b>		<b>Elective Theory - I</b>	
	31071	Advanced Construction Technology	4010532	Concrete Technology
	31072	Remote Sensing and GIS	4010531	Remote Sensing and Geo Informatics
	31073	Soil Mechanics and Foundation Engineering	4010533	Geotechnical Engineering
	31074	Water Resources Management	4010633	Water Resources Engineering
	31054	Civil Engineering Drawing II	4010540	Civil Engineering Drawing and CAD Practical – II
	31055	Construction Practice Lab	4010460	Construction Practice Laboratory
	31056	CAD In Civil Engineering Drawing II	4010540	Civil Engineering Drawing and CAD Practical – II
	30002	Life and Employability Skills Practical	40001	Communication Skill Practical



### List of Equivalent subjects for M-Scheme and N-Scheme

Sem	M-Scheme		N-Scheme (Implementing academic year 2020 - 21 )	
	Sub Code	Subject Name	Sub Code	Subject Name
VI w.e.f Apr 2023	31061	Construction Management with MIS	4010610	Construction Management
	31062	Hydraulics	4010420	Hydraulics
		<b>Elective Theory- II</b>		<b>Elective Theory-II</b>
	31081	Steel Structures	--	No equivalent
	31082	Town Planning	4010632	Urban Planning and Development
	31083	Earthquake Engineering	--	No equivalent
	31084	Building Services	--	No equivalent
	31064	Estimating and Costing II	4010620	Estimation, Costing and Valuation
	31065	Hydraulics Lab	4010440	Hydraulics Laboratory
	31066	Computer Applications In Civil Engineering Practice	4010640	Computer Applications in Civil Engineering Practice
31067	Project Work	--	No equivalent	



**III SEMESTER**



DIPLOMA IN CIVIL ENGINEERING

II YEAR  
**N-SCHEME**

III SEMESTER  
**MECHANICS OF SOLIDS**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE  
**DIRECTORATE OF TECHNICAL EDUCATION**  
**CHENNAI - 600 025, TAMIL NADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented for the students admitted from the year 2020-2021 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			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
<b>MECHANICS OF SOLIDS</b>	<b>6 Hrs</b>	<b>96 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	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
<b>TOTAL</b>		<b>96</b>

**RATIONALE:**

Being the basic engineering subject, this imparts basic knowledge and skill regarding properties of materials, concept of stresses and strains, bending moment and shear force diagrams, second moment of area, bending and shear stresses, slope and deflection and analysis of trusses. The above knowledge will be useful for designing simple structural components. This subject is very important to develop basic concepts and principles related to structural mechanics. This subject is much essential for the students to continue their further education.

**OBJECTIVES:**

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

- Analyse the mechanical properties of engineering materials, elastic constants, relationship between elastic constants, different types of stresses and strains, the deformation of elastic bodies under simple stresses, the use and principles of composite sections;
- Analyse the structural behaviour of materials under various loading conditions.
- Interpret shear force and bending moment diagrams for various types of beams and loading Conditions, application of stress and strain in engineering field. Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections.
- Determine the different types of stresses induced in beams and shafts due to bending and twisting moments respectively
- Analyse perfect frames for vertical loads by analytical as well as graphical methods.



Unit	Name of the Topics	Hours
II	<p><b>SHEAR FORCE AND BENDING MOMENT</b></p> <p><b>2.1 TYPES OF LOADS AND BEAMS</b></p> <p>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.</p>	8
	<p><b>2.2 SHEAR FORCE AND BENDING MOMENT IN BEAMS</b></p> <p>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).</p>	9
III	<p><b>GEOMETRICAL PROPERTIES OF SECTIONS</b></p> <p><b>3.1 CENTROID</b></p> <p>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.</p>	8





Unit	Name of the Topics	Hours
V	<p><b>PIN JOINTED FRAMES</b></p> <p><b>5.1 ANALYSIS BY ANALYTICAL METHOD (METHOD OF JOINTS)</b>            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 of a force - Designation of a force - Nature of forces in the frame members - Analysis of Symmetrical Frames – Assumptions - Methods of analysis - Analytical methods - Method of Joints and Method of Sections - Problems on Analysis of cantilever and simply supported perfect frames ( with not more than ten members ) with vertical nodal loads by method of joints only. Identification of members with nil force in a determinate truss.</p> <p><b>5.2 ANALYSIS BY GRAPHICAL METHOD</b>            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.</p>	<p><b>10</b></p> <p><b>7</b></p>
	<p><b>Test &amp; Model Exam</b></p>	<p><b>7 Hrs.</b></p>

### Reference Books

1. R.S.Khurmi “Strength of Materials”, S.Chand & Company Ltd, New Delhi
2. S.Ramamirtham, “Strength of Materials”, Dhanpat Rai (2003)
3. Vazirani & Ratwani, “Analysis of Structures-Vol 1”, Khanna Publishers(2003)
4. S.B.Junnarkar, “Mechanics of Structures- Vol 1”, Charotar Publishing House
5. Sanchayan Mukherjee, “Elements of Engineering Mechanics”, PHI Learning Pvt. Ltd.
6. R K Bansal, “Engineering Mechanics”, Laxmi Publications Pvt.Ltd.



DIPLOMA IN CIVIL ENGINEERING

II YEAR

**N - SCHEME**

III SEMESTER

**CONSTRUCTION MATERIALS AND  
CONSTRUCTION PRACTICE**

IMPLEMENTED FROM 2020- 2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION  
CHENNAI-600 025, TAMIL NADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented for the students admitted from the year 2020-2021 onwards)

Course Name : 1010 : DIPLOMA CIVIL ENGINEERING  
 Subject Code : 4010320  
 Semester : III Semester  
 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
<b>CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE</b>	5 Hrs.	80 Hrs.	Internal Assessment	Board Examination	Total	
			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	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
	<b>TOTAL</b>	<b>80</b>

**RATIONALE:**

Civil Engineering diploma holders have to supervise construction of various types of civil works involving, the use of various materials like stones, bricks and tiles, cement and cement based products, lime, timber and wood based products, paints and varnishes, metals and other miscellaneous materials. The students should have requisite knowledge regarding the characteristics, uses and availability of various building materials and skills in conducting tests to determine the suitability of materials for various construction purposes. In addition, specifications of various materials should also be known (PWD/BIS) for effective quality control.

To perform the above tasks, 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 Construction Materials and Construction Practice is very important for Civil Engineering diploma holders.

**OBJECTIVES:**

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

- State different construction materials and their properties.
- Explain the different types of cement, grades of cements and tests on cement.
- State and explain the different types of modern building materials such as ceramic products, glass, metals and plastics.
- Explain the method of preparation of mortar, cement concrete and state the different types of structures.
- Describe the different types of foundations.
- Describe the classification of stone masonry & brick masonry. State the different types of doors, windows, lintels & stairs.
- Describe the types of floors and roofs.
- Describe the different methods of pointing, plastering and termite proofing.
- Explain the methods of scaffolding, shoring & underpinning and form work.
- Describe procedure of colour washing, white washing, painting and varnishing.

## DETAILED SYLLABUS

### 4010320-CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE

Contents: Theory

Unit	Name of the Topics	Hours
I	<b>1.1 INTRODUCTION</b>  Physical properties of materials - Density, Bulk density, Specific gravity, porosity, water absorption, permeability, chemical resistance, fire resistance, weathering resistance, thermal conductivity, Durability. (Definitions only).	2
	<b>1.2 ROCKS AND STONES</b>  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).	2
	<b>1.3 BRICKS</b>  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.	2
	<b>1.4 LIME AND POZZOLANAS</b>  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

Unit	Name of the Topics	Hours
I	<p><b>1.5 CEMENT</b></p> <p>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.</p>	3
	<p><b>1.6 WATER</b></p> <p>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.</p>	2
	<p><b>1.7 GLASS</b></p> <p>Definition - Constituents of glass - Classification of glass - Functions and Utility - Types of glass, sizes and thickness used in buildings.</p>	2
II	<p><b>2.1 MORTAR</b></p> <p>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.</p>	1
	<p><b>2.2 CONCRETE</b></p> <p>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.</p>	2
	<p><b>2.3 PAINTS AND VARNISHES</b></p> <p>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.</p>	3

Unit	Name of the Topics	Hours
II	<p><b>2.4 METALS AND PLASTICS</b></p> <p>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.</p>	3
	<p><b>2.5 TIMBER AND TIMBER PRODUCTS</b></p> <p>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.</p>	2
	<p><b>2.6 ROOF COVERINGS</b></p> <p>Definition - objectives and uses - AC Sheets - FRP Sheets - G.I. sheets- Steel sheets- Polycarbonate sheets- Shell roof - R C C roof Advantages - Types.</p>	2
	<p><b>2.7 DAMP PROOFING MATERIALS</b></p> <p>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.</p>	2

Unit	Name of the Topics	Hours
III	<p><b>3.1 INTRODUCTION TO STRUCTURES</b></p> <p>Permanent and temporary structures - Life of structures - Sub structure - super structure - load bearing structure - framed structure - concept of framed structure - advantages of framed structure.</p>	2
	<p><b>3.2 FOUNDATION</b></p> <p>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.</p>	3
	<p><b>3.3 STONE MASONRY</b></p> <p>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 &amp; Random rubble masonry - Ashlar masonry - points to be considered in the construction of stone masonry - Tools used(Names only).</p>	2
	<p><b>3.4 BRICK MASONRY</b></p> <p>Definition - Common terms used - Header, stretcher, bed joint, lap, perpend, closer, king, queen &amp; bevelled, bat permissible loads in brick masonry - Bond - Types Header, stretcher, English bond &amp; 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.</p>	3



Unit	Name of the Topics	Hours
III	<p><b>3.5 PARTITION</b></p> <p>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.</p>	2
	<p><b>3.6 WATER PROOFING AND DAMP PROOFING</b></p> <p>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.</p>	3
IV	<p><b>4.1 DOORS, WINDOWS AND VENTILATORS</b></p> <p>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.</p>	3
	<p><b>4.2 HOLLOW BLOCK CONSTRUCTIONS</b></p> <p>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.</p>	2
	<p><b>4.3 STAIRS</b></p> <p>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.</p>	2

	<p><b>4.4 FLOORS AND FLOORING</b></p> <p>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 &amp; PVC tile flooring- Carpet tile &amp; Rubber flooring.</p> <p><b>4.5 ROOFS</b></p> <p>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.</p> <p><b>4.6 WEATHERING COURSE</b></p> <p>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.</p>	<p><b>3</b></p> <p><b>2</b></p> <p><b>2</b></p>
<b>V</b>	<p><b>5.1 POINTING</b></p> <p>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.</p> <p><b>5.2 PLASTERING</b></p> <p>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.</p>	<p><b>2</b></p> <p><b>3</b></p>

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



DIPLOMA IN CIVIL ENGINEERING

II YEAR  
**N-SCHEME**

III SEMESTER  
**SURVEYING**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**  
**CHENNAI-600 025, TAMIL NADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the student admitted from the year 2020-2021 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			Duration
	Hours / Week	Hours / Semester	Marks			
<b>SURVEYING</b>	<b>6 Hrs.</b>	<b>96 Hrs.</b>	<b>Internal Assessment</b>	<b>Board 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

Unit	Topics	Hours
I	Introduction to Surveying and Chain Surveying and compass 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
	<b>TOTAL</b>	<b>96</b>

**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. While framing the curriculum for the subject of surveying, stress has been given to the development of the skill in each type of survey like chain surveying, compass surveying and levelling that the Civil Engineering diploma holder will normally be called upon to perform. Each type of Survey like Chain surveying, Compass surveying, Levelling, Theodolite surveying, Tacheometric surveying, Contour surveying, Total station surveying and GPS introduced in this course.

**OBJECTIVES:**

On completion of the course, the students will possess knowledge about:

- Chain surveying
- Compass surveying
- Theodolite surveying
- Tacheometric Surveying
- Preparation of Contour layouts
- Total Station Surveying
- Global Positioning System

**DETAILED SYLLABUS**  
**4010330 - SURVEYING**

Contents: Theory

Unit	Name of the Topics	Hours
<b>I</b>	<p><b>INTRODUCTION TO SURVEYING AND CHAIN SURVEYING AND COMPASS SURVEYING</b></p> <p><b>1.1 SURVEYING</b> Definition - Objectives and uses of surveying -Classification of Surveying - Principles of surveying.</p> <p><b>1.2 CHAIN SURVEYING</b> 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.</p> <p><b>1.3 COMPASS SURVEYING</b> 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.</p>	<p><b>2</b></p> <p><b>10</b></p> <p><b>10</b></p>
<b>II</b>	<p><b>2.1 LEVELLING</b> 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,</p>	<b>17</b>

	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.	
<b>III</b>	<p><b>3.1 THEODOLITE SURVEYING</b></p> <p>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</p>	<b>17</b>
<b>IV</b>	<p><b>4.1 TACHEOMETRIC SURVEYING</b></p> <p>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.</p> <p><b>4.2 CONTOUR SURVEYING</b></p> <p>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.</p>	<p><b>9</b></p> <p><b>8</b></p>



<b>V</b>	<b>TOTAL STATION AND GLOBAL POSITIONING SYSTEM</b>	
	<b>5.1 Total Station</b> 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.).	<b>8</b>
	<b>5.2 GLOBAL POSITIONING SYSTEM ( GPS )</b> 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.	<b>8</b>
	<b>Test &amp; Model Exam</b>	<b>7 Hrs.</b>



DIPLOMA IN CIVIL ENGINEERING

II YEAR  
**N-SCHEME**

III SEMESTER  
**BUILDING PLANNING AND DRAWING**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**  
**CHENNAI-600 025, TAMIL NADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMIL NADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 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
<b>BUILDING PLANNING AND DRAWING</b>	4 Hrs.	64 Hrs.	Internal Assessment	Board Examination	Total	
			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	Introduction	5
II	Planning of Building	5
III	Basic Drawings	9
IV	Building Drawings	38
	Test & Model Exam	7
	<b>TOTAL</b>	<b>64</b>

**RATIONALE:**

Drawing is the language of engineers. Engineering is absolutely incomplete without a thorough knowledge of drawing. A Civil Engineering diploma holder must be capable of sketching detailed constructional drawing of various components of building for the purpose of communication with the craftsman. Planning of small buildings, developing a line plan, dimensioning, key plan, and drainage plan should be a part of curriculum. The diploma engineer must be conversant with reading and interpretation of drawing for execution of work.

**OBJECTIVES:**

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

- Study Conventions and Abbreviations;
- Prepare layout of buildings;
- Gain thorough knowledge of the rules, regulations and standards of buildings;
- Read the line sketch and prepare plan, elevations of buildings and gain thorough knowledge of planning various types of buildings.

## DETAILED SYLLABUS

### 4010340-BUILDING PLANNING AND DRAWING

Contents: Theory

Unit	Name of the Topics	Hours
I	<p><b>INTRODUCTION</b></p> <p><b>1.1 CONVENTIONS, SYMBOLS :</b> General – Conventions- Title block- Scales- Line work- Lettering - Symbols - Abbreviations</p> <p><b>1.2 BUILDING BYE-LAWS AND SUBMISSION OF DRAWINGS</b> 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.</p>	5
II	<p><b>PLANNING OF BUILDINGS</b></p> <p><b>2.1 PLANNING OF RESIDENTIAL BUILDINGS</b> 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.</p> <p><b>2.2 PLANNING OF INDUSTRIAL STRUCTURES</b> 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).</p>	5

	<p><b>2.3 PLANNING OF PUBLIC BUILDINGS</b></p> <p>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).</p>	
<b>III</b>	<p><b>BASIC DRAWINGS</b></p> <p>Standard symbols used in Civil Engineering Drawing.</p> <p>Draw the elevation of :</p> <ol style="list-style-type: none"> <li>1. Fully panelled double leaf door.</li> <li>2. Fully Panelled single leaf door</li> <li>3. Flush door</li> <li>4. Fully Panelled window with grill</li> <li>5. Partly glazed and partly panelled window</li> <li>6. Lean- to – roof</li> <li>7. King post roof truss</li> <li>8. Steel roof truss</li> <li>9. Rain water Harvesting– Recharging into the ground <ol style="list-style-type: none"> <li>a. Shallow well system</li> <li>b. Percolation pit system.</li> </ol> </li> </ol>	<b>9</b>
<b>IV</b>	<p><b>BUILDING DRAWINGS</b></p> <p>Preparation of plan, section and elevation of buildings with specifications for the given line drawing to suitable Scale:</p> <ol style="list-style-type: none"> <li>1. A Reading room with R.C.C flat roof</li> <li>2. A House with single bed room and attached bathroom with R.C.C. flat roof.</li> <li>3. A residential building with two bed rooms with R.C.C. flat roof</li> <li>4. A Two roomed house with RCC slope roof with gable ends</li> <li>5. A Small workshop with north light steel roof truss (6 to 10m Span) over R.C.C. Columns.</li> <li>6. A Primary health center for rural area with R.C.C roof.</li> <li>7. A Village Library building with R.C.C flat roof</li> <li>8. A small Restaurant building with R.C.C flat roof</li> <li>9. A Single storied School building with R.C.C flat roof</li> <li>10. A Bank building with R.C.C flat roof.</li> </ol>	<b>38</b>
	<b>Test &amp; Model Exam</b>	<b>7 Hrs.</b>

## Reference Books

1. National Building code of India 2016
2. Tamil Nadu District Municipal building rules and by-laws
3. Civil Engineering Drawing and house planning – by B.P.Verma
4. Elements building drawings and design – by R.S.Deshpande and N.K.Karandikar
5. Design of Houses – by J.S.Yadav
6. A Guide to Civil Engg. Drawing – by V.R.Thothathri Dr
7. Building Planning and Drawing by N. Kumaraswamy and A. Kameswara Rao.
8. Civil Engineering Drawing by S.C.Rangwala
9. Building Planning and Construction Companion”, G. Vaidhyanathan, I. Kulasekaran, G. Sathish Kumar”

## Scheme of Examination

<b>PART A</b> From unit I and II ( 2 x 4, Unit III – 1 x 12)	20 marks
<b>PART B</b> From IV	80 marks
<b>TOTAL</b>	<b>100 Marks *</b>

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



# **DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**N - SCHEME**

**III SEMESTER**

**CIVIL ENGINEERING DRAWING AND**

**CAD PRACTICAL- I**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010 : 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			Duration
	Hours / Week	Hours / Semester	Marks			
<b>CIVIL ENGINEERING DRAWING AND CAD PRACTICAL - I</b>	4 Hrs.	64 Hrs.	Internal Assessment	Board Examination	Total	3 Hrs.
			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, 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 room to 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<sup>2</sup> area.

