SYLLABUS

DIPLOMA IN CIVIL ENGINEERING

FULL TIME, SANDWICH & PART TIME

Course Code: 1010, 2010 & 3010

M - SCHEME

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

Syllabus Revision Committee
Diploma in Civil Engineering (M-Scheme)

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DIPLOMA COURSES IN ENGINEERING/TECHNOLOGY

(SEMESTER SYSTEM)

(Implemented from 2015- 2016)

M – SCHEME

R E G U L A T I O N S*

* *Applicable to the Diploma Courses other than Diploma in Hotel Management & Catering Technology and the Diploma Courses offered through MGR Film Institute, Chennai.*

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 Diploma in Engineering (sandwich) 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^{th} and/or during 7^{th} 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 diploma in Engineering shall extend over a period of 4 academic years containing of 8 semesters*, the subjects of 3 year full time diploma courses being regrouped for academic convenience.

* Each Semester will have 15 weeks duration of study with 35 hrs. /Week for Regular Diploma Programme and 18hrs/ week (21 hrs. / Week I year) for Part-Time Diploma Programmes.

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 2015 – 2016 academic year onwards.

2. Condition 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, TamilNadu.

(Or)

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

(Or)

The Matriculation Examination of Tamil Nadu.

(Or)

Any other Examination recognized as equivalent to the above by the Board of Secondary Education, TamilNadu.

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 TamilNadu affiliated to the TamilNadu Higher Secondary Board with eligibility for university Courses of study or equivalent examination, & Should have studied the following subjects.

Sl. No	Courses	H.Sc Academic	H.Sc Vocational	
		Subjects Studied	Subjects Studied	
			Related subjects	Vocational subjects
1.	All the Regular and Sandwich Diploma Courses	Maths, Physics & Chemistry	Maths / Physics / Chemistry	Related Vocational Subjects Theory & Practical
2.	Diploma course in Modern Office 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 Practical may also be taken for arriving the eligibility.

- Branch will be allotted according to merit through counselling by the respective Principal as per communal reservation.

- For admission to the Textile Technology, Leather Technology, Printing Technology, Chemical Technology and Modern Office 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, TamilNadu, 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:

Diploma Course	Minimum Period	Maximum Period
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

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. 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 and 75 marks are allotted for Board Examination.

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 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. Out of which the best one will be taken and the marks to be reduced to: 05 marks

The Test – III is to be the Model test covering all the five units and the marks so obtained will be reduced to : 05 marks

Total **10 marks**

TEST	UNITS	WHEN TO CONDUCT	MARKS	DURATION
Test I	Unit – I & II	End of 6th week	50	2 Hrs
Test II	Unit – III & IV	End of 12th week	50	2 Hrs
Test III	**Model Examination** - **Compulsory** Covering all the 5 Units. (Board Examination-question paper-pattern).	End of 15th week	75	3 Hrs

 # - From the Academic year 2015-2016 onwards.

Question Paper Pattern for the Periodical Test :(Test - I & Test- II)

With no choice:

PART A type questions:	4 Questions X 2 mark	… … 8 marks
PART B type questions:	4 Questions X 3 marks	… … 12 marks
PART C type questions:	3 Questions X 10 marks	… … 30 marks

	Total	50 marks
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iii) Assignment **10 Marks**

For each subject Three Assignments are to be given each for 20 marks and the average marks scored should be reduced for 10 marks

All Test Papers and assignment notebooks after getting the signature with date from the students must be kept in the safe custody in the Department for verification and audit. It should be preserved for 2 Semesters 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 (Award of marks as same as Theory subjects)	:	**5 Marks**
b)	Procedure/ observation and tabulation/ Other Practical related Work	:	**10 Marks**
c)	Record writing	:	**10 Marks**

	TOTAL	:	**25 Marks**

- *All the Experiments/exercises indicated in the syllabus should be completed and the same to be given for final board examinations.*
- The Record for every completed exercise should be submitted in the subsequent Practical classes and marks should be awarded for 20 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 and the marks awarded for attendance is to be added to arrive at the internal assessment mark for Practical. (20+5=25 marks)

- The students have to submit the duly signed bonafide record note book/file during the Practical Board Examinations.
- *All the marks awarded for assignment, Test and attendance should be entered in the Personal Log Book of the staff, who is handling the subject. This is applicable to both Theory and Practical subjects.*

10. Life and Employability Skill Practical:

The Life and Employability Skill Practical with more emphasis is being introduced in IV Semester for Circuit Branches and in V Semester for other branches of Engineering.
Much Stress is given to increase the employability of the students:

Internal assessment Mark **….. 25 Marks**

11. Project Work:

The students of all the Diploma Programmes **(except Diploma in Modern Office Practice)** have to do a Project Work as part of the Curriculum and in partial fulfilment for the award of Diploma by the State Board of Technical Education and Training, Tamilnadu. 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.**

a) Internal assessment mark for Project Work & Viva Voce:

Project Review I	…	**10 marks**
Project Review II	…	**10 marks**
Attendance	…	**05 marks** (award of marks same as theory subjects pattern)
Total	…	**25 marks**

Proper record to be maintained for the two Project Reviews, and It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

b) Allocation of Mark for Project Work & Viva Voce in Board Examination:

Viva Voce	…	30 **marks**
Marks for Report Preparation, Demo	…	35 **marks**
Total		**65 marks**

c) Written Test Mark (from 2 topics for 30 minutes duration): $

i) Environment Management	2 questions X 2 ½ marks	= **5 marks**
ii) Disaster Management	2 questions X 2 ½ marks	= **5 marks**
		10marks

$ **-** Selection of Questions should be from Question Bank, by the External Examiner.

No choice need be given to the candidates.

Project Work & Viva Voce in Board Examination	--	**65 Marks**
Written Test Mark (from 2 topics for 30 minutes duration)	--	**10 Marks**
TOTAL	--	**75 Marks**

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual during the Project Work & Viva Voce 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 subject* out of the total prescribed maximum marks including both the internal assessment and the Board Examination marks put together, subject to the condition that he/she secures at least a minimum of *30 marks out of 75 marks in the Board's Theory examinations and a minimum of 35 marks out of 75 marks in the Board Practical Examinations.*

14. Classification of successful candidates:

Classification of candidates who will pass out the final examinations from April 2018 onwards (Joined in first year in 2015-2016) 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 3/ 3½/ 4 years (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 of marks in all the semesters put together and passes all the semesters except the I and II semesters in the first appearance itself and passes all the subjects within the stipulated period of study 3/ 3½/ 4 years (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 semesters put together and passes all the subjects within the stipulated period of study 3/ 3½ / 4 years (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 mentioned classifications are also applicable for the Sandwich / Part-Time students who pass out Final Examination from October 2018 /April 2019 onwards (both joined in First Year in 2015-2016)

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).

16. Seminar:

For seminar the total seminar 15 hours(15 weeks x 1hour) should be distributed equally to total theory subject per semester(i.e 15 hours divided by 3/4 subject). A topic from subject or current scenario is given to students. During the seminar hour students have to present the paper and submit seminar material to the respective staff member, who is handling the subject. It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

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ANNEXURE - I

(1010 – DIPLOMA IN CIVIL ENGINEERING FULL TIME)
CURRICULUM OUTLINE

THIRD SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31031	Engineering Mechanics	6	-	-	6
31032	Construction Materials and Construction Practice	5	-	-	5
31033	Surveying I	5	-	-	5
31034	Civil Engineering Drawing I	-	5	-	5
31035	Material Testing Lab I	-	-	3	3
31036	Surveying Practice I	-	-	6	6
30001	Computer Application Practical**	-	-	4	4
Seminar		1	-	-	1
TOTAL		17	5	13	35

FOURTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31041	Theory of Structures	6	-	-	6
31042	Transportation Engineering	5	-	-	5
31043	Surveying II	5	-	-	5
31044	Estimating and Costing I	5	-	-	5
31045	Material Testing Lab II	-	-	3	3
31046	Surveying Practice II	-	-	6	6
31047	CAD in Civil Engineering Drawing I	-	-	4	4
Seminar		1	-	-	1
TOTAL		22	-	13	35

CURRICULUM OUTLINE

FIFTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31051	Structural Engineering	6	-	-	6
31052	Environmental Engineering and Pollution Control	5	-	-	5
Elective Theory I		5	-	-	5
31071	Advanced Construction Technology				
31072	Remote Sensing and GIS				
31073	Soil Mechanics and Foundation Engineering				
31074	Water Resources Management				
31054	Civil Engineering Drawing II	-	6	-	6
31055	Construction Practice Lab	-	-	3	3
31056	CAD In Civil Engineering Drawing II	-	-	5	5
30002	Life and Employability Skill Practical**	-	-	4	4
Seminar		1	-	-	1
TOTAL		17	6	12	35

SIXTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31061	Construction Management with MIS	5	-	-	5
31062	Hydraulics	6	-	-	6
Elective Theory II		5	-	-	5
31081	Steel Structures				
31082	Town Planning				
31083	Earthquake Engineering				
31084	Building Services				
31064	Estimating and Costing II	5	-	-	5
31065	Hydraulics Lab	-	-	4	4
31066	Computer Applications In Civil Engineering Practice	-	-	5	5
31067	Project Work	-	-	4	4
Seminar		1	-	-	1
TOTAL		22	-	13	35

ANNEXURE – II
(1010 – DIPLOMA IN CIVIL ENGINEERING FULL TIME)
SCHEME OF EXAMINATION

THIRD SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam. Marks	Total Marks		
31031	Engineering Mechanics	25	75	100	40	3
31032	Construction Materials and Construction Practice	25	75	100	40	3
31033	Surveying I	25	75	100	40	3
31034	Civil Engineering Drawing I	25	75	100	40	3
31035	Material Testing Lab I	25	75	100	50	3
31036	Surveying Practice I	25	75	100	50	3
30001	Computer Application Practical**	25	75	100	50	3
		175	525	700		

FOURTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam Marks	Total Mark		
31041	Theory of Structures	25	75	100	40	3
31042	Transportation Engineering	25	75	100	40	3
31043	Surveying II	25	75	100	40	3
31044	Estimating and Costing I	25	75	100	40	3
31045	Material Testing Lab II	25	75	100	50	3
31046	Surveying Practice II	25	75	100	50	3
31047	CAD in Civil Engineering Drawing I	25	75	100	50	3
TOTAL		175	525	700		

(1010 – DIPLOMA IN CIVIL ENGINEERING FULL TIME)

SCHEME OF EXAMINATION

FIFTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam. Marks	Total Mark		
31051	Structural Engineering	25	75	100	40	3
31052	Environmental Engineering And Pollution Control	25	75	100	40	3
Elective Theory I		25	75	100	40	3
31071	Advanced Construction Technology					
31072	Remote Sensing and GIS					
31073	Soil Mechanics and Foundation Engineering					
31074	Water Resources Management					
31054	Civil Engineering Drawing II	25	75	100	40	3
31055	Construction Practice Lab	25	75	100	50	3
31056	CAD in Civil Engineering Drawing II	25	75	100	50	3
30002	Life and Employability Skill Practical**	25	75	100	50	3
		175	525	700		

SIXTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam Marks	Total Mark		
31061	Construction Management With MIS	25	75	100	40	3
31062	Hydraulics	25	75	100	40	3
Elective Theory II		25	75	100	40	3
31081	Steel Structures					
31082	Town Planning					
31083	Earthquake Engineering					
31084	Building Services					
31064	Estimating And Costing II	25	75	100	40	3
31065	Hydraulics Lab	25	75	100	50	3
31066	Computer Applications in Civil Engineering practice	25	75	100	50	3
31067	Project Work	25	75	100	50	3
TOTAL		175	525	700		

ANNEXURE - III

3010 DIPLOMA IN CIVIL ENGINEERING (PART-TIME)
CURRICULUM OUTLINE

THIRD SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31031	Engineering Mechanics	5			5
31033	Surveying I	4			4
30016	Engineering Graphics I		3		3
31035	Material Testing Lab I			3	3
31036	Surveying Practice I			3	3
	TOTAL	9	3	6	18

FOURTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31032	Construction Materials and Construction Practice	4			4
31043	Surveying II	4			4
30026	Engineering Graphics II		3		3
31034	Civil Engineering Drawing I		4		4
31046	Surveying Practice II			3	3
TOTAL		8	7	3	18

FIFTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31041	Theory of Structures	5			5
31042	Transportation Engineering	4			4
31045	Material Testing Lab II			3	3
31047	CAD in Civil Engineering Drawing I			3	3
30001	Computer Application Practical**			3	3
TOTAL		9		9	18

3010 DIPLOMA IN CIVIL ENGINEERING (PART-TIME)
CURRICULUM OUTLINE

SIXTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31044	Estimating and Costing I	4			4
31051	Structural Engineering	5			5
Elective Theory I		4			4
31071	Advanced Construction Technology				
31072	Remote Sensing and GIS				
31073	Soil Mechanics and Foundation Engineering				
31074	Water Resources Management				
31054	Civil Engineering Drawing II		3		3
31055	Construction Practice Lab			2	2
TOTAL		13	3	2	18

SEVENTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31052	Environmental Engineering and Pollution Control	5			5
Elective Theory II		5			5
31081	Steel Structures				
31082	Town Planning				
31083	Earthquake Engineering				
31084	Building Services				
31056	CAD In Civil Engineering Drawing II			3	3
31066	Computer Applications In Civil Engineering Practice			3	3
30002	Life and Employability Skills Practical**			2	2
TOTAL		10		8	18

3010 DIPLOMA IN CIVIL ENGINEERING (PART-TIME)
CURRICULUM OUTLINE

EIGHTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31061	Construction Management with MIS	3			3
31062	Hydraulics	5			5
31064	Estimating and Costing II	4			4
31065	Hydraulics Lab			3	3
31067	Project Work			3	3
TOTAL		12		6	18

ANNEXURE – IV
3010 DIPLOMA IN CIVIL ENGINEERING (PART-TIME)
SCHEME OF THE EXAMINATION

THIRD SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam. Marks	Total Mark		
31031	Engineering Mechanics	25	75	100	40	3
31033	Surveying I	25	75	100	40	3
30016	Engineering Graphics I	25	75	100	40	3
31035	Material Testing Lab I	25	75	100	50	3
31036	Surveying Practice I	25	75	100	50	3
		125	375	500		

3010 DIPLOMA IN CIVIL ENGINEERING (PART-TIME)
SCHEME OF THE EXAMINATION

FOURTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam Marks	Total Mark		
31032	Construction Materials and Construction Practice	25	75	100	40	3
31043	Surveying II	25	75	100	40	3
30026	Engineering Graphics II	25	75	100	40	3
31034	Civil Engineering Drawing I	25	75	100	40	3
31046	Surveying Practice II	25	75	100	50	3
TOTAL		125	375	500		

FIFTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam Marks	Total Mark		
31041	Theory of Structures	25	75	100	40	3
31042	Transportation Engineering	25	75	100	40	3
31045	Material Testing Lab II	25	75	100	50	3
31047	CAD in Civil Engineering Drawing I	25	75	100	50	3
30001	Computer Application Practical**	25	75	100	50	3
TOTAL		125	375	500		

3010 DIPLOMA IN CIVIL ENGINEERING (PART-TIME)
SCHEME OF THE EXAMINATION

SIXTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam. Marks	Total Mark		
31044	Estimating and Costing I	25	75	100	40	3
31051	Structural Engineering	25	75	100	40	3
Elective Theory I		25	75	100	40	3
31071	Advanced Construction Technology					
31072	Remote Sensing and GIS					
31073	Soil Mechanics and Foundation Engineering					
31074	Water Resources Management					
31054	Civil Engineering Drawing II	25	75	100	40	3
31055	Construction Practice Lab	25	75	100	50	3
		125	375	500		

SEVENTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam Marks	Total Mark		
31052	Environmental Engineering and Pollution Control	25	75	100	40	3
Elective Theory II		25	75	100	40	3
31081	Steel Structures					
31082	Town Planning					
31083	Earthquake Engineering					
31084	Building Services					
31056	CAD In Civil Engineering Drawing II	25	75	100	50	3
31066	Computer Applications In Civil Engineering Practice	25	75	100	50	3
30002	Life and Employability Skills Practical**	25	75	100	50	3
TOTAL		125	375	500		

3010 DIPLOMA IN CIVIL ENGINEERING (PART-TIME)
SCHEME OF THE EXAMINATION

EIGTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam Marks	Total Mark		
31061	Construction Management with MIS	25	75	100	40	3
31062	Hydraulics	25	75	100	40	3
31064	Estimating and Costing II	25	75	100	40	3
31065	Hydraulics Lab	25	75	100	50	3
31067	Project Work	25	75	100	50	3
TOTAL		125	375	500		

ANNEXURE – V

(2010 – DIPLOMA IN CIVIL ENGINEERING SANDWICH)
CURRICULUM OUTLINE

THIRD SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31031	Engineering Mechanics	5			5
31032	Construction Materials and Construction Practice	4			4
31033	Surveying I	5			5
31042	Transportation Engineering	4			4
31034	Civil Engineering Drawing I		4		4
31035	Material Testing Lab I			3	3
31036	Surveying Practice I			6	6
30001	Computer Application Practical**			3	3
Seminar		1			1
TOTAL		19	4	12	35

(2010 – DIPLOMA IN CIVIL ENGINEERING SANDWICH)
CURRICULUM OUTLINE

FOURTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31045	Material Testing Lab II			3	3
31047	CAD in Civil Engineering Drawing I			4	4
31091	Industrial Training I				
TOTAL					

FIFTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31041	Theory of Structures	5			5
31043	Surveying II	5			5
31044	Estimating and Costing I	4			4
31052	Environmental Engineering and Pollution Control	4			4
Elective Theory I					
31071	Advanced Construction Technology	4	-	-	4
31072	Remote Sensing and GIS				
31073	Soil Mechanics and Foundation Engineering				
31074	Water Resources Management				
31054	Civil Engineering Drawing II		4		4
31046	Surveying Practice II			5	5
31056	CAD In Civil Engineering Drawing II			3	3
Seminar		1			1
TOTAL		23	4	8	35

SIXTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31051	Structural Engineering	6			6
31061	Construction Management with MIS	4			4
31062	Hydraulics	5			5
31064	Estimating and Costing II	5			5
Elective Theory II		4			4
31081	Steel Structures				
31082	Town Planning				
31083	Earthquake Engineering				
31084	Building Services				
31065	Hydraulics Lab			3	3
31066	Computer Applications In Civil Engineering Practice			4	4
30002	Life and Employability Skill Practical**			3	3
Seminar		1			1
TOTAL		25		10	35

SEVENTH SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
31055	Construction Practice Lab			3	3
31067	Project Work			4	4
31092	Industrial Training II				
TOTAL					

ANNEXURE – VI

(2010 – DIPLOMA IN CIVIL ENGINEERING SANDWICH)

SCHEME OF THE EXAMINATION

THIRD SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam. Marks	Total Mark		
31031	Engineering Mechanics	25	75	100	40	3
31032	Construction Materials and Construction Practice	25	75	100	40	3
31033	Surveying I	25	75	100	40	3
31042	Transportation Engineering	25	75	100	40	3
31034	Civil Engineering Drawing I	25	75	100	40	3
31035	Material Testing Lab I	25	75	100	50	3
31036	Surveying Practice I	25	75	100	50	3
30001	Computer Application Practical**	25	75	100	50	3
TOTAL		200	600	800		

FOURTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam Marks	Total Mark		
31045	Material Testing Lab II	25	75	100	50	3
31047	CAD in Civil Engineering Drawing I	25	75	100	50	3
31091	Industrial Training I	25	75	100	50	3
TOTAL		75	225	300		