13. Preparation of approval drawing to be submitted to Corporation or Municipality showing required details in one sheet such as
- Site Plan (Land boundary, Building boundary, Car Parking, Passage, sanitary layout, septic tank location etc.
  - G.F. Plan, F.F. Plan, Section and Elevation (line diagram is enough)
  - Key Plan
  - Septic tank Plan and section (line diagram)
  - Rain water harvesting pit (with all detail)
  - Typical foundation details (Column foundation or spread footing)
  - 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.

**IN BOARD EXAMINATION, QUESTIONS WILL BE CHOSEN AS FOLLOWS**

PART – A	45 marks
PART – B	50 marks
Viva – voce	5 marks
<b>TOTAL</b>	<b>100 marks</b>

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

S.No.	List of the equipments	Quantity Required
1.	Computers	30 Nos.
2.	Laser printer	3 Nos.
3.	CAD software	30 Users



# **DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**N - SCHEME**

**III SEMESTER**

**MATERIAL TESTING LABORATORY-I**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented for the students admitted from the year 2020-2021 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
<b>MATERIAL TESTING LABORATORY- I</b>	<b>3 Hrs.</b>	<b>48 Hrs.</b>	<b>Internal Assessment</b>	<b>Board Examination</b>	<b>Total</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:**

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
<b>PART A</b>	<ol style="list-style-type: none"><li>1. Tension test on mild steel / deformed steel bars.</li><li>2. Deflection test on Simply Supported Beams of<ol style="list-style-type: none"><li>a. wood and b. steel to find Young's modulus</li></ol></li><li>3. Torsion test on mild steel bar to determine the Modulus of Rigidity.</li><li>4. Double shear test on M.S. bar.</li><li>5. Impact Test on mild steel by performing Izod / Charpy tests.</li><li>6. Find Brinell's hardness numbers of the following materials.<ol style="list-style-type: none"><li>a. Mild steel b. Brass c. Aluminium.</li></ol></li><li>7. Find Rockwell's hardness numbers of the following materials.<ol style="list-style-type: none"><li>a. Mild steel b. Brass c. Aluminium.</li></ol></li></ol>	<b>25 Hrs.</b>
<b>PART B</b>	<ol style="list-style-type: none"><li>8. Compression Test on Wooden cube.</li><li>9. Compression test on Bricks.</li><li>10. Compression test on Solid Blocks</li><li>11. Water absorption test on Bricks /pressed tiles.</li><li>12. Flexure test on Tiles.</li><li>13. Casting of Cement Mortar cubes after determining the normal consistency of cement..</li><li>14. Determining the compressive strength of Cement Mortar cubes.</li></ol>	<b>23 Hrs.</b>

## 4010360 - MATERIAL TESTING LABORATORY - I

### DETAILED ALLOCATION OF MARKS

S.No	Description	Part - A Max. Marks (50)	Part - B Max. Marks (45)
1.	Procedure	5	5
2.	Tabulation and Observation	20	20
3.	Calculations	15	10
4.	Sketch / Graph	5	5
5.	Accuracy of result	5	5
6.	Viva	5	

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

S.No.	List of the Equipments	Quantity
1.	UTM	1 no.
2.	Rock well-cum-Brinell Hardness testing machine	1 no.
3.	Torsion testing machine	1 no.
4.	Impact testing machine for Izod and Charpy test	1 no.
5.	Deflection test verification of Maxwell theorem with magnetic stand, deflection gauge, weights and sets of beam (floor type)	1 no.
6.	Weighing balance-digital 10 kg capacity one gram accuracy with battery backup 8 hours/direct electrical connection	1 no.
7.	Compression testing machine 100 tons capacity (electrical operated)	1 no.
8.	Flexural Testing Machine for Tiles	1 no.
9.	Spring testing Apparatus	1 no.
10.	Double shear test apparatus	1 no.
11.	Vicat's Apparatus	1 no.



# **DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**N - SCHEME**

**III SEMESTER**

**SURVEYING PRACTICE- I**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 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			Duration
	Hours / Week	Hours / Semester	Marks			
<b>SURVEYING PRACTICE-I</b>	<b>4 Hrs.</b>	<b>64 Hrs.</b>	<b>Internal Assessment</b>	<b>Board 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:**

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
<b>PART A</b>	<b>1. CHAIN AND COMPASS SURVEYING</b> Study of chain, tape and accessories used for chain survey. Study of Prismatic compass, setting up over a station and observe bearings of lines. 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.	<b>8</b>
	<b>2. GLOBAL POSITIONING SYSTEM ( GPS )</b> 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.	<b>8</b>
<b>PART B</b>	<b>3. LEVELLING</b> 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) 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). Check levelling and reduction of levels (Minimum Two exercises)	<b>48</b>

## 4010370 - SURVEYING PRACTICE-I

**In Board Examination, questions will be chosen as follows:**

PART A	By Lot i. Compass Survey - 35 Marks
	ii. GPS - 15 Marks
PART B	Levelling (Compulsory) - 45 Marks
	Viva-Voce - 5 Marks
<b>TOTAL</b>	<b>- 100 Marks</b>

### DETAILED ALLOCATION OF MARKS

S.No	Description	Part - A		Part - B
		Max.Marks (35)	Max.Marks (15)	Max. Marks (45)
1.	Procedure, Handling Instruments / Tools	5	3	5
2.	Field works, Observation and Tabulation	15	10	20
3.	Calculations and Check / drawings.	10	0	15
4.	Accuracy of result	5	2	5
5.	Viva-Voce	5		

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

S.No.	List of the Equipments	Quantity Required
1.	Chain with (arrows)	6 nos.
2.	Prismatic compass	6 nos.
3.	Dumpy level	10 nos.
4.	Levelling staff	10 nos.
5.	Cross staff	6 nos.
6.	Ranging rod	2 nos.
7.	Hand held GPS	6 nos.

**IV SEMESTER**



# **DIPLOMA IN CIVIL ENGINEERING**

**II YEAR  
N-SCHEME**

**IV SEMESTER  
THEORY OF STRUCTURES**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION  
CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**

**N-SCHEME**

**(To be implemented to the student admitted from the year 2020-2021 onwards)**

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
Subject Code : 4010410  
Semester : IV Semester  
Subject Title : **THEORY OF STRUCTURES**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
THEORY OF STRUCTURES	6 Hrs.	96 Hrs.	Internal Assessment	Board 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	Slope and Deflection of beams, Propped Cantilever	18
II	Fixed Beams Continuous Beams – Theorem of Three moments method	18
III	Continuous Beams – Moment Distribution method portal frames - moment distribution method	18
IV	Columns and Struts Combined bending and direct stresses	18
V	Masonry Dams Earth pressure and Retaining walls	17
	Test & Model Exam	7
	<b>TOTAL</b>	<b>96</b>

**RATIONALE:**

Study of structural behaviour, analysis and design is a principal part of civil engineering courses and is essential for professional accreditation. This subject enhances the structural analytical ability of the students.

**OBJECTIVES:**

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

- Determine the of Slope and Deflection of Determinate beams by area moment method.
- Analyse of Propped cantilevers and Fixed beams by Area-Moment method and draw SFD, BMD.
- Analyse of Continuous beams by Theorem of Three moments and draw SFD, BMD.
- Analyse of Continuous beams, Portal frames and Substitute frames by Moment Distribution Method and draw SFD, BMD.
- Define the different types of Columns and finding critical loads of Columns.
- Analyse of Columns and Chimneys subject to eccentric loading / moment / horizontal loads and find maximum and minimum combined stresses in their sections.
- Calculate the maximum and minimum bearing pressures and check the stability of Masonry Dams
- Calculate the maximum and minimum bearing pressures and check the stability of Retaining walls.

**DETAILED SYLLABUS**  
**4010410 THEORY OF STRUCTURES**

Contents: Theory

<b>Unit</b>	<b>Name of the Topics</b>	<b>Hours</b>
<b>I</b>	<p><b>1.1 SLOPE AND DEFLECTION OF BEAMS</b>            Deflected shapes / Elastic curves of beams with different support conditions –Definition of Slope and Deflection- Flexural rigidity and Stiffness of beams- Mohr's Theorems – Area Moment method for slope and deflection of beams – Derivation of expressions for maximum slope and maximum deflection of standard cases by area moment method for cantilever and simply supported beams subjected to symmetrical UDL &amp; point loads – Numerical problems on determination of slopes and deflections at salient points of Cantilevers and Simply supported beams from first principles and by using formulae.</p> <p><b>1.2 PROPPED CANTILEVERS</b>            Statically determinate and indeterminate Structures- Stable and Unstable Structures- Examples- Degree of Indeterminacy- Concept of Analysis of Indeterminate beams - Definition of Prop–Types of Props- Prop reaction from deflection consideration – Drawing SF and BM diagrams by area moment method for UDL throughout the span, central and non-central concentrated loads – Propped cantilever with overhang – Point of Contra flexure.</p>	<b>10</b>
		<b>8</b>
<b>II</b>	<p><b>2.1 FIXED BEAMS – AREA MOMENT METHOD</b>            Introduction to fixed beam - Advantages –Degree of indeterminacy of fixed beam- Sagging and Hogging bending moments – Determination of fixing end(support) moments(FEM) by Area Moment method – Derivation of Expressions for Standard cases – Fixed beams subjected to symmetrical and unsymmetrical concentrated loads and UDL – Drawing SF and BM diagrams for Fixed beams with supports at the same level (sinking of supports or supports at different levels are not included) – Points of Contra flexure –Problems- Determination of Slope and Deflection of fixed beams subjected to only symmetrical loads by area moment method – Problems.</p>	<b>9</b>



<p><b>II</b></p>	<p><b>2.2 CONTINUOUS BEAMS – THEOREM OF THREE MOMENTS METHOD</b></p> <p>Introduction to continuous beams – Degree of indeterminacy of continuous beams with respect to number of spans and types of supports –Simple/Partially fixed / Fixed supports of beams- General methods of analysis of Indeterminate structures – Clapeyron’s theorem of three moments – Application of Clapeyron’s theorem of three moments for the following cases – Two span beams with both ends simply supported or fixed – Two span beams with one end fixed and the other end simply supported – Two span beams with one end simply supported or fixed and other end overhanging –Determination of Reactions at Supports- Application of Three moment equations to Three span Continuous Beams and Propped cantilevers –Problems- Sketching of SFD and BMD for all the above cases.</p>	<p><b>9</b></p>
<p><b>III</b></p>	<p><b>3.1 CONTINUOUS BEAMS – MOMENT DISTRIBUTION METHOD</b></p> <p>Introduction to Carry over factor, Stiffness factor and Distribution factor –Stiffness Ratio or Relative Stiffness- Concept of distribution of un balanced moments at joints - Sign conventions</p> <p>– Application of M-D method to Continuous beams of two / three spans and to Propped cantilever (Maximum of three cycles of distribution sufficient) –Finding Support Reactions- Problems - Sketching SFD and BMD for two / three span beams.</p> <p><b>3.2 PORTAL FRAMES – MOMENT DISTRIBUTION METHOD</b></p> <p>Definition of Frames – Types – Bays and Story - Sketches of Single/Multi Story Frames, Single/Multi Bay Frames- Portal Frame – Sway and Non- sway Frames- Analysis of Non sway (Symmetrical) Portal Frames for Joint moments by Moment Distribution Method and drawing BMD only– Deflected shapes of Portal frames under different loading / support conditions.</p>	<p><b>10</b></p> <p><b>8</b></p>

Unit	Name of the Topics	Hours
IV	<p><b>4.1 COLUMNS AND STRUTS</b></p> <p>Columns and Struts – Definition – Short and Long columns – End conditions – Equivalent length / Effective length– Slenderness ratio – Axially loaded short column - Axially loaded long column – Euler’s theory of long columns – Derivation of expression for Critical load of Columns with hinged ends – Expressions for other standard cases of end conditions (separate derivations not required) – Problems – Derivation of Rankine’s formula for Crippling load of Columns– Factor of Safety- Safe load on Columns- Simple problems.</p>	9
	<p><b>4.2 COMBINED BENDING AND DIRECT STRESSES</b></p> <p>Direct and Indirect stresses – Combination of stresses – Eccentric loads on Columns – Effects of Eccentric loads / Moments on Short columns – Combined direct and bending stresses – Maximum and Minimum stresses in Sections– Problems – Conditions for no tension – Limit of eccentricity – Middle third rule – Core or Kern for square, rectangular and circular sections – Chimneys subjected to uniform wind pressure –Combined stresses in Chimneys due to Self weight and Wind load- Chimneys of Hollow square and Hollow circular cross sections only – Problem.</p>	9
V	<p><b>5.1 MASONRY DAMS</b></p> <p>Gravity Dams – Derivation of Expression for maximum and minimum stresses at Base – Stress distribution diagrams – Problems – Factors affecting Stability of masonry dams – Factor of safety- Problems on Stability of Dams– Minimum base width and maximum height of dam for no tension at base – Elementary profile of a dam – Minimum base width of elementary profile for no tension - Middle third rule.</p>	8
	<p><b>5.2 EARTH PRESSURE AND RETAINING WALLS</b></p> <p>Definition – Angle of repose /Angle of Internal friction of soil– State of equilibrium of soil – Active and Passive earth pressures – Rankine’s theory of earth pressure – Assumptions – Lateral earth pressure with level back fill / level surcharge (Angular Surcharge not required)– Earth pressure due to Submerged soils –(Soil retained on vertical back</p>	9

	of wall only) – Maximum and minimum stresses at base of Trapezoidal Gravity walls – Stress distribution diagrams – Problems – Stability of earth retaining walls – Problems to check the stability of walls-Minimum base width for no tension.	
	<b>Test &amp; Model exam</b>	<b>7 Hrs.</b>

**Reference Books :**

1. S. Ramamrutham, "Theory of structures", Dhanpat Rai Publications, New Delhi
2. B.C. Punmia, Ashok Jain & Arun Jain," Theory of structures ",Laxmi Publications, 9<sup>th</sup> Edition, April1992.
3. S.B. Junnarkar, Mechanics of structures (Vol.II) Charator Publishing House Anand, Gujarat.
4. V.N. Vazirani & M.M. Ratwani, "Analysis of structures", Khanna Publishers, New Delhi.
5. R.L. Jindal , "Elementary Theory of Structures", S.Chand Pvt., Co. Ltd.New Delhi.
6. Madhan Mohan Dass, " Structural Analysis" PHI Learning Pvt. Ltd., New Delhi.



# **DIPLOMA IN CIVIL ENGINEERING**

**II YEAR  
N-SCHEME**

**IV SEMESTER  
HYDRAULICS**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION  
CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010420  
 Semester : IV Semester  
 Subject Title : **HYDRAULICS**

**TEACHING AND SCHEME OF EXAMINATION**

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
HYDRAULICS	6 Hrs.	96 Hrs.	Internal Assessment	Board Examination	Total	
			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	Introduction of measurement of Pressure Hydrostatic Pressure on Surfaces	20
II	Flow of fluids, Flow through Orifices and Mouthpieces, Flow through Pipes	20
III	Flow through Notches and Flow through weirs	16
IV	Flow through Open channels	15
V	Pumps	18
	Test & Model Exam	7
	<b>Total</b>	<b>96</b>

**RATIONALE:**

Subject of hydraulics is a science subject and helps in solving problems in the field of Aeronautical, Electronics, Electrical, Mechanical, Metallurgical Engineering subject. The subject deals with basic concepts and principles in hydrostatics, hydro- kinematics and hydrodynamics and their application in solving fluid flow problems.