(2010 – DIPLOMA IN CIVIL ENGINEERING SANDWICH)
SCHEME OF EXAMINATION

FIFTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam. Marks	Total Mark		
31041	Theory of Structures	25	75	100	40	3
31043	Surveying II	25	75	100	40	3
31044	Estimating and Costing I	25	75	100	40	3
31052	Environmental Engineering and Pollution Control	25	75	100	40	3
Elective Theory I		25	75	100	40	3
31071	Advanced Construction Technology					
31072	Remote Sensing and GIS					
31073	Soil Mechanics and Foundation Engineering					
31074	Water Resources Management					
31054	Civil Engineering Drawing II	25	75	100	40	3
31046	Surveying Practice II	25	75	100	50	3
31056	CAD In Civil Engineering Drawing II	25	75	100	50	3
		200	600	800		

(2010 – DIPLOMA IN CIVIL ENGINEERING SANDWICH)
SCHEME OF EXAMINATION

SIXTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam Marks	Total Mark		
31051	Structural Engineering	25	75	100	40	3
31061	Construction Management with MIS	25	75	100	40	3
31062	Hydraulics	25	75	100	40	3
31064	Estimating and Costing II	25	75	100	40	3
	Elective Theory II	25	75	100	40	3
31081	Steel Structures					
31082	Town Planning					
31083	Earthquake Engineering					
31084	Building Services					
31065	Hydraulics Lab	25	75	100	50	3
31066	Computer Applications In Civil Engineering Practice	25	75	100	50	3
30002	Life and Employability Skills Practical**	25	75	100	50	3
TOTAL		200	600	800		

SEVENTH SEMESTER

Subject Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assess-ment Marks	Board Exam Marks	Total Mark		
31055	Construction Practice Lab	25	75	100	50	3
31067	Project Work	25	75	100	50	3
31092	Industrial Training II	25	75	100	50	3
TOTAL		75	225	300		

Relevant papers in 'L' and 'M' Scheme

SEM	' L' Scheme		" M " Scheme (Implementing academic year 2015 - 16)	
	Sub Code	Subject	Sub Code	Subject
III w.e.f. OCT '16	21031	Engineering Mechanics	31031	Engineering Mechanics
	21032	Construction Materials and Construction Practice	31032	Construction Materials and Construction Practice
	21033	Surveying I	31033	Surveying I
	21034	Civil Engineering Drawing I	31034	Civil Engineering Drawing I
	21035	Material Testing Lab I	31035	Material Testing Lab I
	21036	Surveying Practice I	31036	Surveying Practice I
	20001	Computer Application Practical**	30001	Computer Application Practical**
IV w.e.f. APR '17	21041	Theory of Structures	31041	Theory of Structures
	21042	Transportation Engineering	31042	Transportation Engineering
	21043	Surveying II	31043	Surveying II
	21044	Estimating and Costing I	31044	Estimating and Costing I
	21045	Material Testing Lab II	31045	Material Testing Lab II
	21046	Surveying Practice II	31046	Surveying Practice II
	21047	CAD in Civil Engineering Drawing I	31047	CAD in Civil Engineering Drawing I

Relevant papers in 'L' and 'M' Scheme

SEM	' L' Scheme		" M " Scheme (Implementing academic year 2017 - 18)	
	Sub Code	Subject	Sub Code	Subject
V w.e.f. OCT '17	21051	Structural Engineering	31051	Structural Engineering
	21052	Environmental Engineering and Pollution Control	31052	Environmental Engineering and Pollution Control
	Elective Theory I		Elective Theory I	
	21071	Advanced Construction Technology	31071	Advanced Construction Technology
	21072	Remote Sensing and GIS	31072	Remote Sensing and GIS
	21073	Soil Mechanics and Foundation Engineering	31073	Soil Mechanics and Foundation Engineering
	21074	Water Resources Management	31074	Water Resources Management
	21054	Civil Engineering Drawing II	31054	Civil Engineering Drawing II
	21055	Construction Lab Practice	31055	Construction Practice Lab
	21056	CAD In Civil Engineering Drawing II	31056	CAD In Civil Engineering Drawing II
	20002	Communication and Life Skills Practical**	30002	Life and Employability Skills Practical**
VI w.e.f. APR '18	21061	Construction Management with MIS	31061	Construction Management with MIS
	21062	Hydraulics	31062	Hydraulics
	Elective Theory II		Elective Theory II	
	21081	Steel Structures	31081	Steel Structures
	21082	Town Planning	31082	Town Planning
	21083	Earthquake Engineering	31083	Earthquake Engineering
	21084	Building Services	31084	Building Services
	21064	Estimating and Costing II	31064	Estimating and Costing II
	21065	Hydraulics and Plumbing Lab	31065	Hydraulics Lab
	21066	Computer Applications In Civil Engineering Practice	31066	Computer Applications In Civil Engineering Practice
	21067	Project Work	31067	Project Work

Question paper pattern common to all theory subjects
Unless it is specified

PART A ***- (1 to 8) 5 Questions are to be answered out of 8 questions for 2 marks each.*****(Question No. 8 will be the compulsory question and *can be asked from any one of the units)(From each unit maximum of two 2 marks questions alone can be asked)***

PART B ***- (9 to 16)5 Questions are to be answered out of 8 questions for 3 marks each.*** **(Question No. 16 will be the compulsory question and *can be asked from any one of the units) (From each unit maximum of two 3 marks questions alone can be asked)***

PART C ***- (17 to 21) Five Questions will be in the Either OR Pattern. Students have to answer these five questions. Each question carries 10 marks. (Based on the discretion of the question setter, he/she can ask two five mark questions (with sub division A & sub division B) instead of one ten marks question if required)***

III SEMESTER

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 -2016 onwards

ENGINEERING MECHANICS

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31031

Semester : III Semester

Subject Title : **ENGINEERING MECHANICS**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
ENGINEERING MECHANICS	6 Hrs	90 Hrs	Internal Assessment	Board Examination	Total	
			25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS :

Sl. No.	TOPIC	Time (Hrs)
1	SIMPLE STRESSES AND STRAINS	18
2	SHEAR FORCE AND BENDING MOMENT	16
3	GEOMETRICAL PROPERTIES OF SECTIONS	14
4	STRESSES IN BEAMS AND SHAFTS	16
5	PIN JOINTED FRAMES	16
6	TEST AND REVISION	10
	Total	90

RATIONALE:

This is a basic engineering subject. The purpose of the subject is to impart 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 will also enable the students to continue their further education.

OBJECTIVES:

On completion of the course, the student will be familiar with:

- The mechanical properties of engineering materials, elastic constants, different types of stresses and strains, the deformation of elastic bodies under simple stresses, the use and principles of composite sections;
- The effects of transverse forces such as shear force and bending moment in beams; determination of SF and BM in simple beams under different loading systems;
- The geometrical properties such as centroid, moment of inertia etc of sections of different shapes;
- Determination of different types of stresses induced in beams and shafts due to bending and twisting moments respectively
- Analysis of perfect frames for vertical loads by analytical as well as graphical methods.

31031 ENGINEERING MECHANICS

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**SIMPLE STRESSES AND STRAINS** **1.1 INTRODUCTION TO STRESSES AND STRAINS** Definitions of: Force, Moment of force, Actions and reactions, Statics, Static equilibrium of bodies, Mechanics, Engineering Mechanics - Conditions of static equilibrium - Types of forces on structural members - Study of strength of material - Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability - Definitions of stress and strain - Types of stresses -Tensile, Compressive and Shear stresses - Types of strains - Tensile, Compressive and Shear strains - Elongation and Contraction - Longitudinal and Lateral strains - Poisson's Ratio - Volumetric strain - Simple problems in computation of stress, strain, Poisson's ratio, change in dimensions and volume etc- Hooke's law - Elastic Constants - Definitions of: Young's Modulus of Elasticity – Shear modulus (or) Modulus of Rigidity - Bulk Modulus - Relationship between elastic constants **(Derivations not necessary)-** Simple problems - Young's modulus values of few important engineering materials. **1.2 APPLICATION OF STRESS AND STRAIN IN ENGINEERING FIELD** Behaviour of ductile and brittle materials under direct loads - Load Extension curve (or) Stress Strain curve of a ductile material - Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress, Actual / Nominal stresses - Working stress - Factor of safety - Percentage elongation - Percentage reduction in area - Significance of percentage elongation and reduction in area of cross section - Deformation of prismatic and stepped bars due to uniaxial load - Deformation of prismatic bars due to its self weight - Numerical problems. Composite Sections – Examples of composite sections in Engineering field- Advantages - Assumptions made – Principles of analysis of Composite sections - Modular ratio - Equivalent area **(No problems)**	**18 Hrs**

Unit	Name of the Topic	Hours
II	**SHEAR FORCE AND BENDING MOMENT** **2.1 TYPES OF LOADS AND BEAMS** 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. **2.2 SHEAR FORCE AND BENDING MOMENT IN BEAMS** 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 and Over hanging beams – Position of maximum BM - Point of contra flexure – 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 and udl only)	**16Hrs**
III	**GEOMETRICAL PROPERTIES OF SECTIONS** **3.1 CENTROID** 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 **3.2 MOMENT OF INERTIA** Definitions of: Inertia, Moment of Inertia, Polar moment of inertia, Radius of gyration, Section Modulus, Polar modulus - Parallel and perpendicular axes theorems - Derivation of expressions for M.I / Polar M I, Section modulus and Radius of gyration of regular geometrical plane sections (rectangle, circle, triangle) – M.I about centroidal axis / base, Section modulus, Radius of gyration of symmetric, asymmetric, anti symmetric and built up sections – Numerical problems.	**14 Hrs**