**OBJECTIVES:**

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

- Define the properties of fluids and their physical quantities.
- List the different types of pressures and various pressure measuring devices.
- Calculate hydrostatic forces on plane surfaces immersed in water.
- Understand types of forces, energy and application of Bernoulli's theorem.
- Know the different types of Orifices and Mouthpieces and to derive discharge formulae and their practical applications.
- State the different losses of head of flowing liquids in pipes and their equations.
- Know the different types of Notches and Weirs, and deriving the discharge formulas and their Practical applications.
- Study the different types of Channels and their discharge formulas and to determine the condition for maximum discharge.
- Learn the construction details, specifications and efficiencies of Reciprocating Pumps and Centrifugal Pumps.

## DETAILED SYLLABUS

### 4010420 - HYDRAULICS

Contents: Theory

Unit	Name of the Topics	Hours
I	<b>1.1 INTRODUCTION</b> Hydraulics – Definition - Properties of fluids - Mass, force, weight, specific volume, specific gravity, specific weight, density, relative density, compressibility, viscosity, cohesion, adhesion, capillarity and surface tension - Dimensions and Units for area, volume, specific volume, velocity, acceleration, density, discharge, force, pressure and power.	6
	<b>1.2 MEASUREMENT OF PRESSURE</b> Pressure of liquid at a point – Intensity of pressure - Pressure head of liquid – Conversion from intensity of pressure to pressure head and vice-versa - Formula and Simple problems - Types of pressures - Static pressure, Atmospheric pressure, Gauge pressure, Vacuum pressure and Absolute pressure – Simple problems - Measurement of pressure - Simple mercury barometer - Pressure measuring devices- Piezometer tube - Simple U-tube manometer - Differential manometer – Micrometer - Problems.	9
	<b>1.3 HYDROSTATIC PRESSURE ON SURFACES</b> Pressure on plane surfaces - Horizontal, vertical and inclined surfaces- Total pressure-Centre of pressure - Depth of centre of pressure - Resultant pressure – Problems on Practical application - Sluice gates, Lock gates and Dams- Descriptions.	5
II	<b>2.1 FLOW OF FLUIDS</b> Types of flow – Laminar and turbulent flow - Steady and unsteady flow – Uniform and Non-uniform flow - Equation for continuity of flow (law of conservation of mass) – Energy possessed by a fluid body - Potential energy and Potential Head – Pressure energy and Pressure Head - Kinetic Energy and Kinetic Head - Total Energy and Total Head – Bernoulli's theorem – ( No proof) – Problems on Practical applications of Bernoulli's theorem – Venturimeter - Orificemeter (Derivation not necessary) - Simple problems.	8

	<p><b>2.2 FLOW THROUGH ORIFICES AND MOUTHPIECES</b></p> <p>Definitions- Types of orifices - Vena contracta and its significance – Hydraulic coefficients Cd, Cv and Cc - Formula - Simple problems - Large orifice – Definition – Discharge formula – Simple problems - Practical applications of orifices – Types of mouthpieces - External and internal mouthpieces - Discharge formula - Simple problems.</p> <p><b>2.3 FLOW THROUGH PIPES</b></p> <p>Definition of pipe-Losses of head in pipes – Major losses - Minor losses - Sudden enlargement, sudden contraction, obstruction in pipes (no proof) - Simple problems – Energy / Head losses of flowing fluid due to friction - Darcy's equation - Chezy's equation (No derivation) – Problems - Transmission of power through pipes – Efficiency - Pipes in parallel connected to reservoir - Discharge formula - Simple problems.</p>	<p><b>6</b></p> <p><b>6</b></p>
<b>III</b>	<p><b>3.1 FLOW THROUGH NOTCHES</b></p> <p>Definitions- Types of notches – Rectangular, Triangular and Trapezoidal notches – Derivation of equations for discharges - Simple problems - Comparison of V-Notch and Rectangular Notch.</p> <p><b>3.2 FLOW THROUGH WEIRS</b></p> <p>Definitions - Classification of weirs - Discharge over a rectangular weir and trapezoidal weir – Derivation – Simple problems – End contractions of a weir – Franci's and Bazin's formula – Simple problems - Cippoletti weir – Problems - Narrow crested weir – Sharp crested weir with free over fall - Broad crested weir - Drowned or Submerged weirs - Suppressed weir - Stepped weir – Problems - Definition of terms - Crest of sill, Nappe or Vein, Free discharge - Velocity of approach – Spillways.</p>	<p><b>6</b></p> <p><b>10</b></p>
<b>IV</b>	<p><b>4.1 FLOW THROUGH OPEN CHANNELS</b></p> <p>Definition - Classification - Rectangular and Trapezoidal channels – Discharge – Chezy's formula, Bazin's formula and Manning's formula - Hydraulic mean depth – Problems - Conditions of rectangular/trapezoidal sections - Specific energy, critical depth –Conditions of maximum discharge and maximum velocity - Problems - Flow in a venturiflume –</p>	<p><b>15</b></p>



	Uniform flow in channels – Flow through a sluice gate – Types of channels – Typical cross- sections of irrigation canals - Methods of measurements of velocities – Channel losses - Lining of canals – Advantages of lining of canals - Types of lining- Cement concrete lining with sketches - Soil cement lining with sketches – LDPE lining.	
<b>V</b>	<p><b>5.1 PUMPS</b></p> <p>Pumps – Definition – Difference between a pump and a turbine- Classification of pumps - Positive displacement pumps and roto-dynamic pressure pumps - Characteristics of modern pumps - Maximum recommended suction, lift and power consumed- Reciprocating pump - Construction detail and working principle - Types - Single acting and Double acting -Slip -Air vessels- Discharge and Efficiency- Problems - Centrifugal pump</p> <p>Advantages and disadvantages over a reciprocating pump - Layout - Construction details – Priming of centrifugal pump – Working of the pump – Classification – Functions of Foot valve, Delivery valve and Non-return valve – Fundamental equation of centrifugal pump - Characteristics of a centrifugal pump – Discharge, power and efficiency - Problems - Specifications of centrifugal pumps and their sections- Hand pump - Jet pump- Deep well pump - Plunger pumps - Piping system- Computation of power required for pumps, Other types of pumps (not for exam)- Selection and choice of pump.</p>	<b>18</b>
	<b>Test &amp; Model Exam</b>	<b>7 Hrs.</b>

## Reference Books

1. Dr. Jagadish Lal - Hydraulics, Fluid Mechanics and Hydraulic Machines- Metropolitan Book Company- New Delhi
2. P.N. Modi & S.M. Sethi - Fluid Mechanics - Standard Publishers – New Delhi
3. S. Ramamirtham-Hydraulics,Fluid Mechanics and Hydraulics Machines- Dhanpat Rai & Sons, New Delhi
4. K.L.Kumar - Fluid Mechanics – Eurasia Publishing House – New Delhi
5. R.K. Bansal - Fluid Mechanics - Lakshmi Publications
6. Prof. S. Nagarathinam - Fluid Mechanics - Khanna Publishers – New Delhi
7. K.R. Arora - Hydraulics, Fluid Mechanics and Hydraulics Machines –Standard Publishers & Distributors, New Delhi
8. B C S Rao, “Fluid Mechanics and Machinery” Tata-McGraw-Hill Pvt. Ltd., New Delhi



# **DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**N-SCHEME**

**IV SEMESTER**

**TRANSPORTATION ENGINEERING**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMIL NADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented for the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010430  
 Semester : IV Semester  
 Subject Title : **TRANSPORTATION ENGINEERING**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

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

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

**Topics and Allocation of Hours**

Unit	Topics	Hours
I	Highway Engineering	15
II	Highway Engineering (Contd.)	15
III	Railway Engineering	15
IV	Railway Engineering (Contd.)	14
V	Bridge Engineering	14
	Test & Model Exam	7
	<b>TOTAL</b>	<b>80</b>

**RATIONALE:**

Construction of roads is one of the areas in which diploma holders in Civil Engineering get employment. These diploma holders are responsible for construction and maintenance of highways. Basic concepts of road geo-metrics, surveys and plans, elements of traffic engineering, road materials, construction of rigid and flexible pavements, special features of hill roads, road drainage system and various aspects of maintenance find place in above course.

In addition, this subject will cater the needs of those technicians who would like to find employment in the construction of railway tracks, bridges. The subject aims at providing broad based knowledge regarding various components and construction of railway track, bridges.

**OBJECTIVES:**

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

- Study the importance of the roads, development of roads and classification of roads.
- Know about highway pavements, Geometrical design, Traffic controls, Road Arboriculture and Highway Lighting
- Study the highway alignment, road machineries and construction of different types of Roads
- Study the Railway fixtures, Types of stations, Signalling and Control of movement of trains
- Study the Maintenance of Track and Rapid Transport System of Railways
- Know about Bridges, Classifications and its Components

## DETAILED SYLLABUS

### 4010430 - TRANSPORTATION ENGINEERING

Contents: Theory

Unit	Name of the Topic	Hours
<b>I</b>	<b>HIGHWAY ENGINEERING</b>	
	<b>1.1 INTRODUCTION</b> General – Development of Roads in India - Modes of transportation - Nagpur Plan - Ribbon development - Advantages of Roads - Importance of roads in India - Requirements of an ideal road - Indian Road Congress - Objects of Highway planning - Classifications of Highways.	<b>3</b>
	<b>1.2 HIGHWAY PAVEMENTS</b> Objectives - Types of Pavement - Flexible and Rigid Pavements - Comparative study of Flexible and Rigid pavements - Factors affecting the design of pavements - Other types of pavements ( Description not reqd. )	<b>2</b>
	<b>1.3 GEOMETRICAL DESIGN OF HIGHWAYS</b> General - Road structure - Right of way - Land width - Width of formation - Road Camber - Super elevation - Sight distances - Road gradient - Road Curves - Horizontal curves - Vertical curves - Types - Widening of pavement on horizontal curves.	<b>3</b>
<b>1.4 TRAFFIC ENGINEERING</b> Objectives - Traffic surveys - Road accidents - Causes of road accidents - Preventive measures - Parking - Methods of parking - Road junctions ( Grade intersections and Grade separators ) - Traffic signals - Advantages - Types of road signs - Expressways.	<b>3</b>	

<b>I</b>	<p><b>1.5 SUB GRADE SOIL</b></p> <p>Significance - Soil mass as a three phase system - Grain size classification - Atterberg limits - Definition and description - I S Classification of soils - Compaction - Definition - Objects of compaction - Standard Proctor Compaction test - Shear strength - Definition - importance - Direct shear test.</p> <p><b>1.6 ROAD ARBORICULTURE AND LIGHTING</b></p> <p>Objects of Arboriculture - Selection of trees - Location of trees - Highway lighting - Benefits.</p>	<b>2</b>
<b>II</b>	<p><b>HIGHWAY ENGINEERING ( Contd. )</b></p> <p><b>2.1 HIGHWAY ALIGNMENT AND SURVEYS</b></p> <p>Definition - Principles for ideal highway alignment - Factors affecting highway alignment - Surveys - Engineering surveys - Reconnaissance, Preliminary and Location surveys - Project Report and Drawings - Highway Re-alignment projects.</p> <p><b>2.2 ROAD MACHINERIES</b></p> <p>Excavating equipments - Tractor, Bull dozer, Grader, Scraper, J C B - Compaction equipments - Road roller - Types and description - Equipment for Bituminous road.</p> <p><b>2.3 LOW COST ROADS</b></p> <p>General - Classifications - Earthen road, Gravel road, Water Bound Macadam roads - Construction with sketches - Advantages and disadvantages - Maintenance - Soil stabilization - Methods.</p> <p><b>2.4 BITUMINOUS ROADS</b></p> <p>General - Advantages and disadvantages - Bituminous materials used - Types of Bituminous roads - Surface dressing - Types - Bituminous Concrete - Maintenance of Bituminous roads.</p>	<b>3</b>

	<p><b>2.5 CEMENT CONCRETE ROADS</b></p> <p>General - Advantages and disadvantages - Methods of construction of cement concrete roads with sketches - Construction procedure for concrete roads.</p>	<b>2</b>
	<p><b>2.6 HILL ROADS</b></p> <p>Factors considered in alignment - Formation of hill roads - Hair pin bends - Retaining and Breast walls.</p>	<b>2</b>
<b>III</b>	<p><b>RAILWAY ENGINEERING</b></p> <p><b>3.1 INTRODUCTION</b></p> <p>Introduction to Railways - Classifications of Indian Railways - Rail Gauges - Types - Uniformity in gauges - Loading gauge - Construction gauge.</p>	<b>3</b>
	<p><b>3.2 RAILS</b></p> <p>General - Functions of rails - Requirements of an ideal rail - Types of rail sections - Length of rails - Welding of rails - Wear of rails - Coning of wheels - Hogged rails - Bending of rails - Creep of rails - Causes and prevention of creep.</p>	<b>4</b>
	<p><b>3.3 SLEEPERS AND BALLAST</b></p> <p>Functions of Sleepers - Types of sleepers - Requirements of sleepers - Materials for sleepers - Sleeper density – Ballast- Functions of Ballast - Requirements of ballast - Materials used as ballast.</p>	<b>4</b>
	<p><b>3.4 RAIL FASTENINGS AND PLATE LAYING</b></p> <p>Rail joints - Types - Rail fastenings - Fish plates - Fish bolts Spikes -Chairs and Keys -Bearing plates - Blocks- Elastic fastenings - Anchors and anti-creepers - Plate laying Methods of plate laying -PQRS method of relaying.</p>	<b>3</b>
	<p><b>3.5 MAINTENANCE OF TRACK</b></p> <p>Necessity - Maintenance of Track, Bridges and Rolling stock.</p>	<b>1</b>



<p><b>IV</b></p>	<p><b>RAILWAY ENGINEERING ( Contd. )</b></p> <p><b>4.1 STATIONS AND YARDS</b></p> <p>Definition of station - Purpose of railway station - Types of stations - Wayside, Junction and Terminal stations - Platforms - Passenger and Goods platforms - Definition of Yard - Types of yard - Passenger yard, Goods yard, Marshalling yard and Locomotive yards - Level crossings.</p> <p><b>4.2 STATION EQUIPMENTS</b></p> <p>General - Engine shed - Ash pits - Examination pits - Drop pits - Water columns - Triangles - Turn table - Traversers - Scotch Block - Buffer stops - Fouling marks - Derailing switch - Sand hump - Weigh bridges.</p> <p><b>4.3 POINTS AND CROSSINGS</b></p> <p>Purpose - Some definitions - Turnouts - Right hand and left hand turnouts - Sleepers laid for points and crossings - Types of switches - Crossings - Types of crossings.</p> <p><b>4.4 SIGNALLING</b></p> <p>General - Objects of signalling - Types of signalling - Based on function and location - Special signals - Control of movement of trains - Different methods - Following train system - Absolute block system - Automatic signalling - Pilot guard system - Centralized traffic control system.</p> <p><b>4.5 INTERLOCKING</b></p> <p>Definition - Principles of interlocking - Methods of interlocking - Tappets and locks system - Key system - Route relay system - - Improvements in interlocking and signalling.</p> <p><b>4.6 RAPID TRANSPORT SYSTEM</b></p> <p>General - Underground railways - Advantages - Tube railways - Its features.</p>	<p><b>3</b></p> <p><b>2</b></p> <p><b>2</b></p> <p><b>3</b></p> <p><b>2</b></p> <p><b>2</b></p>
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<b>V</b>	<b>BRIDGE ENGINEERING</b>	
	<b>5.1 INTRODUCTION</b>	<b>2</b>
	Bridge: Definition - Components of bridge - IRC loadings - Selection of type of bridge - Scour - Afflux - Economic span - Waterway - Factors governing the ideal site for bridge - Alignment of bridge - Factors to be considered in alignment.	
	<b>5.2 FOUNDATIONS</b>	<b>2</b>
	Functions of foundation - Types of foundations - Selection of foundations - Control of ground water for foundation - Caisson foundation - Cofferdam – Types.	
	<b>5.3 CLASSIFICATION OF BRIDGES</b>	<b>3</b>
Classification according to IRC loadings, Materials, Bridge floor, Type of superstructure - Culverts and Cause ways - Classifications with sketches - Conditions to construct causeways.		
<b>5.4 SUBSTRUCTURE</b>	<b>2</b>	
Abutments - Types - Piers - Types - Wing walls - Types.		
<b>5.5 SUPERSTRUCTURE</b>	<b>4</b>	
Types - Description - Simple bridge - Types according to bridge floor - Continuous bridge - Cantilever bridge - Balanced cantilever bridge - Arch bridge - Bow-string girder type bridge - Rigid frame bridge - Suspension bridge - Continuous steel bridges - Steel arched bridges.		
<b>5.6 BRIDGE BEARINGS</b>	<b>1</b>	
Definition - Purpose - Importance of bearings - Types of bearings – Elastomer bearings - Pot bearings.		
<b>Test &amp; Model Exam</b>	<b>7 Hrs.</b>	

## Reference Books

1. S.K.Khanna and C.E.G Justo, "Highway Engineering", Nem Chand and Bros, Roorkee.
2. RANGWALA, "Highway Engineering", Charotor Publishing House Pvt. Ltd., Edition 2010
3. RANGWALA, "Railway Engineering", Charotor Publishing House Pvt. Ltd., Edition 2010
4. RANGWALA, "Bridge Engineering", Charotor Publishing House Pvt. Ltd., Edition 2009
5. S P CHANDOLA, "A Text Book of Transportation Engineering" S Chand & Company Ltd.,
6. G V RAO, "Principles of Transportation & Highway Engineering" Tata McGraw-Hill Publishing Company Ltd.,
7. Madhan Mohan Dass, "Structural Analysis" PHI Learning Pvt. Ltd., New Delhi.