Unit	Name of the Topic	Hours
IV	**STRESSES IN BEAMS AND SHAFTS** **4.1 STRESSES IN BEAMS DUE TO BENDING** Types of Bending stresses – Neutral axis – Theory of simple bending – Assumptions – Moment of resistance – Derivation of flexure/bending equation $M / I = E / R = \sigma/y$ – Bending stress distribution – Curvature of beam – Position of N.A and centroidal axis – Stiffness equation – Flexural rigidity – Strength equation – Significance of Section modulus – Numerical problems. **4.2 STRESS IN SHAFTS DUE TO TORSION** Definitions of: Shaft, Couple, Torque (or) Twisting moment - Types of Shafts (one end fixed and the other rotating, both ends rotating at different speeds) - Theory of Pure Torsion – Assumptions -Derivation of Torsion equation, $T / I_p = \lambda_{max}/ R = G\Theta / l$ - Shear stress distribution in circular section due to torsion - Strength and Stiffness of shafts – Torsional rigidity - Torsional modulus - Comparative analysis of hollow and solid shafts - Power transmitted by a shaft - Numerical problems.	**16 Hrs**
V	**PIN JOINTED FRAMES** **5.1 ANALYSIS BY ANALYTICAL METHOD (METHOD OF JOINTS)** 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 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. **5.2 ANALYSIS BY GRAPHICAL METHOD** 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 ten members) with vertical nodal loads only. **TEST & REVISION**	**16 Hrs** **10 Hrs**

Reference Book :

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”,
5) Sanchayan Mukherjee, “Elements of Engineering Mechanics”, PHI Learning Pvt Ltd
6) R K Bansal, “ Engineering Mechanics”, Laxmi Publications Pvt.Ltd.,

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 -2016 onwards

CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student Admitted from the year 2015-2016 onwards)

Course Name **:** Diploma in Civil Engineering

Subject Code **:** 31032

Semester **:** III Semester

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

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	BUILDING MATERIALS	13
2	BUILDING MATERIALS (Contd.)	13
3	FOUNDATIONS AND MASONRIES	13
4	DOORS,FLOORS,ROOFS, etc.,	13
5	POINTING,PLASTERING,PAINTING,FORM WORK, etc.,	13
6	TEST & REVISION	10
	Total	75

RATIONALE:

Civil Engineering diploma holders have to supervise construction of various types of civil works involving 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 characteristics, uses and availability of various building materials and skills in conducting tests to determine 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 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 Materials and Construction Practice is very important for Civil Engineering diploma holders.

OBJECTIVES:

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

- State different construction materials and their properties.
- Explain different types of cement, grades of cements and tests on cement.
- State and explain different types of modern building materials such as ceramic products, glass, metals and plastics.
- Explain method of preparation of mortar and cement concrete.
- 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.

31032 CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**1.1 INTRODUCTION** Physical properties of materials – Density, Bulk density, Specific gravity, porosity, water absorption, permeability, chemical resistance, fire resistance, weathering resistance, thermal conductivity, Durability. (Definitions only) **1.2 ROCKS AND STONES** 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) **1.3 BRICKS** 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 -grades and corresponding requirements of bricks as per BIS **1.4 LIME AND POZZOLANAS** Sources of lime – classification 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. **1.5 CEMENT** 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 – objects of each test – Test requirements/ BIS specifications of OPC - Admixtures – Definition –types and uses . **1.6 WATER** 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. **1.7 GLASS** Definition – Constituents of glass – Classification of glass – Functions and Utility – Types of glass – sizes and thickness – uses in buildings.	**13 Hrs**

Unit	Name of the Topic	Hours
I	**1.8 CERAMIC PRODUCTS** Definition – Earthenware , Stoneware , Porcelain , Terracotta, Glazing, Tiles (Definitions only) – Types of Tiles – Clay Terracing tiles – Thermal care tiles – Glazed Ceramic tiles – Fully Vitrified tiles – Roof tiles – special requirements for floor, wall and roof tiles– Sanitary appliances.	
II	**2.1 MORTAR** Definition – Properties and uses of mortar – Types of mortar – Cement and Lime mortar – Mix ratio of cement mortars for different works. **2.2 CONCRETE** Definition – Constituents of concrete and their requirements – uses of concrete – Types of concrete: Lime concrete, cement concrete and light weight concrete. **2.3 PAINTS AND VARNISHES** 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 – Ingredients of varnish– Types of varnish and their uses –Oil, Turpentine , Spirit and water varnish **2.4 METALS AND PLASTICS** Types of metals used in construction – Cast Iron ,Steel, Aluminium, G I, Stainless steel– Market forms of steel – Steel for reinforced concrete - steel for pre stressed concrete –Hot rolled steel sections – cold formed light gauge section.- 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 – UPVC pipes and fittings - Asbestos - uses of asbestos. **2.5 TIMBER AND TIMBER PRODUCTS** Types of Timber – Teak, Sal, Rosewood, Mango, and Jack – Defects in timber – seasoning of timber - objectives – Timber Products – Veneers , Ply woods , Particle Board , Fibre board, Hard board, Block board, Laminated board – Uses. **2.6 ROOF COVERINGS** Definition – objectives and uses -Mangalore tiles – AC Sheets – FRB Sheets- G.I. sheets- Shell roof – R C C roof – Advantages – Types.	**13 Hrs**