# **DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**N-SCHEME**

**IV SEMESTER**

## **HYDRAULICS LABORATORY**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010440  
 Semester : IV Semester  
 Subject Title : **HYDRAULICS LABORATORY**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
<b>HYDRAULICS LABORATORY</b>	<b>4 Hrs.</b>	<b>64 Hrs.</b>	Internal Assessment	Board Examination	Total	<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:**

Subject of hydraulics lab is a practical subject which deals with the basic concepts and principles in hydrostatics, hydro-kinematics and hydrodynamics and their applications in solving fluid flow problems.

**OBJECTIVES:**

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

- Understand parameters associated with fluid flow and hydrostatic pressure.
- Measure the fluid pressure using manometers
- Determine the co-efficient of discharges of Orifice, mouthpiece, orifice meter, venturimeter, notches etc.,
- Determine pipe friction factor
- Draw the characteristic curves for centrifugal and Reciprocating pumps.

**DETAILED SYLLABUS**  
**4010440 - HYDRAULICS LABORATORY**

**Contents: Practical**

**List of Experiments**

**64 Hrs.**

**Flow of Fluids:**

1. Verification of Bernoulli's theorem.
2. Flow through Venturimeter – Determination of Co-efficient of Discharge.
3. Flow through Orificemeter – Determination of Co-efficient of Discharge.

**Flow through orifice:**

4. Determination of Co-efficient of Discharge by Time fall - Head method
5. Determination of Co-efficient of Discharge by Constant head method.

**Flow through external cylindrical mouth piece:**

6. Determination of Co-efficient of Discharge by Timing fall in head method
7. Determination of Co-efficient of Discharge by Constant head method

**Flow through pipes:**

8. Determination of friction factor for the given GI pipe / PVC pipe.

**Flow through notch:**

9. Determination of Co-efficient of Discharge for Rectangular Notch / V-Notch

**Pumps:**

10. Reciprocating pump – To draw characteristic curves and determine the efficiency
11. Centrifugal pump – To draw characteristic curves and determine the efficiency
12. Study of working principle of a pelton wheel.

## 4010440 - Hydraulics Laboratory

### DETAILED ALLOCATION OF MARKS

S.No	Description	Marks
1	Procedure	10
2	Tabulation and Observation	35
3	Calculations	30
4	Sketch / Graph	15
5	Accuracy of result	5
6	Viva-Voce	5
	<b>Total</b>	<b>100</b>

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

S.No.	List of Equipments required	Quantity required
1.	Bernoulli's theorem apparatus (closed circuit)	1 No.
2.	Venturimeter/Orificemeter apparatus (closed circuit) with all accessories	1 No.
3.	Pipe Friction apparatus (closed circuit) with all accessories	1 No.
4.	Orifice/Mouthpiece apparatus (closed circuit) with all accessories	1 No.
5.	Notch apparatus (closed circuit) with accessories	1 No.
6.	Reciprocating Pump test rig with accessories	1 No.
7.	Centrifugal Pump test rig	1 No.
8	Pelton wheel	1 No.



# **DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**N-SCHEME**

**IV SEMESTER**

**MATERIAL TESTING LABORATORY- II**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N -SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010450  
 Semester : IV Semester  
 Subject Title : **MATERIAL TESTING LABORATORY- II**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
<b>MATERIAL TESTING LABORATORY- II</b>	<b>3 Hrs</b>	<b>48 Hrs</b>	Internal Assessment	Board Examination	Total	
			<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:**

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 hands-on experience with the testing and evaluation of civil engineering materials, including sand, clay, fine aggregates, coarse aggregates and water.

**OBJECTIVES:**

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

- Test the properties of fine aggregate and coarse aggregate.
- Test the properties of soil.
- Analyse the properties of water/waste water

## **DETAILED SYLLABUS**

### **4010450 - MATERIAL TESTING LABORATORY- II**

Contents: Practical

Total : 48 Hrs.

#### **LIST OF EXPERIMENTS**

##### **PART A**

24 Hours

1. Determination of Voids ratio and porosity of sand.
2. Determination of liquid limit and plastic limit of the given soil.
3. Determination of bulk density and specific gravity of Fine aggregates.
4. Determination of bulk density and specific gravity of Coarse aggregates.
5. Proctor's compaction test on soil.
6. Direct shear test on sand.
7. Field Density of Soil by core cutter method / sand replacement method.

##### **PART B**

14 Hours

1. Attrition test on Aggregate.
2. Abrasion test on Aggregate.
3. Aggregate crushing value test.
4. Aggregate impact value test.
5. Determination of Water absorption of coarse aggregate.

##### **PART C**

10 Hours

1. Determination of Total solids present in the given sample of water.
2. Determination of Turbidity of water by "Jackson candle turbidity meter."
3. Determination of settleable solids present in the given sample of water/ waste water by "Imhoff cone."
4. Determination of Organic and inorganic matters present in the given sample of water.

## 4010450 - MATERIAL TESTING LABORATORY- II

### SCHEME OF EXAMINATION:

In the examination question has to be given either as a single question from Part A or two questions, one from Part B and another from Part-C.

### DETAILED ALLOCATION OF MARKS

S.No	Description	Part - A Max.Marks (95)	Part - B Max.Marks (50)	Part - C Max.Marks (45)
1.	Procedure	10	5	5
2.	Tabulation and Observation	40	25	20
3.	Calculations	30	10	10
4.	Sketch / Graph	10	5	5
5.	Accuracy of result	5	5	5
	TOTAL	95	50	45
	VIVA VOCE	5	5	
	<b>GRAND TOTAL</b>	<b>100</b>	<b>100</b>	

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

S.No.	List of equipments required	Quantity Required
1.	Pycnometer	4 nos.
2.	Liquid limit device with all accessories	2 nos.
3.	Field density of soil apparatus (sand pouring cylinder) with complete set	2 nos.
4.	Proctor compaction mould with all accessories	2 nos.
5.	Direct shear machine with complete accessories	1 no.
6.	Devals attrition testing machine with complete accessories	1 no.
7.	Dorry's abrasion testing machine with complete accessories	1 no.
8.	Aggregate impact testing machine with complete accessories	1 no.
9.	Crushing strength apparatus	1 no.
10.	Jackson Candle Turbidity Meter	1 no.
11.	Imhoff Cone	1 no.



# **DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**N-SCHEME**

**IV SEMESTER**

**CONSTRUCTION PRACTICE LABORATORY**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010460  
 Semester : IV Semester  
 Subject Title : **CONSTRUCTION PRACTICE LABORATORY**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
<b>CONSTRUCTION PRACTICE LABORATORY</b>	<b>4 Hrs.</b>	<b>64 Hrs.</b>	<b>Internal Assessment</b>	<b>Board 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 supposed to supervise 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 Construction Practice is very important for Civil Engineering diploma holders.

**OBJECTIVES:**

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

- Prepare center line plan and foundation plan for a building.
- Set out foundation in the field for spread footing and column footing for a building.
- Determine the Workability of concrete by Compacting factor, slump cone test and Vee - Bee consistometer test.
- Cast Concrete cubes and to test for compressive strength.
- Determine the fineness Modulus of fine and coarse aggregate.
- Perform Shape test on coarse aggregate.
- Determine the bulking characteristics of the given sand.
- Perform Non-Destructive test on hardened concrete

## DETAILED SYLLABUS

### 4010460- CONSTRUCTION PRACTICE LABORATORY

Contents: Practical

Total:64 Hrs.

#### List of Experiments

##### Part A

**30 Hrs.**

1. Identify various sizes of available coarse aggregates from sample of 10 kg in laboratory and prepare report (60,40, 20,10 mm)
2. Identify the available construction materials in the laboratory on the basis of their sources.
3. Identify the grain distribution pattern in given sample of teak wood in the laboratory and draw the various patterns. (along and perpendicular to the grains)
4. Identify various layers and types of soil in foundation pit by visiting at least 3 construction sites in different locations of city and prepare report consisting photographs and samples.
5. Select first class, second class and third class bricks from the stake of bricks and prepare report on the basis of its properties.
6. Measure dimension of 10 bricks and find average dimension and weight. Perform field tests - dropping, striking and scratching by nail and correlate the results obtained.
7. Apply the relevant termite chemical on given damaged sample of timber.
8. Apply two or more coats of selected paint on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/ rollers adopting safe practices.
9. Prepare mortar using cement and Sand/ Fly ash or Granite/marble polishing waste in the proportion 1:6 or 1:3.

10. Prepare and develop a centre line plan, foundation Plan and set out spread footing in the field for the given line sketch of a building.
11. Prepare and develop a centre line plan, foundation Plan and set out the layout of columns and footing in the field for the given line sketch of a building (Framed structure).
12. Arrangement of bricks using English bond for one brick thick wall and one and half brick thick wall for right angled corner junction.
13. Arrangement of bricks using English Bond for one brick thick wall, one and half brick thick wall for Tee junction.
14. Arrangement of bricks using English bond for one brick thick, one and half and two brick thick square pillars.
15. Straightening, cutting, hooking and bending and arrangement of Steel reinforcement bars.
  - a. Singly reinforce beam
  - b. Lintel and Sunshade
  - c. Column and footing



**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(35)</b>	<b>Part – B Max.Marks (60)</b>
1.	Procedure	5	5
2.	Tabulation and Observation	20	25
3.	Calculations/Field work		20
4.	Sketch / Graph		5
5.	Accuracy of result/ Report	10	5
	Viva Voce		5
	<b>Total</b>	<b>100</b>	

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

<b>Sl.No.</b>	<b>List of Equipments Required</b>	<b>Quantity Required</b>
1.	Pegs, thread, cranking tools	As required
2.	Consumables like Bricks, aggregate, paints, Fly ash, polish, steel rods	As required



# **DIPLOMA IN CIVIL ENGINEERING**

## **II YEAR N-SCHEME**

### **IV SEMESTER SURVEYING PRACTICE-II**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE  
**DIRECTORATE OF TECHNICAL EDUCATION**  
**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010470  
 Semester : IV Semester  
 Subject Title : **SURVEYING PRACTICE-II**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

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

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

**RATIONALE:**

The important functions of a civil technician include the jobs of detailed surveying, plotting of survey data, preparation of survey maps and setting out works. While framing the curriculum for the subject of surveying, stress has been given to the development of the skill in each type of survey like Theodolite surveying, Tachometric surveying and surveying using Total station that the Civil Engineering diploma holder will normally be called upon to perform.

**OBJECTIVE:**

At the end of the course, students will have experiences:

- In handling surveying equipments
- To do practical exercises in Theodolite surveying,
- To do Tachometric surveying
- To do surveying using Total station.

## DETAILED SYLLABUS

### 4010470 - SURVEYING PRACTICE- II

**Contents: Practical**

**Total:64 Hrs.**

#### LIST OF EXPERIMENTS

#### **PART A: THEODOLITE SURVEYING**

**20 Hrs.**

1. Study of a Theodolite – Temporary adjustments Reading horizontal angles.
2. Measurement of horizontal angle by:
  - i. Reiteration method (not for Exam)
  - ii. Repetition method (not for Exam)
3. Determination of distance between two points when their bases are accessible, using Theodolite – Measuring Horizontal angles by repetition method and distances from a Theodolite Station.
4. Determination of distance between two points when their bases are inaccessible, using Theodolite – Measuring Horizontal angles by reiteration method from a baseline.
5. Measurements of vertical angles to different points.
6. Determination of Elevation of an object when the base is accessible.
7. Determination of Elevation of an object when the base is inaccessible by :
  - a) Single plane method
  - b) Double plane method.
8. Run a closed theodolite traverse for measuring length, included angles and bearing at initial Station and Plot the traverse.

#### **PART B: TACHEOMETRIC SURVEYING**

**12 Hrs.**

8. Determination of constants of a tacheometer.
9. Determination of distance and elevation of points by Stadia tacheometry.
10. Determination of gradient between two points (with different elevations) by Stadia tacheometry.
11. Determination of distance and elevation of points by Tangential tacheometry.

**PART C: TOTAL STATION****11 Hrs**

12. Study of Total Station General commands used – Instrument preparation and setting  
Reading distances and angles.
13. Measurement of distances and co-ordinates of given points, using Total station.
14. Measurement of altitude of given elevated points, using Total Station.
15. Run closed traverse using Total Station and plotting the traverse.
16. Determination of area of a field / land / College Campus etc. using Total station.

**SURVEY CAMP : ( Outside/Inside the Campus)****Duration: 4 days**

The objective of the survey camp is to enable the students to get practical training in the field work. Groups of not more than six members in a group will carry out each exercise in Survey camp. The camp must involve work on a large area of not less than 10 acres outside/Inside the campus. At the end of the camp, each student shall have mapped and contoured the area. The camp record shall include all original field observations, calculations and plotting. Three working days and one Saturday will be used for the Camp work during the 14<sup>th</sup> week.

**20 marks to be allotted for Survey file in the Board Examination for the works carried out by the students in survey camp:**

- i. L.S and C.S for a road / canal alignment
- ii. Radial Tachometric contouring
- iii. Contouring by block levels
- iv. Curve setting by deflection angle
- v. Theodolite / Tacheometric traverse (Balancing the traverse by Bowditch rule)
- vi. Total Station (Closed Traverse) – Plotting & Finding the area of the given field.

## 4010470 - SURVEYING PRACTICE - II

### SCHEME OF EXAMINATION:

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

### DETAILED ALLOCATION OF MARKS

S.No	Description	Part – A/ B Max. Marks (45)	Part - C Max. Marks (30)
1.	Procedure	5	5
2.	Tabulation and Observation	20	10
3.	Calculations	10	5
4.	Sketch / Graph	5	5
5.	Accuracy of result	5	5
	Total	45	30
	Survey Camp	20	
	Viva Voce	5	
	<b>GRAND TOTAL</b>	<b>100</b>	

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

Sl.No.	List of Equipments Required	Quantity Required
1.	Vernier Theodolite	6 nos.
2.	Total Station	3 nos.

# **V SEMESTER**



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**V SEMESTER**

**STRUCTURAL ENGINEERING**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 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	Board 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
<b>I</b>	<p><b>REINFORCED CEMENT CONCRETE STRUCTURES</b></p> <p><b>1.1 INTRODUCTION TO WORKING STRESS AND LIMIT STATE 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>1.2 DESIGN OF RECTANGULAR BEAMS FOR FLEXURE BY L.S.M</b></p> <p>Design requirements-Effective spans of cantilever and simply supported</p>	<b>8</b>





<p><b>IV</b></p>	<p><b>4.1 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>4.2 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>	<b>9</b>
	<b>Test &amp; Model Exam</b>	<b>7 Hrs.</b>

**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





# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**V SEMESTER**

**ENVIRONMENTAL ENGINEERING**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students Admitted from the year 2020-2021 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			
<b>ENVIRONMENTAL ENGINEERING</b>	5 Hrs.	80 Hrs.	Internal Assessment	Board 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, Seware 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>1.1 INTRODUCTION</b> Water Supply – Salient Features of a Water Supply Scheme – Flow Chart of a Water Supply Scheme- Agencies responsible for protected water supply.	3
	<b>1.2 QUANTITY OF WATER</b> 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.	4
	<b>1.3 SOURCES OF WATER</b> Sources of Water – Surface Sources – Underground Water Sources – Selection of Source of Water.	3
	<b>1.4 INTAKES AND CONVEYANCE</b> 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.	5
II	<b>2.1 QUALITY OF WATER</b> Impurities in Water - Testing of Water - Collection of Water Sample - Physical, Chemical, Bacteriological Tests - Standards of Drinking Water - Water Borne Diseases and their Causes.	3
	<b>2.2 PRIMARY TREATMENT OF WATER</b> 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.	5

	<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><b>3</b></p> <p><b>4</b></p>
<b>III</b>	<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><b>7</b></p> <p><b>8</b></p>
<b>IV</b>	<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><b>7</b></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>	<b>7</b>
<b>V</b>	<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>	<b>2</b>
	<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>	<b>3</b>
	<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>	<b>6</b>
	<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>	<b>3</b>
	<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



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**V SEMESTER**

**REMOTE SENSING AND GEOINFORMATICS**

(Elective Theory I)

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 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			
<b>REMOTE SENSING AND GEOINFORMATICS</b>	5 Hrs.	80 Hrs.	Internal Assessment	Board 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

Unit	Name of the Topics	Hours
I	<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.	15
II	<b>PHOTOGRAMMETRY</b> Geometric elements of a vertical photograph – Stereoscopic plotting instruments, Ortho photos, Flight planning	15
III	<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	15
IV	<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).	14

<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.



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**V SEMESTER**

**CONCRETE TECHNOLOGY**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the student admitted from the year 2020-2021 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			
	Hours/ week	Hours/ Semester	Marks			Duration
<b>CONCRETE TECHNOLOGY</b>	5 Hrs.	80 Hrs.	Internal Assessment	Board Examination	Total	
			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	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

Unit	Name of the Topics	Hours
I	<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).	15
II	<b>2.1 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>2.2 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.	5  10



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><b>7</b></p> <p><b>8</b></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><b>10</b></p> <p><b>4</b></p>
V	<p><b>5.1 Cracks in Concrete Structure and their Prevention</b>  Cracks in concrete structures – assessment of cracks – types of cracking – preventive measures.</p> <p><b>5.2 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><b>6</b></p> <p><b>8</b></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.



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**V SEMESTER**

**GEOTECHNICAL ENGINEERING**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 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	Board 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></p> <p><b>1.1 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>1.2 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>2.1 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>2.2 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><b>III</b></p>	<p><b>SEEPAGE ANALYSIS AND SEEPAGE BELOW HYDRAULIC STRUCTURES, BEARING CAPACITY AND SETTLEMENT OF FOUNDATIONS</b></p> <p><b>3.1 Seepage Analysis and Seepage Below Hydraulic Structures :</b>  Seepage analysis - Introduction - Head , Gradient and Potential - Hydraulic gradient - Seepage pressure - Upward flow (Quick condition or Quick sand ) - Types of flow lines - Types of flow (Definition only) - Two dimensional flow (Laplace equation) - Velocity potential -Properties of flow net - Uses of flow net - Seepage below Hydraulic structures - Introduction - Hydraulic gradient - Piping - Exit gradient - Khosla’s theory - Seepage flow nets below hydraulic structures.</p> <p><b>3.2 Bearing Capacity and Settlement of Foundations :</b>  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><b>7</b></p> <p><b>8</b></p>
<p><b>IV</b></p>	<p><b>FOUNDATIONS AND FOUNDATIONS IN EXPANSIVE SOIL</b></p> <p><b>4. 1 Foundations :</b>  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><b>8</b></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>5.1 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>5.2 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>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





# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**V SEMESTER**

**CIVIL ENGINEERING DRAWING AND  
CAD PRACTICAL - II**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 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			Duration
	Hours/ Week	Hours/ Semester	Marks			
CIVIL ENGINEERING DRAWING AND CAD PRACTICAL - II	6 Hrs.	96 Hrs.	Internal Assessment	Board Examination	Total	3 Hrs.
			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



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**V SEMESTER**

**ENVIRONMENTAL ENGINEERING LABORATORY**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 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>Board 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





# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**V SEMESTER**

**ADVANCED SURVEYING AND BASIC GIS PRACTICAL**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 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			
	Hours/ Week	Hours/ Semester	Marks			Duration
<b>ADVANCED SURVEYING AND BASIC GIS PRACTICAL</b>	<b>3 Hrs.</b>	<b>48 Hrs.</b>	<b>Internal Assessment</b>	<b>Board Examinations</b>	<b>Total</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



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**V SEMESTER**

**CONCRETE TECHNOLOGY PRACTICAL**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 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			
<b>CONCRETE TECHNOLOGY PRACTICAL</b>	<b>3 Hrs.</b>	<b>48 Hrs.</b>	<b>Internal Assessment</b>	<b>Board 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 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





# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**V SEMESTER**

**GEOTECHNICAL ENGINEERING LABORATORY**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 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	Board 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.



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**V SEMESTER**

**ENTREPRENEURSHIP AND STARTUPS**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 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			Duration
	Hours/ Week	Hours/ Semester	Marks			
			Internal Assessment	Board 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
I	<b>ENTREPRENEURSHIP – INTRODUCTION AND PROCESS</b> <ul style="list-style-type: none"><li>• Concept, Functions and Importance</li><li>• Myths about entrepreneurship</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>	10
II	<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>	10



	<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>4.1 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>4.2 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>4.3 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>5.1 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>5.2 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>5.3 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>5.4 MARKET SURVEY REPORT FOR CONSTRUCTION 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 Poornima 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.

### **Board 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

### **BOARD 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 Board 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 board 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 board 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>

# **VI SEMESTER**



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**VI SEMESTER**

**CONSTRUCTION MANAGEMENT**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010610  
 Semester : VI Semester  
 Subject Title : **CONSTRUCTION MANAGEMENT**

**TEACHING AND SCHEME OF EXAMINATION**

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours/ Week	Hours/ Semester	Marks			
<b>CONSTRUCTION MANAGEMENT</b>	6 Hrs.	96 Hrs.	Internal Assessment	Board 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	Construction sector in India Feasibility study, planning of Civil Engineering Project and Contract Management	18
II	Construction Organisation and their Superintendence, Departmental procedure and Accounting	18
III	Scheduling and Time Management Resource Management	18
IV	Quality Management and Safety, Construction Disputes and their Settlement, Construction Labour and Legislation Ethics in Engineering	18
V	Entrepreneurship, Information Management and Computers and Financial Management	17
	Test & Model Exam	7
	<b>Total</b>	<b>96</b>



**RATIONALE:**

This is an applied engineering subject. The subject aims at imparting basic knowledge about construction planning and management, site organisation, construction labour, control of work progress, inspection and quality control, accidents and safety and heavy construction equipment.

A good percentage of diploma engineers start working as small contractors. They require the knowledge of contractorship, tendering and preparation of specifications for various types of jobs. Also diploma holders adopt valuers as their profession. To promote entrepreneurship amongst these engineers, knowledge and associated skills in the above field becomes essential. Hence this subject is of great importance to diploma engineers.

**OBJECTIVES:**

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

- Describe the Role of government and construction agencies in the field of housing
- Describe the organization set up of PWD
- Mention the construction activity and fixing the construction agency.
- Describe the aspects of inspection and quality control methods
- Describe the banking system.
- Carryout the Feasibility study of a project
- Understand the process of Planning for civil engineering projects.
- Explain the significance of CPM and PERT Techniques.
- Understand the types of contract system
- Study the organization chart of a construction company.
- Understand the concepts and requirement of Entrepreneurship
- Perform the Computation of Net present value.

## DETAILED SYLLABUS

### 4010610 - CONSTRUCTION MANAGEMENT

Contents: Theory

Unit	Name of the Topics	Hours
I	<b>1.1 CONSTRUCTION SECTOR IN INDIA</b> Construction Management – Definition- Need – Scope - Objectives and & functions - Role of government and private construction agencies – Types of construction sectors - Public and Private functions of construction management in national development - Construction practice:- the owner, consultant, and contractor - Duties and responsibilities - Various stages of a construction project.	5
	<b>1.2 FEASIBILITY STUDY</b> Study of necessity of project– Technical feasibility, Financial feasibility, Ecological feasibility, Resource feasibility, Recovery from the project, Economical Analysis –Building Economics – Preliminary studies- Analysis – valuation.	4
	<b>1.3 PLANNING OF CIVIL ENGINEERING PROJECT</b> Objectives of planning – Public Project - Preliminary planning – Design factors – Site utilization- – Reconnaissance survey – Preliminary survey – Analysis and plotting of data – Estimate : preliminary and detailed estimate – Project report – Land acquisition – Administrative approval – Technical sanction – Budget provision- Private project – Advantages of planning to client and engineer – limitations -Stages of planning by owner and contractor.	5
	<b>1.4 CONTRACT MANAGEMENT</b> Types of contracts - Contract documents - Contractual obligations - Specifications - Tender notice – Types - Tender documents - Earnest Money Deposit (EMD) and Security Deposits (SD) - Scrutiny and acceptance of a tender - Contract agreement – Contractual changes and termination of contract – Work order – Execution of agreement – Sub contract - Rights and duties of sub-contractor.	4

<p><b>II</b></p>	<p><b>2.1 CONSTRUCTION ORGANISATIONS AND THEIR SUPERINTENDENCE</b></p> <p>Forms of business organizations - sole proprietorship – Partnership - Joint stock company,- Co-operative society,- and State enterprises- Advantages and Disadvantages -delegation of responsibility, personnel requirements and division of works – Decentralization - Construction supervision and Superintendence – Requirements and Responsibilities of Executives of the project – Qualities of Efficient construction Manager - Pay rolls and Records - Purchase and delivery of construction materials and equipments – Percentage completion report - Insurance record - Project office requirement - Organisation chart of a small / medium / large construction company (broad outline only).</p> <p><b>2.2 DEPARTMENTAL PROCEDURE AND ACCOUNTING</b></p> <p>Organisation of P.W.D. - Responsibilities of officers - Accounting procedure (administrative sanctions, technical sanctions, payment of bills) – Imprest and Temporary accounts – Cash book - Works register - Accounting for consumable materials - Record for tools and plants – Importance of M-book and its entries – Work charged establishment – Nominal Muster Roll (N.M.R) – Daily Labour Reports (D.L.R)</p>	<p><b>10</b></p> <p><b>8</b></p>
<p><b>III</b></p>	<p><b>3.1 SCHEDULING AND TIME MANAGEMENT</b></p> <p>Scheduling – Definition – Preparation of Schedule – uses and advantages – Classification of Schedules – Methods of scheduling – Bar chart – Job layout – Work breakdown chart(WBC) – Network for projects management – Activity – Event – Dummies – Basic assumptions in creating a network – Rules for developing networks – Fulckerson’s rule for numbering the events - Critical Path Method Critical and Subcritical paths – Critical and Non critical activities/ events – Significance of critical path – Simple Problems - PERT – Time estimate – EST, EFT, LST, LFT - Earliest expected time – Latest allowable occurrence time –Floats - Slack. Standard deviation - Variance – Simple problems.</p>	<p><b>10</b></p>

	<p><b>3.2 RESOURCE MANAGEMENT</b></p> <p>Definition – Need for resource management – Optimum utilization of resources- finance, materials, machinery, human resources - Resource planning – Resource levelling and its objectives – Construction planning – Stages – Operations – Schedule –Crashing – Need for crashing an activity – Methods and tips for crashing – Time Vs Cost optimization curve – Cost slope and its significance in crashing – simple problem on resource levelling ( Description only)</p>	<b>8</b>
<b>IV</b>	<p><b>4.1 QUALITY MANAGEMENT AND SAFETY</b></p> <p>Importance of quality – Elements of quality – Quality assurance techniques (inspection, testing, sampling) Importance of safety – Causes of accidents – Role of various parties ( designer / employer / worker ) in safety management – Benefits – Approaches to improve safety in construction.</p> <p><b>4.2 CONSTRUCTION DISPUTES AND THEIR SETTLEMENT</b></p> <p>Introduction – Development of disputes – Categories of disputes – Modes of settlements - Arbitration.</p> <p><b>4.3 CONSTRUCTION LABOUR AND LEGISLATION</b></p> <p>Need for legislation - Payment of wages Act - Factories Act – Contract labour( Regulation and abolition) Act – Employees Provident Fund (EPF) Act.</p> <p><b>4.4 ETHICS IN ENGINEERING</b></p> <p>Human values - Definition of Ethics - Engineering ethics - Engineering as a profession - Qualities of professional - Professional institutions - Code of ethics - Major ethical issues - Ethical judgement - Engineering and management decision - Value based ethics.</p>	<p><b>6</b></p> <p><b>3</b></p> <p><b>4</b></p> <p><b>5</b></p>
<b>V</b>	<p><b>5.1 ENTREPRENEURSHIP</b></p> <p>Definition – Role and Significance – Risks and Rewards – Concepts of Entrepreneurship – Profile and requirement of entrepreneur - Programmes existing in India – SISL, DIC, TANSIDCO – Funding and technical assistance to Entrepreneurship- NIDCO,ICICI,IDBI,IFCI,SFC.</p>	<b>5</b>

	<p><b>5.2 INFORMATION MANAGEMENT AND COMPUTERS</b></p> <p>Introduction – Definition of MIS – Out lines of MIS – Use of computers in construction industry – Requirements of MIS – A data base approach – Definition – Benefits - A data base approach to contractor’s account and its advantage – Basic concepts of estimation – Project management and operations simulation packages – Construction automation and Robotics.</p>	6
	<p><b>5.3 FINANCIAL MANAGEMENT</b></p> <p>Elements of cash flow – Time value of money – Interest rate of capital – Present value computation - NPV method – IRR method – simple problems - Global banking culture - Types of banks –Activities of Banks – Corporate finance – Personal, retail and rural banking – Treasury management.</p>	6
	<b>Test &amp; Model Exam</b>	<b>7 Hrs.</b>

### Reference Books

1. Sanga Reddy. S, “Construction Management”,Kumaran Publications, Coimbatore.
2. Sengupta.B, &H.Guha. “Construction Management and Planning ”,Tata McGraw Hill Publishing Company Ltd., New Delhi
3. Seetharaman. S, ” Construction Engineering & Management “,Umesh Publications, NaiSarak, New Delhi
4. Boyd.C. & Paulson Jr, “Computer Applications in Construction ”,Tata McGraw Hill Publishing company Ltd., New Delhi.
5. Rangwala.S.C.,”Construction of Structures and Management of Works” Charotar Publishing House, Anand 388 001, 2000
6. B C Punmia, “ Project Planning and control with PERT and CPM”, Laxmi Publications.



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**VI SEMESTER**

**ESTIMATION, COSTING AND VALUATION**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N - SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010620  
 Semester : VI Semester  
 Subject Title : **ESTIMATION, COSTING AND VALUATION**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours/ Week	Hours/ Semester	Marks			
<b>ESTIMATION, COSTING AND VALUATION</b>	<b>6 Hrs.</b>	<b>96 Hrs.</b>	<b>Internal Assessment</b>	<b>Board 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	Introduction, Approximate Estimates, Measurements and Material Requirement and Specifications	15
II	Preparation of Data and Rate Analysis	16
III	Detailed Estimate : Taking of quantities by Trade System	20
IV	Detailed Estimate : Taking of quantities by Group System	20
V	Report Writing, Valuation and Rent Calculation	18
	Test & Model Exam	7
	<b>Total</b>	<b>96</b>

**RATIONALE:**

Diploma holders in Civil Engineering are supposed to prepare material estimates and cost estimates for various Civil Engineering works namely; buildings, irrigation works, public health works and roads etc. In addition, they must have basic knowledge regarding analysis of rates and contracting principles of valuation. Therefore, this subject has great importance for diploma holders in Civil Engineering.

**OBJECTIVES:**

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

- Learn the procedure for estimating and costing of Civil Engineering works. To write specifications for various materials and for different items of works.
- Perform rate analysis for various items of works using Standard data and Schedule of Rates.
- Prepare detailed estimate of quantities of various items of works
- Write Technical reports on the proposed projects
- Calculate the value of a building / property; to fix rent for a building adopting suitable method.



## DETAILED SYLLABUS

### 4010620 - ESTIMATION, COSTING AND VALUATION

Contents: Theory

Unit	Name of the Topics	Hours
I	<b>1.1 INTRODUCTION:</b> Estimation – Definition of Estimate – Approximate estimate – Detailed estimate - Main estimate - Revised estimate – Supplementary estimate – Sub estimate – Annual maintenance estimate – Repair estimate – Complete estimate.	3
	<b>1.2 APPROXIMATE ESTIMATES:</b> Necessity – Types – Plinth area method – Cubical content method – Service unit method – Typical bay method – Simple problems on preliminary estimate of a building project.	3
	<b>1.3 MEASUREMENTS &amp; MATERIAL REQUIREMENTS:</b> Units of measurements for works and materials – Degree of accuracy in measurements - Deduction for openings in masonry, plastering and white washing area – Painting co- efficient – out turn of works - working out of materials requirements – cement, sand, bricks, aggregates etc based on thumb rules for different works.	4
	<b>1.4 SPECIFICATIONS:</b> Specification – Necessity – Types of specifications – Essential requirements of specifications – Specification for various materials like Cement, Sand, Brick, Timber, Reinforcement Steel, Stone Aggregate, Water - Specifications for various items of works – General Specifications for a building - Culvert - Concrete Roads - Detailed specifications for works such as, earthwork excavation, foundation concrete, Reinforcement cement concrete in column, beam and slab - Weathering course - Steps involved in writing standard specifications.	5

<p><b>II</b></p>	<p><b>2.1 PREPARATION OF DATA</b></p> <p>Data – Types – Main and sub data – Observed data – lead statement - Schedule of rates – Standard data book – Sundries – Lump sum provision – Preparation of data using standard data and schedule of rates.</p> <p><b>2.2 RATE ANALYSIS:</b></p> <p>Brick and stone masonry – Plain cement concrete in foundation – Cement concrete for flooring works - Weathering course – R.C.C works for slab, sunshade, beam and column – Partition wall – Form works for beams and slabs – Road works, WBM and surface dressing – White washing and painting works – A.C. sheet roofing – Apron and revetment works in canals – Wall plastering – Ceiling plastering – Pointing – Plumbing and sanitary works in buildings.</p>	<p><b>4</b></p> <p><b>12</b></p>
<p><b>III</b></p>	<p><b>3.1 TRADE SYSTEM:</b></p> <p>Introduction - Taking off Quantities: Systems – Trade system – Group system – Methods – Long wall and Short wall method – Centre line method – Preparation of data – Lump sum provision and contingencies – Quantity surveyor – Duties – Essential Qualities.</p> <p><b>3.2 TAKING OFF QUANTITIES USING TRADE SYSTEM:</b></p> <p>Prepare detailed estimate using Trade system and Take off quantities for all items of works in the following types of buildings:</p> <ul style="list-style-type: none"> <li>i. A small residential building with two rooms with RCC roof.</li> <li>ii. Industrial buildings with AC/GI sheet roof with steel trusses.</li> <li>iii. Community Hall with R C C columns and T- beams</li> <li>iv. Septic tank with dispersion trench / soak pit</li> <li>v. R.C.C slab culvert</li> <li>vi. Water bound Macadam Road</li> </ul>	<p><b>2</b></p> <p><b>18</b></p>



**Reference Books:**

1. Rangawala, "Estimating & Costing" , Charotar Publishing;
2. N.A.Shaw, "Quantity Surveying & Valuation", Khanna Publishers;
3. L.N.Dutta, "Estimating & Costing", Dhanpat Rai & Sons
4. Bridie, "Estimating & Costing"
5. Civil Estimating, Casting and Valuation – Kalsan Publication, Ludhiana.
6. Vazirani & Chandola," Estimating and Costing" 2001.
7. IS:1200 - Methods of Measurement of Building and Civil Engineering works.



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**VI SEMESTER**

**SUSTAINABLE AND GREEN BUILDING TECHNOLOGY**

**(Elective Theory-II)**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010631  
 Semester : VI Semester  
 Subject Title : **SUSTAINABLE AND GREEN BUILDING TECHNOLOGY**

**TEACHING AND SCHEME OF EXAMINATION**

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
<b>SUSTAINABLE AND GREEN BUILDING TECHNOLOGY</b>	5 Hrs.	80 Hrs.	Internal Assessment	Board Examination	Total	
			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	Introduction to Green Building and Design Features	15
II	Energy Audit and Environmental Impact Assessment (EIA)	15
III	Energy and Energy conservation	15
IV	Principles and planning of Green building	14
V	Rating System	14
	Test & Model Exam	7
	<b>Total</b>	<b>80</b>

**RATIONALE:**

On learning Sustainable and Green Building Materials, the students will be able to Identify various requirements for green building, use different steps in environmental impact assessment, relate the construction of green building with prevailing energy conservation policy and regulations, supervise the construction of green building construction using green materials and focus on criteria related to particular rating system for assessment of particular Green building.

**OBJECTIVES:**

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

- Know various aspects of green buildings
- Use different steps involved in measuring environmental impact assessment.
- Relate the construction of green building with prevailing energy conservation policy and regulations.
- Know and identify different green building construction materials.
- Learn different rating systems and their criteria

## DETAILED SYLLABUS

### 4010631 - SUSTAINABLE AND GREEN BUILDING TECHNOLOGY

Contents: Theory

Unit	Name of the Topics	Hours
I	<b>INTRODUCTION TO GREEN BUILDING AND DESIGN FEATURES</b> Definition of Green Building, Benefits of Green Building, Components/features of Green Building, Site selection, Energy Efficiency, Water efficiency, Material Efficiency, Indoor Air Quality.  Site selection strategies, Landscaping, building form, orientation, building envelope and fenestration, material and construction techniques, roofs, walls, fenestration and shaded finishes, advanced passive heating and cooling techniques, waste reduction during construction.	15
II	<b>ENERGY AUDIT AND ENVIRONMENTAL IMPACT ASSESSMENT (EIA)</b> <b>2.1 ENERGY AUDIT:</b> Meaning, Necessity, Procedures, Types, Energy Management Programs. <b>2.2 ENVIRONMENTAL IMPACT ASSESSMENT (EIA):</b> Introduction, EIA regulations, Steps in environmental impact assessment process, Benefits of EIA, Limitations of EIA, Environmental clearance for civil engineering projects.	7  8
III	<b>ENERGY AND ENERGY CONSERVATION</b> <b>3.1 ENERGY:</b> Renewable Energy Resources: Solar Energy, Wind Energy, Ocean Energy, Hydro Energy, Biomass Energy. Non-renewable Energy Resources: Coal, Petroleum, Natural Gas, Nuclear Energy, Chemical Sources of Energy, Fuel Cells, Hydrogen, Biofuels. <b>3.2 ENERGY CONSERVATION</b> Introduction, Specific objectives, present scenario, Need of energy conservation, LEED India Rating System and Energy Efficiency.	8  7



	Energy-saving houses, Green House, Passive house, Passive house construction, Low-energy house, Zero-energy house, Energy consulting, Energy efficiency:	
<b>IV</b>	<p><b>PRINCIPLES AND PLANNING OF GREEN BUILDING</b></p> <p>Features: Salient features of Green Building, Environmental design (ED) strategies for building construction.</p> <p>Process: Improvement in environmental quality in civil structure</p> <p>Materials: Green building materials and products- Bamboo, Rice husk ash concrete, plastic bricks, Bagasse particle board, Insulated concrete forms. reuse of waste material-Plastic, rubber, Newspaper wood, Nontoxic paint, Green roofing.</p> <p>Housing modernization and management (building and construction safety, energy efficiency in housing, Property Refurbishment / Upgrade / Modernization / Renovation - Modular kitchens, bathrooms,</p>	<b>14</b>
<b>V</b>	<p><b>RATING SYSTEM</b></p> <p>Introduction to (LEED) criteria, Indian Green Building council (IGBC) Green rating, Green Rating for Integrated Habitat Assessment. (GRIHA) criteria Heating Ventilation Air Conditioning (HVAC) unit in green Building Functions of Government organization working for Energy conservation and Audit(ECA) - National Productivity council(NPC) Ministry of New and Renewable Energy (MNRE) Bureau of Energy efficiency (BEE) - BER ( Building Energy Rating ) - Certificates – Plumbing and Electrical to heating efficiency</p>	<b>14</b>
	<b>Test &amp; Model Exam</b>	<b>7 Hrs.</b>

## Reference Books

1. Kibert, C.J., Sustainable construction: Green Building design and Delivery, John Wiley Hobouken, New Jersey.
2. Chauhan, D S Sreevasthava, S K., Non-conventional Energy Resources, New Age International Publishers, New Delhi.
3. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
4. Jagadeesh, K S, Reddy Venkatta Rama & Nanjunda Rao, K S., Alternative Building Materials and Technologies, New Age International Publishers, Delhi.
5. Sam Kubba., Handbook of Green Building Design and Construction, Butterworth-Heinemann.
6. Means R S, Green Building - Project Planning and Cost Estimating, John Wiley & Sons
7. Sharma K V, Venkateshaiah P., Energy Management and Conservation, IK International.



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**VI SEMESTER**

## **URBAN PLANNING AND DEVELOPMENT**

**(Elective Theory-II)**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING

Subject Code : 4010632

Semester : VI Semester

Subject Title : **URBAN PLANNING AND DEVELOPMENT**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
<b>URBAN PLANNING AND DEVELOPMENT</b>	<b>5 Hrs.</b>	<b>80 Hrs.</b>	Internal Assessment	Board Examination	Total	
			<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	Town planning Principles, Surveys and Zoning	15
II	Housing and Slums	15
III	Public Buildings, Parks, Play Grounds, Master Plan and Re-planning Existing Towns	15
IV	Urban Roads and Traffic Management	14
V	Building Bye-Laws and Miscellaneous Topics	14
	Test & Model Exam	7
	<b>Total</b>	<b>80</b>

**RATIONALE:**

Considerable employment opportunities are available in urban sector. This subject aims at imparting knowledge and skill in the Town Planning and surveys, urban roads and Traffic management, Master plan and Building bye laws which can be promoted for upgrading standards of life in urban areas.

**OBJECTIVES:**

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

- Understand the principle of Town Planning and surveys.
- Know the requirements of housing and slum clearance.
- Learn the requirement of Public buildings, parks and play grounds.
- Understand the requirements and types of Urban roads and Traffic management
- Know the Importance of housing and slum clearance programmes
- Prepare Master plan and for Re-planning of existing Towns.
- Learn the Building bye laws and other miscellaneous topics.

## DETAILED SYLLABUS

### 4010632 - URBAN PLANNING AND DEVELOPMENT

Contents: Theory

Unit	Name of the Topics	Hours
I	<b>1.1 TOWN PLANNING PRINCIPLES</b> General - Evolution of planning - Objects of town planning – Economic justification for town planning - Principles of Town planning - Necessity of town planning - Origin of towns - Growth of towns – Stages in town development - Personality of town - Distribution of land - Forms of planning - Site for an ideal town - Requirements of new towns - Planning of a modern town - Powers required for enforcement of Town planning scheme - Cost of Town planning - Present position of Town Planning in India.	7
	<b>1.2 SURVEYS</b> General – Necessity - Collection of Data - Types of surveys for planning a new town - Uses of surveys.	3
	<b>1.3 ZONING</b> Meaning of the term - Uses of land, objects and Principles of Zoning - Advantages of Zoning - Importance of Zoning - Aspects of Zoning – Transition Zone – Economy of Zoning – Special Economic Zone (SEZ) - Zoning powers - Maps for Zoning.	5
II	<b>2.1 HOUSING</b> General - Importance of housing - Demand for houses - Building site - Requirements of residential buildings -Classification of residential buildings - Design of residential areas - Rural Housing - Agencies for housing -Investment in housing - HUDCO – CIDCO - Housing problems in India.	7
	<b>2.2 SLUMS</b> General - Causes of slums - Characteristics of slums - Effects of	8

	slums - Slum clearance - Problems in removing slums - Improvement Works - Open plot scheme - Slum clearance and rehousing - Prevention of slum formation - Resources for slum clearance programmes - The Indian slums.	
<b>III</b>	<p><b>3.1 PUBLIC BUILDINGS</b></p> <p>General – Suitable Location of Public Buildings – Classification of Public Buildings - Principles of design of public buildings - Town centres - Grouping of public buildings – Requirements of Public buildings – Green House– Civic aesthetics.</p> <p><b>3.2 PARKS AND PLAY GROUNDS</b></p> <p>General – Types of recreation - Necessity of open spaces - Location of urban green spaces - Classification of parks - Park systems - Park design – Finance for parks – Parkways – Playgrounds - Space standards - Landscape architecture.</p> <p><b>3.3 MASTER PLAN</b></p> <p>General – Objects – Necessity - Factors to be considered - Data to be collected - Drawings to be prepared - Features of master plan - Planning standards – Report – Stages of preparation – Method of Execution - Conclusion.</p> <p><b>3.4 RE-PLANNING EXISTING TOWNS</b></p> <p>General - Objects of re-planning – Analyzing the defects of existing towns - Data to be collected –difficulties in Master Planning existing towns / cities - Urban renewal projects- merging of suburban areas – Decentralization - Satellite Towns – Smart cities- definition and features- Surface drains – Refuses of Towns – Refuse disposal methods.</p>	<p><b>3</b></p> <p><b>4</b></p> <p><b>4</b></p> <p><b>4</b></p>
<b>IV</b>	<p><b>4.1 URBAN ROADS</b></p> <p>General - Objects - Requirements of good city road – Factors to be considered – Classification of urban roads – Types of street systems - Through and By-pass roads – Outer and inner ring roads - Expressways – Freeways – Precincts - Road aesthetics.</p>	<b>6</b>





## Reference Books

1. Town Planning - S.C. Rangwala,: Charotar Publisher (2011), Publisher
2. K.S.Rangwala and P.S.Rangwala,. „Town Planning ”,Charotar Publishing House,15<sup>th</sup> Edition,1999.
3. Michael Hord, R. Remote sensing methods and application, John Wiley and Sons, NewYork, 1986.
4. National Building Code of India- Part-III.(2005).
5. Municipal and Panchayat bye-laws, CMDA Rules and Corporation bye-laws.
6. KA. Ramegowda, Urban and regional planning , University of Mysore
7. Principles and practice of town and country planning Lewis B. Keeble, Estates Gazette, University of Michigan, 2010



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**VI SEMESTER**

## **WATER RESOURCES ENGINEERING**

**(Elective Theory-II)**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU  
DIPLOMA IN CIVIL ENGINEERING SYLLABUS**

**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010633  
 Semester : VI Semester  
 Subject Title : **WATER RESOURCES ENGINEERING**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
<b>WATER RESOURCES MANAGEMENT</b>	5 Hrs.	80 Hrs.	Internal Assessment	Board 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	Introduction and Hydrology	15
II	Ground Water and Management of Ground Water	15
III	Rivers and River Training Works, Storage Works	15
IV	Distribution Works and Management of Canal Irrigation	14
V	Water Shed Management and Water Harvesting and Recycling	14
	Test & Model Exam	7
	<b>Total</b>	<b>80</b>

**RATIONALE:**

Diploma holders in civil engineering have to supervise the construction, repair and maintenance of canals, head works, river training works, cross drainage works, regulatory and other works. Some of the diploma holders are also engaged for preventing water logging and irrigation by tubewells. This subject imparts knowledge regarding hydrology, flow irrigation – storage and distribution system, constructional features of head works, river training works, cross drainage works, causes and prevention of water logging and construction of tube wells.

**OBJECTIVES:**

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

- Understand water resource potential in India and need for water resource management.
- Understand the components of hydrological cycle and hydrograph.
- Understand the occurrence of ground water and ground water exploration methods.
- Understand the ground water basin management concept.
- Learn the classification of rivers and river training works.
- Know the different types of storage works and dam structures.
- Understand the distribution system of canals and management of canal irrigation.
- Understand the concept of water shed management including GIS approach.
- Learn the types of detention basins and reclamation of water logged lands.

## DETAILED SYLLABUS

### 4010633 - WATER RESOURCES ENGINEERING

Contents: Theory

Unit	Name of the Topics	Hours
I	<b>1.1 INTRODUCTION</b> Water resources – world water inventory - Importance of water resources - Necessity for conservation and development of water resources – water resources of India - water resources management - purpose - factors involved in water resources management.	7
	<b>1.2 HYDROLOGY</b> Introduction – Definition - Application of Hydrology in engineering - Hydrological cycle - Precipitation – forms of Precipitation - measurements of rain fall - Rain gauge - types of rain gauges - rain gauge network – mean rainfall over a drainage basin – methods - Radar and Satellite Measurements of rainfall - runoff - Estimation of runoff - losses – Hydrograph – Unit Hydrograph - uses	8
II	<b>2.1 GROUND WATER</b> Ground water resources- zones of Ground water-Aquifer - types-terms used –porosity, permeability, yield, specific yield, specific retention, coefficient of storage, specific capacity – Darcy's law- measurement of yield of well -pumping test- recuperation test- ground water exploration –geo physical methods -Electrical resistivity method – seismic resistivity method- logs.	8
	<b>2.2 MANAGEMENT OF GROUND WATER</b> Concept of basin management - Ground water basin investigations - data collection and field work -mining yield - perennial yield - salt balance - basin management by conjunctive use - artificial recharge of Ground water - recharge methods.	7

<p><b>III</b></p>	<p><b>3.1 RIVERS AND RIVER TRAINING WORKS</b></p> <p>Classification of river - Major rivers in India and Tamil Nadu -Inter linking of rivers in India and its importance – flood - flood forecasting - flood control in India. River training - objectives of river training - classification of river training - methods of river training – levees - guide banks – spurs – types - artificial cut-offs – launching apron - pitching of banks - pitched islands - miscellaneous methods.</p> <p><b>3.2 STORAGE WORKS</b></p> <p>Surface storage - purpose of surface storage – tanks – types - tank weirs – tank outlet – reservoirs – types - storage capacity of reservoir - methods of determination of storage capacity of reservoir – reservoir losses – dams - classification of dams - selection of dam site - Earth dams – types - methods of construction- causes of failure of earth dam - remedial measures – spillway - types - spillway crest gates- types – sluiceway - types.</p>	<p><b>7</b></p> <p><b>8</b></p>
<p><b>IV</b></p>	<p><b>4.1 DISTRIBUTION WORKS</b></p> <p>Irrigation Canal - Typical cross section of canal - components of canal section - classification of canal -alignment of canal - canal head works – types - components of diversion head works - cross drainage works – types - canal losses - lining of canal – necessity - types of lining.</p> <p><b>4.2 MANAGEMENT OF CANAL IRRIGATION</b></p> <p>Canal irrigation system - Need for canal irrigation management - objectives of canal irrigation management - methods of improving canal irrigation management - cropping pattern - need for crop rotation - crop water requirement - water delivery system - irrigation scheduling - frequency of irrigation - optimum use of irrigation water - irrigation efficiencies - conservation of water on the field - farmer’s participation - irrigation manager.</p>	<p><b>7</b></p> <p><b>7</b></p>

<b>V</b>	<p><b>5.1 WATER SHED MANAGEMENT</b></p> <p>Water shed - classification of water sheds - integrated approach for water shed management - role of remote sensing and GIS in water shed management - soil and water conservation – Necessity - soil erosion – causes - effects – remedial measures against erosion - contour bunding - strip cropping - bench terracing – check dams - vegetated water way – afforestation - crop residue - land drainage - surface drains - sub surface drains.</p>	<b>8</b>
	<p><b>5.2 WATER HARVESTING AND RECYCLING</b></p> <p>water harvesting - runoff collection - onsite detention basin - ponds - types - Seepage control – methods -evaporation control - Recycling of harvested water - waste water recharge for reuse – methods -water logging-remedial measures-soil reclamation.</p>	<b>6</b>
<b>Test &amp; Model exam</b>		<b>7 Hrs.</b>

**Reference Books :**

1. Santhosh Kumar Garg, Hydrology and Water Resources Engineering, Khanna Publishers, Delhi.
2. G.L.Asawa, Irrigation and Water Resources Engineering, New ageinternational(p) Ltd., Publishers, New Delhi.
3. David Keith Todd., Ground water Hydrology,John wiley &sons,Singapore.
4. Dilip Kumar Majumdar, Irrigation Water Management - Principles and Practice, PHI Pvt.Ltd. NewDelhi-1.
5. Madan Mohan Das & Mimi Das Saikia, Irrigation and water power Engineering,PHI learning pvt. Ltd., NewDelhi-1
6. K.Subramanya, Engineering hydrology, Tata McGraw-Hill publishing company ltd., New Delhi.



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**VI SEMESTER**

## **COMPUTER APPLICATIONS IN CIVIL ENGINEERING PRACTICE**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010 : DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010640  
 Semester : VI Semester  
 Subject Title : **COMPUTER APPLICATIONS IN CIVIL ENGINEERING PRACTICE**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hour / Week	Hours / Semester	Marks			Duration
<b>COMPUTER APPLICATIONS IN CIVIL ENGINEERING PRACTICE</b>	5 Hrs.	80 Hrs.	Internal Assessment	Board 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 use the computers effectively in problem solving, this course offers various engineering applications of computers in civil engineering.

## **OBJECTIVES:**

After completing this course, students will be able to:

- Prepare the estimate and abstract estimate using Electronics Spread sheet software.
- Know the RCC detailing using software.
- Analyse the simple frame structure using software.
- Use the Construction Project Management Software to develop the CPM/PERT network.
- Practice the Aerial Map using GIS software.

## DETAILED SYLLABUS

### 4010640 - COMPUTER APPLICATIONS IN CIVIL ENGINEERING PRACTICE

Contents: Practical

Total: 80 Hrs.

#### PART - A

#### LIST OF EXPERIMENTS

#### I ELECTRONIC SPREAD SHEET USING SOFTWARE

20 Hours

Solving problems involving estimation, analysis and design using any one of the available packages mentioned below or any other suitable packages for the following exercises.

1. Prepare the Estimate sheet with given data (provide all the measurement details) and calculate the quantity using formula bar.
2. Prepare the Abstract sheet for the given data and calculate Amount and Total Amount using Formula bar ( Use separate column for rates and units)
3. Design and Analysis problems
4. Calculate Area and Elongation using Formula bar
5. Calculate Effective depth 'd' and Area of Steel 'A<sub>st</sub>' using Formula Bar for given singly reinforced section.
6. For given dimension of Masonry/R.C.C Dam ie. top width, bottom width, height of Dam , height of water, Specific weight of masonry/R.C.C. , Sp.wt of Water etc., Find the base pressure and check the stability of the dam.
7. Finding centre of gravity; I<sub>xx</sub> and I<sub>yy</sub> of I, L, T and channel sections.

Note : In addition to the above, similar exercises may be given for practice

Commercial Software	Similar Open source	Download Link
Microsoft Office	Open office	<a href="http://download.openoffice.org/">http://download.openoffice.org/</a>
	LibreOffice	<a href="http://www.libreoffice.org/">http://www.libreoffice.org/</a>

## PART B

### II RCC DETAILING USING SOFTWARE

20 Hours

Generation of detailed drawings for the given specification and Preparation of Bar Bending schedule using any one of the software packages for the following exercises.

Cross section and longitudinal section of:

1. Continuous one way slab (with three equal spans)
2. Simply supported two-way slab
3. Restrained two - way slab
4. Singly reinforced rectangular beam
5. Doubly reinforced continuous rectangular beam with two equal span
6. Dog-legged staircase
7. R.C.C Column with square Isolated footing

### III RCC STRUCTURES - ANALYSIS USING SOFTWARE

20 Hours

1. Carry out the analysis and design of simple RCC structures using any one of the available packages like STAADPRO, ETAB, CADSD3D or any other suitable packages.

### IV. CONSTRUCTION PROJECT MANAGEMENT USING SOFTWARE

12 Hours

1. Develop the CPM / PERT Network for the proposed simple building project using any one of the available packages mentioned below or any other suitable packages.

Commercial Software	Similar Open source	Download Link
Microsoft Project	GANTT PROJECT	<a href="http://www.ganttproject.biz/">http://www.ganttproject.biz/</a>

### V. DRAWING MAPS USING GIS SOFTWARE

8 Hours

(Demonstration and Practice only)

1. Develop Aerial map of given area using **any one** of the available packages mentioned below or any other suitable packages.

Commercial Software	Similar Open source	Download Link
ARCGIS	QGIS	<a href="http://www.qgis.org/en/site/">http://www.qgis.org/en/site/</a>
	GRASS GIS	<a href="http://grass.osgeo.org/">http://grass.osgeo.org/</a>

**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 (40)</b>	<b>Part - B Max.Marks (55)</b>
1.	Procedure	5	5
2	Tabulation and Observation	15	25
3	Calculations	10	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):**

<b>S.No.</b>	<b>List of the Equipments</b>	<b>Quantity Required</b>
1.	Computers	30 Nos.
2.	Suitable Software for Electronic Spread Sheet	30 Users
3.	Suitable RCC Detailing Software	30 Users
4.	Suitable Structural Analysis Software	30 Users
5.	Suitable Project Management Software	30 Users
6.	Suitable GIS Software	30 Users



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**VI SEMESTER**

**ESTIMATION AND COSTING LABORATORY**

**(Elective Practical -II)**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010651  
 Semester : VI Semester  
 Subject Title : **ESTIMATION AND COSTING LABORATORY**

**TEACHING AND SCHEME OF EXAMINATION:**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
<b>ESTIMATION AND COSTING LABORATORY</b>	<b>4 Hrs.</b>	<b>64 Hrs.</b>	<b>Internal Assessment</b>	<b>Board Examination</b>	<b>Total</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:**

Estimation and Costing Lab deals with the procedure for estimating and costing of Civil Engineering works and to perform rate analysis for different items associated with construction projects.

**OBJECTIVES:**

After completing this course, students will be able to:

- Select modes of measurements for different items of works.
- Prepare detailed estimate of a civil engineering works.
- Use relevant software for estimating the quantities and cost of items of works.
- Justify rate for given items of work using rate analysis techniques

## DETAILED SYLLABUS

### 4010651 - ESTIMATION AND COSTING LABORATORY

Contents: Practical

Total: 64 Hrs.

#### **List of Experiments**

1. Prepare the list of items to be executed with units for detailed estimate of a given structure from the given drawing.
2. Prepare a report on market rates for given material, labour wages, hire charges of tools & equipments required to construct the given structure as mentioned in at Serial number 1 above.
3. Recording in Measurement Book (MB) for any four items
4. Prepare bill of quantities of given item from actual measurements. (any four items).
5. Prepare approximate estimate for the given engineering works.
6. Calculate the quantity of items of work from the given set of drawings using standard measurement sheet for load bearing residential structure using description of item from (1BHK Building with staircase).
7. Prepare detailed estimate from the given set of drawings using “standard measurement and abstract format” for RCC framed structure using description of item ( G+1 Building)
8. Calculate the reinforcement quantities from the given set of drawings for a room size of 3 m x 4m with bar bending schedule.
9. Prepare detailed estimate of bitumen road of one kilometre length from the given drawing.
10. Prepare detailed estimate of small Septic tank from the given set of drawings.
11. Prepare bar bending schedule for the given singly reinforced and doubly reinforced beams
12. Prepare bar bending schedule for the given continuous beam
13. Prepare bar bending schedule for the given one way slab
14. Prepare bar bending schedule for the given two way slab
15. Prepare bar bending schedule for the given square column and square footing



### Reference Books:

1. Datta, B.N., Estimating and Costing in Civil engineering, UBS Publishers Distributors
2. Rangwala,S.C., Estimating and Costing, Charotar Publishing House, Anand.
3. Birdie,G.S., Estimating and Costing, Dhanpat Rai Publishing Company(P) Ltd. Delhi.
4. Patil,B.S., Civil Engineering Contracts and Estimates, Orient Longman, Mumbai..  
Monojit Chakraborti, Kolkata.
5. PWD Schedule of Rates.

### 4010651 - ESTIMATION AND COSTING LABORATORY

#### DETAILED ALLOCATION OF MARKS

S.No	Description	Marks
1.	Tabulation and Observation	50
2.	Calculations	35
3.	Accuracy of result	10
4.	Viva-Voce	5
	<b>Total</b>	<b>100</b>



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**VI SEMESTER**

**HIGHWAY ENGINEERING LABORATORY**

**(Elective Practical -II)**

IMPLEMENTED FROM 2020 -2021

CURRICULUM DEVELOPMENT CENTRE

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010652  
 Semester : VI Semester  
 Subject Title : **HIGHWAY ENGINEERING LABORATORY**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hour/ Week	Hours / Semester	Marks			
<b>HIGHWAY ENGINEERING LABORATORY</b>	<b>4 Hrs.</b>	<b>64 Hrs.</b>	<b>Internal Assessment</b>	<b>Board 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:**

In this course, the students learn about testing of aggregates, bitumen and preparing a report about roadworks.

**OBJECTIVES:**

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

- Identify the types of roads as per IRC recommendations.
- Understand the geometrical design features of different highways.
- Perform different tests on road materials.

## **DETAILED SYLLABUS**

### **4010652 - HIGHWAY ENGINEERING LABORATORY**

Contents: Practical

Total: **64 Hours**

#### **LIST OF EXPERIMENTS**

##### **Exercises:**

1. Draw the sketches showing standard cross sections of Expressways, Freeways, NH/SH, MDR/ODR
2. Flakiness and Elongation Index of aggregates.
3. Angularity Number of aggregates.
4. Los Angeles Abrasion test
5. Softening point test of bitumen.
6. Penetration test of bitumen.
7. Ductility test of Bitumen.
8. Study of dense Bituminous macadam design
9. Visit the constructed road for visual inspection to identify defects and suggest remedial measures.
10. Prepare the photographic report containing details for exercise No.9
11. Visit the hill road constructed site to understand its components.
12. Prepare the photographic report containing details for exercise No.11
13. Visit the road of any one type (flexible or rigid) to know the drainage condition.

**Reference Books:**

1. L.R. Kadiyali, Transportation Engineering, Khanna Book Publishing Co., New Delhi (ISBN:978-93-82609-858) Edition 2018
2. Khanna S.K., Justo, C E G and Veeraragavan, A., Highway Engineering, Nem Chand and Brothers, Roorkee.
3. Arora, N. L., Transportation Engineering, Khanna Publishers, Delhi.
4. Saxena S C and Arora S P, A Textbook of Railway Engineering, Dhanpat Rai Publication.
5. Birdi, Ahuja, Road, Railways, Bridge and Tunnel Engg , Standard Book House, Delhi.
6. Sharma, S.K., Principles, Practice and Design of Highway Engineering,, S. Chand
7. Duggal, Ajay K. and Puri, V. P., Laboratory Manual in Highway Engineering, New Age International (P) Limited, Publishers, New Delhi.
8. Subramanian, K.P., Highway, Railway, Airport and Harbour Engineering, Scitech Publications, Hyderabad.

## 4010652 - HIGHWAY ENGINEERING LABORATORY

### DETAILED ALLOCATION OF MARKS

S.No	Description	Marks
1.	Procedure	15
2.	Tabulation and Observation	40
3.	Calculations	30
4.	Accuracy of result	10
5.	Viva-Voce	5
	<b>Total</b>	<b>100</b>

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

S. NO.	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1.	Sieve test for coarse aggregate made of brace 200mm dia complete set	2 sets
2.	Length gauge and Thickness gauge	2 Nos.
3.	Los Angeles Abrasion testing equipment	1 no.
4.	Viscometer	1 no.
5.	Ductility testing machine, briquette mould, water bath	1 No.
6.	Flash and Fire point apparatus	1 set
7.	Bitumen Penetro meter	1 No.
8.	Weigh balance-digital upto 10kg capacity with 1gm accuracy battery backup	1No



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**VI SEMESTER**

**WATER RESOURCES ENGINEERING LABORATORY**

**(Elective Practical -II)**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010653  
 Semester : VI Semester  
 Subject Title : **WATER RESOURCES ENGINEERING LABORATORY**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hour/ Week	Hours / Semester	Marks			Duration
WATER RESOURCES ENGINEERING LABORATORY	4 Hrs.	64 Hrs.	Internal Assessment	Board Examination	Total	
						25

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

**RATIONALE:**

Diploma holders in civil engineering have to supervise the construction, repair and maintenance of canals, head works, river training works, cross drainage works, regulatory and other works. Some of the diploma holders are also engaged for preventing water logging and irrigation by tubewells. This subject imparts knowledge regarding hydrology, flow irrigation – storage and distribution system, constructional features of head works, river training works, cross drainage works, causes and prevention of water logging and construction of tube wells.

**OBJECTIVES:**

The following are the objectives of this course:

- To learn estimation of hydrological parameters.
- To understand water demand of crops and provisions to meet the same.
- To know planning of reservoirs and dams.
- To design irrigation projects, canals and other diversion works.



## DETAILED SYLLABUS

**4010653 - WATER RESOURCES ENGINEERING LABORATORY**

**Contents: Practical**

**Total : 64 Hrs.**

### **LIST OF EXPERIMENTS**

#### **EXERCISES**

1. Calculate average rainfall for the given area using arithmetic mean method.
2. Calculate average rainfall for the given area using isohyetal, Thiessen polygon method.
3. Delineation of contributory area for the given outlet from the given topo-sheet.
4. Estimate crop water requirement for the given data.
5. Estimate capacity of the canal for the given data.
6. Calculate reservoir capacity from the given data.
7. Calculate control levels for the given data for a given reservoir.
8. Draw a labeled sketch of the given masonry/earthen dam section.
9. Draw the theoretical and practical profile of the given gravity dam section.
10. Prepare a presentation on the technical details of any one micro or minor irrigation scheme.
11. Prepare a model of any irrigation structure using suitable material.
12. Prepare a maintenance report for any major/minor irrigation project site in the vicinity of your area, based on field visit.
13. Prepare summary of the technical details of any existing water resource project in the vicinity of your area.
14. Draw a labeled sketch of the given diversion head works and Cross Drainage works.
15. Design a canal section for the given conditions with estimation of the quantity of material required for lining.

## Reference Books

1. Punmia, B.C., Pande, B, Lal, Irrigation and water power engineering, Laxmi Publications
2. Subramanayan, Engineering Hydrology, McGraw Hill.
3. Mutreja K N, Applied Hydrology, McGraw Hill
4. Sharma, R.K. and Sharma, T.K., Irrigation Engineering, S.Chand and Company
5. Basak, N.N., Irrigation Engineering, McGraw Hill Education India Pvt. Ltd.
6. Asawa, G.L., Irrigation and water resource Engineering, New Age International(P)
7. Dahigaonkar, J.G., Irrigation Engineering, Asian Book Pvt. Ltd., New Delhi.
8. Garg, S K, Irrigation and Hydraulic structures, Khanna Publishers, Delhi.
9. Priyani V.B., Irrigation Engineering, Charotar Book Stall, Anand.

### DETAILED ALLOCATION OF MARKS

S.No	Description	Marks
1.	Tabulation and Observation/ Procedure	35
2.	Calculations	45
3.	Accuracy of result	15
4.	Viva-Voce	5
	<b>Total</b>	<b>100</b>



# **DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**N-SCHEME**

**VI SEMESTER**

**PROJECT WORK AND INTERNSHIP**

**IMPLEMENTED FROM 2020 -2021**

**CURRICULUM DEVELOPMENT CENTRE**

**DIRECTORATE OF TECHNICAL EDUCATION  
CHENNAI - 600 025, TAMILNADU**

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN CIVIL ENGINEERING SYLLABUS**  
**N-SCHEME**

(To be implemented to the students admitted from the year 2020-2021 onwards)

Course Name : 1010: DIPLOMA IN CIVIL ENGINEERING  
 Subject Code : 4010660  
 Semester : VI Semester  
 Subject Title : **PROJECT WORK AND INTERNSHIP**

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per semester: 16 weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
<b>PROJECT WORK AND INTERNSHIP</b>	6 Hrs.	96 Hrs.	Internal Assessment	Board Examination	Total	3 Hrs.
			25	100*	100	

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

Minimum marks for Pass is 50 out of which minimum 50 marks should be obtained out of 100 marks in the Board Examination alone.

**RATIONALE:**

The students of all the Diploma Courses have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamil Nadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise.

As far as possible, the students should be given live project problems with a view to:

- i) Develop understanding regarding the size and scale of operations and nature of field work in which students are going to play their role after completing the courses of study.
- ii) Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.

- iii) Develop first and experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems of the world of work.
- iv) Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values

### **OBJECTIVES:**

The objective of the project work is to enable the students to work in convenient groups of not more than six members in a group on a project involving theoretical and experimental studies related to Civil Engineering. Every Project Work shall have a Guide who is a member of the faculty of Civil Engineering of the college. The hours allotted for this course shall be utilized by the students to receive directions from the Guide, on library reading, laboratory work, computer analysis or field work and also to present in periodical seminars the progress made in the project. Each student shall finally produce a comprehensive report covering background information, literature Survey, problem statement, Project work details and conclusions.

This experience of project work shall help the student in expanding his / her knowledge base and also provide opportunity to utilise the creative ability and inference capability.

- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment
- Get exposure on industrial environment and its work ethics.
- Understand what entrepreneurship is and how to become an entrepreneur.
- Learn and understand the gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.

### WORKS INVOLVED IN PROJECT WORK:

Collection of Data from various Journals and Civil Engineering Magazines about the list of Projects given below- Select a suitable project based on the data collected and available resources in your locality -Surveyed Site Plan – Site particulars – Preparation of Architectural Drawings – soil type in the location – Specification for materials & construction procedure - Structural design – Preparation of Detailed Estimate, Data as per Current schedule of Rates - Abstract Estimate – Structural Drawings – Preparation of Report about the project.

### IMPORTANT DOCUMENTS TO BE REFERRED FOR THE ABOVE ACTIVITIES:

S.No	Activity	Reference
1.	Preparation of Architectural Drawings	1. Building Regulations of Locality 2. National Building Code of India, etc
2.	Structural design, Concrete Reinforcement, Steel etc.	1. Relevant IS code for Masonry, Structures 2. IS 456 for Reinforced Cement Concrete 3. Hand book on Concrete Reinforcement and Detailing (SP-34)
3.	Specification of material and work procedure as per State Govt. Highways, Central Govt. Railways, etc	1. Construction procedure by organization, viz. PWD 2. Construction procedure by organization viz. CPWD 3. Specification by Architect etc.,

**The Project work must be reviewed twice in the same semester. The project work is approved during the V semester by the properly constituted committee with guidelines.**

#### a) INTERNAL ASSESSMENT:

The internal assessment should be calculated based on the review of the progress of the work done by the student periodically as follows:

Details of assessment	Period of assessment	Max.Marks
First Review	6 <sup>th</sup> Week	10
Second Review	12 <sup>th</sup> week	10
Attendance	Entire semester	5
<b>Total</b>		<b>25</b>

**b) Allocation of Marks for Project Work and Intership in Board Examinations:**

<b>Details of Mark allocation</b>	<b>Max. Marks</b>
Demostration/Presentation	25
Report	25
Viva Voce	30
Internship report	20
<b>Total</b>	<b>100*</b>

\*Examination will be conducted for 100 marks and will be converted to 75 marks.

**c) Internship Report:**

The internship training for a period of two weeks shall be undergone by every candidate at the end of IV / V semester during vacation. The certificate shall be produced along with the internship report for evaluation. The evaluation of internship training shall be done along with final year "Project Work & Internship" for 20 marks. The internship shall be undertaken in any industry / Government or Private certified agencies which are in social sector / Govt. Skill Centres / Institutions / Schemes.

**A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the Project Work & Internship Board examination.**

## LIST OF SUGGESTED PROJECTS

- **COMPARATIVE STUDY**

- Conventional and Composite concrete mixtures Light weight construction materials
- Prefabricated and R.C.C. Structures
- Cost and construction procedures for steel and R.C.C. Structures
- Cost and Construction procedures for Prestressed and R.C.C. Structures

- **ADMIXTURES**

- Economy of using flyash in concrete

- **MIX DESIGN**

- Comparative study of mix design by different methods

- **STUDY OF SPECIAL TYPES OF CONCRETE IN CONSTRUCTION BY EXPERIMENTS**

- Bamboo as a reinforcing material
- Bagasse ash concrete
- Flyash concrete
- Concrete with Natural vegetative materials
- Concrete using Plastic waste
- Concrete using Steel slag
- Concrete using factory wastes
- Self Compacting concrete, Fibre reinforced concrete, Ferro cement products,

- **PAPER PROJECTS**

- Residential Houses, Primary Health center, School Buildings, Guest House
- Panchayat Union Office Building, Bank Building
- Post Office Building, College Building, Hospital Building, Hotel Building, Hostel Building, Factory Building, Auditorium, Shopping Centre, Community Hall, Theatre
- Market Building, Multistoried Car park, Rural Bus Stand, Stadium
- Swimming Pool
- Over head tank for a village, New village road with culvert, Small Bridge
- Plate girder bridge
- Septic Tank for a Colony
- Other Civil Engineering related structures



- **ENVIRONMENTAL MANAGEMENT PROJECTS**

- Treatment of Wastewater and recirculation for a Colony.
- Solid waste management in a Colony.
- Hydrological data Collection for a river basin/water shed Industrial effluent Collection and analysis .

- **MISCELLANEOUS**

- Rain water Harvesting system for buildings
- Rain water Harvesting system for a small colony
- Low cost Housing techniques
- Rehabilitation of structures

## **FORMAT FOR PREPARATION OF PROJECT REPORT**

### **1. ARRANGEMENT OF CONTENTS:**

The sequence in which the project report material should be arranged and bound should be as follows:

1. Cover Page & Title Page
2. Bonafide Certificate
3. Abstract
4. Table of Contents
5. List of Tables
6. List of Figures
7. List of Symbols, Abbreviations and Nomenclature
8. Chapters
9. Appendices
10. References

The table and figures shall be introduced in the appropriate places.

### **2. PAGE DIMENSION AND BINDING SPECIFICATIONS:**

The dimension of the project report should be in A4 size. The project report should be bound using flexible cover of the thick white art paper. The cover should be **printed in black letters** and the text for printing should be identical.

### **3. PREPARATION OF FORMAT:**

- 3.1 Cover Page & Title Page** – A specimen copy of the Cover page & Title page of the project report are given in **Appendix 1**.
- 3.2 Bonafide Certificate** – The Bonafide Certificate shall be in double line spacing using Font Style Times New Roman and Font Size 14, as per the format in **Appendix 2**.

The certificate shall carry the guide's signature and shall be followed by the guide's name, academic designation (not any other responsibilities of administrative nature), department and full address of the institution where the supervisor has guided the student. The term '**GUIDE**' must be typed in capital letters between the guide's name and academic designation.

- 3.3 Abstract** – Abstract should be one page synopsis of the project report typed double line spacing, Font Style Times New Roman and Font Size 14.

- 3.4 Table of Contents** – The table of contents should list all material following it as well as any material which precedes it. The title page and Bonafide

Certificate will not find a place among the items listed in the Table of Contents but the page numbers of which are in lower case Roman letters. One and a half spacing should be adopted for typing the matter under this head. A specimen copy of the Table of Contents of the project report is given in **Appendix 3**.

- 3.5 List of Tables** – The list should use exactly the same captions as they appear above the tables in the text. One and a half spacing should be adopted for typing the matter under this head.

- 3.6 List of Figures** – The list should use exactly the same captions as they appear below the figures in the text. One and a half spacing should be adopted for typing the matter under this head.

- 3.7 List of Symbols, Abbreviations and Nomenclature** – One and a half spacing should be adopted or typing the matter under this head. Standard symbols, abbreviations etc. should be used.

### **3.8 Chapters** – The chapters may be broadly divided into 3 parts

- (i) Introductory chapter,
- (ii) Chapters developing the main theme of the project work such as
  1. Objectives
  2. Collection of data and required survey work
  3. Management and construction procedure
  4. Resources scheduling and networking
  5. Design details
  6. Required drawing set
  7. Utility to society if any and Conclusion

The main text will be divided into several chapters and each chapter may be further divided into several divisions and sub-divisions.

- Each chapter should be given an appropriate title.
- Tables and figures in a chapter should be placed in the immediate vicinity of the reference where they are cited.
- Footnotes should be used sparingly. They should be typed single space and placed directly underneath in the very same page, which refers to the material they annotate.

### **3.9 Appendices** – Appendices are provided to give supplementary information, which is included in the main text may serve as a distraction and cloud the central theme.

- Appendices should be numbered using Arabic numerals, e.g. Appendix 1, Appendix 2, etc.
- Appendices, Tables and References appearing in appendices should be numbered and referred to at appropriate places just as in the case of chapters.
- Appendices shall carry the title of the work reported and the same title shall be made in the contents page also.

### **3.10 List of References** –The listing of references should be typed 4 spaces below the heading “REFERENCES” in alphabetical order in single spacing left – justified. The reference material should be listed in the alphabetical order of the first author. The name of the author/authors should be immediately followed by the year and other details.

A typical illustrative list given below relates to the citation example quoted above.

**Reference:**

1. Code of practice for plain and reinforced concrete (fourth edition), IS456:2000, Bureau of India Standard, New Delhi
2. Neville, A. M., Concrete Technology, Fourth edition, Pearson Education, New Delhi.
3. Handbook on concrete mixes (based on Indian Standards), SP: 23- 1988, Bureau of Indian Standards, New Delhi, India

**3.10.1 Table and figures** - By the word Table, is meant tabulated numerical data in the body of the project report as well as in the appendices. All other non- verbal materials used in the body of the project work and appendices such as charts, graphs, maps, photographs and diagrams may be designated as figures.

**4.0 Typing Instructions:**

The impression on the typed copies should be black in colour.

One and a half spacing should be used for typing the general text. The general text shall be typed in the Font style 'Times New Roman' and Font size 12.

\*\*\*\*\*

**APPENDIX 1**  
(A typical Specimen of Cover Page & Title Page)  
<Font Style Times New Roman – Bold>

**TITLE OF PROJECT REPORT**

<Font Size 18><1.5 line spacing>

**A PROJECT REPORT**

<Font Size 14>

*Submitted by*

<Font Size 14><Italic>

**NAME OF THE CANDIDATE(S)**

<Font Size 16>

*Submitted for partial fulfillment of requirement for the award of the diploma*

*in*

<Font Size 14><1.5 line spacing><Italic>

**BRANCH OF STUDY**

<Font Size 14>

**NAME OF THE POLYTECHNIC COLLEGE**

<Font Size 14>

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI 600 025**

<Font Size 16><1.5 line spacing>

MONTH & YEAR

<Font Size 14>

**SPECIMEN**

**PLANNING ANALYSIS AND DESIGNING OF  
MULTI- LEVEL CAR PARKING**

**A PROJECT REPORT**

*Submitted by*

<b>SANDHYA. A</b>	<b>10200382</b>
<b>GAYATHRI. R</b>	<b>10293990</b>
<b>MUTHUSAMY. G</b>	<b>10293991</b>
<b>RAJA. D</b>	<b>10289898</b>

*in partial fulfillment of requirement for the award of the diploma*

*in*

**CIVIL ENGINEERING**

**XXXXX POLYTECHNIC COLLEGE**

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI 600 025**

**APRIL 20....**

**APPENDIX 2**

(A typical specimen of Bonafide Certificate)

<Font Style Times New Roman>

**DIRECTORATE OF TECHNICAL EDUCATION**

**CHENNAI 600 025**

<Font Style Times New Roman – size -18>

**BONAFIDE CERTIFICATE**

<Font Style Times New Roman – size -16>

<Font Style Times New Roman – size -14>

Certified that this project report entitled “.....**TITLE OF THE PROJECT.....**”is the bonafide work done by “ .....**NAME OF THE CANDIDATE(S).....**” with his/her batch-mates, in partial fulfillment of the requirement for the award of Diploma in Civil Engineering under my guidance.

Signature of the Head of the Department>>

**SIGNATURE**

<<Name>>

**HEAD OF THE DEPARTMENT**

<<Department>>

<<Full address of the Dept & College >>  
the Dept & College >>

<<Signature of the Guide>>

**SIGNATURE**

<<Name>>

**GUIDE**

<<Academic Designation>>

<<Department>>

<<Full address of

Submitted for Board Examination held on \_\_\_\_\_ at  
.....XXXXX... Polytechnic College.

INTERNAL EXAMINER

EXTERNAL EXAMINER

**APPENDIX 3**  
 (A typical specimen of table of contents)  
 <Font Style Times New Roman>

**TABLE OF CONTENTS**

<b>CHAPTER NO.</b>	<b>TITLE</b>	<b>PAGE NO.</b>
	<b>ABSTRACT</b>	<b>iii</b>
	<b>LIST OF TABLE</b>	<b>xvi</b>
	<b>LIST OF FIGURES</b>	<b>xviii</b>
	<b>LIST OF SYMBOLS</b>	<b>xxvii</b>
<b>1.</b>	<b>INTRODUCTION</b>	<b>1</b>
	1.1 GENERAL	1
	1.2 .....	2
	1.2.1 General	5
	1.2.2 .....	12
	1.2.2.1 General	19
	1.2.2.2 .....	25
	1.2.2.3 .....	29
	1.2.3 .....	30
	1.3 .....	45
	1.4 .....	58
<b>2.</b>	<b>CHAPTER I</b>	<b>69</b>
	2.1 GENERAL	75
	2.2 .....	99
	2.2 .....	100



## SANDWICH DIPLOMA COURSE-INDUSTRIAL TRAINING

**4010491** - Industrial Training I (Report writing & Viva Voce)

**4010492** - Industrial Training II (Report writing & Viva Voce)

### 1. Introduction

The main objective of the sandwich Diploma course is to mould a well rounded technician acclimated with industrial environment while being a student in the institution.

The Sandwich Diploma Course study is pursued by students, in 7 Semesters of 3 ½ years duration, the subjects of 3 years-Full Time Diploma Course being regrouped for academic convenience.

While in the 4<sup>th</sup> semester students under Industrial Training for 6 months(December through May). They also do course work in the institution for one day in a week, While in the 7<sup>th</sup> semester they undergo another spell of 6 months (June through November) Industrial training.

The Apprenticeship (Amendment) Act 1973 is followed in regulating the Industrial training procedure for Sandwich Course.

I SEM	II SEM	III SEM	IV SEM	V SEM	VI SEM	VII SEM
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### 2. Attendance Certification

Every month students have to get their attendance certified by industrial supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the institution supervisor. Regularity in attendance and submission of report will be duly considered while awarding the Internal Assessment mark.

### 3. Training Reports

The students have to prepare two types of reports:

- Weekly report in the form of diary to be submitted to the concerned staff in- charge of the institution. This will be reviewed while awarding Internal Assessment marks.
- Comprehensive report at the end of each spell which will be used for Board Examination.

#### 3.1 Industrial Training Diary

Students are required to maintain the record of day-to-day work done. Such record is called Industrial training Diary. Students have to write this report regularly. All days for the week should be accounted for clearly giving attendance particulars (Presence, absence, Leave, Holidays etc). The concern Industrial supervisor is to check periodically these progress reports.

#### 3.2 Comprehensive Training Report

In addition to the diary, students are required to submit a comprehensive report on training with details of the organisation where the training was undergone after attestation by the supervisors. The comprehensive report should be incorporating study of plant/product/process/construction along with intensive in-depth study on any one of the topics such as processes, methods, tooling, construction and equipment, highlighting aspects of quality, productivity and system. The comprehensive report should be completed in the last week of Industrial training. Any data, drawings etc should be incorporated with the consent of the Organisation.

### Scheme of Evaluation:

#### 1.1 Internal Assessment Marks

First Review (during Third month)	:	10 marks
Second Review (during Fifth month)	:	10 marks
Attendance *	:	05 marks (Awarded same as in Theory)
<b>Total</b>	:	<b>25 marks</b>

\* For awarding marks to attendance, the Industrial Training attendance has to be considered.

## 1.2 Board Examination :

### DETAILED ALLOCATION OF MARKS

<b>S.No</b>	<b>Description</b>	<b>Marks</b>
1.	Presentation about Industrial Training	30
2.	Comprehensive Training Report	40
3.	Viva-voce	30
	<b>Total</b>	<b>100*</b>

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

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