Unit	Name of the Topic	Hours
	2.7 DAMP PROOFING MATERIALS 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.	**13 Hrs**
III	**3.1 INTRODUCTION TO STRUCTURES** Permanent and temporary structures – Life of structures – Sub structure – super structure – load bearing structure – framed structure – concept of framed structure – advantages of framed structure. **3.2 FOUNDATION** Definition – objectives of foundation – Bearing capacity of soil – Definition – maximum/ultimate and safe bearing capacity - Bearing capacity of different types of soils – Factors affecting bearing capacity – Requirements of a good foundation – Types of foundations – Shallow foundation : Spread foundation, Isolated column footing, combined footing, continuous footing, Raft foundation – Deep foundation : Pile, Stone columns – Types of piles : Bearing pile, Friction pile, under reamed pile – Causes of failure of foundation – Remedial measures. **3.3 STONE MASONRY** Definition – Common terms used : Natural bed, sill, corbel, course, cornice, coping, weathering, throat, spalls, quoins, string course, lacing course, through stone, plinth, jambs – Classification of stone masonry – Rubble masonry : Coursed, un coursed & Random rubble masonry – Ashlar masonry– points to be considered in the construction of stone masonry – Tools used – Trowel, square, sprit level, plumb bob, chisel line & pins, spall hammer, punch, pitching tool. **3.4 BRICK MASONRY** Definition – Common terms used – Header, stretcher, bed joint, lap, perpend, closer, king, queen& bevelled, bat – permissible loads in brick masonry - Bond - Types – Header, stretcher, English bond & Flemish bond – one brick thick and one and a half brick thick– 'T' junction in English bond –Points to be considered in the construction of brick masonry – Cavity bond masonry- Defects in brick masonry – Maintenance of brick masonry.- Reinforced brick masonry – purpose – Its Advantage with respect to strength and Earthquake resistance.	

Unit	Name of the Topic	Hours
	3.5 PARTITION 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. **3.6 WATER PROOFING AND DAMP PROOFING** 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.	**13 Hrs**
IV	**4.1 DOORS, WINDOWS AND VENTILATORS** Standard sizes of doors and windows – Location of doors and windows – Different materials used – Doors – Component parts – Types – Framed and panelled – gazed, 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. **4.2 HOLLOW BLOCK CONSTRUCTIONS** 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 – Physical requirements – Use of light weight aggregates -Hollow concrete (Hollow Block) masonry –Construction of walls– Advantages of hollow concrete masonry. . **4.3 STAIRS** 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. **4.4 FLOORS AND FLOORING** Floors - Definition – Types – Timber, Composite, RCC floors – Flooring - Definition- Materials used – Selection of flooring – types – Construction Methods (As per C.P.W.D / P.W.D Specifications) - Mosaic, Granolithic, Tiled, Granite, Marble, Pre cast concrete flooring, Plastic & PVC tile flooring- – Carpet tile & Rubber flooring.	

Unit	Name of the Topic	Hours
V	**4.5 ROOFS** 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. **4.6 WEATHERING COURSE** 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. **5.1 POINTING** 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. **5.2 PLASTERING** Definitions – Objectives – Cement mortars for Plastering - Requirements of a good plaster – Methods of Plastering- Defects in plastering- Stucco plastering –Acoustic plastering – Granites silicon- plastering – Barium plastering – Asbestos marble plastering – Facade finishing (Structural Glazing)Sand faced – Pebble dash – Wall paper finishing–Wall tiling. **5.3 WHITE WASHING, COLOUR WASHING , DISTEMPERING, PAINTING & VARNISHING** White washing – preparation of surface – Application of white wash – Colour washing - Distempering – Preparation of surfaces – Application of distemper- Painting & Varnishing **-**Preparation of surface – Application of Painting & Varnishing. **5.4 ANTI-TERMITE TREATMENT** Definition – objectives and uses – Methods of termite treatment. **5.5 SCAFFOLDING, SHORING AND UNDER PINNING** Scaffolding – Definition – Component parts – Types – Single, double & Steel scaffolding, Shoring – Definition – Types – Raking, flying and dead shores – Underpinning – definition – Purpose – Types – Pit Methods – Pile Method. **5.6 FORM WORK** Definition – Materials used – Requirements of a good form work – Form work for column, RC beams and RC slab. **TEST & REVISION**	**13 Hrs** **10 Hrs**

Reference Book:

1. P.C.Varghese, “Building Materials”, Prentice-Hall of India (P) Ltd., I Edition, 2011.
2. S.K.Duggal, “Building Materials”, New Age International (P) Ltd., II Edition, 2003.
3. S.C.Rangwala, “ Building Materials”,Charotar Publishing House, VII Edition, 1982.
4. P.C.Varghese, “BuildingConstructions”, Prentice-Hall of India (P) Ltd., I Edition, 2011.
5. Dr. B.C. Punmia, “Building Construction”, Laxmi publications (p)Ltd New Delhi.
6. S.C.Rangwala, “ Building Construction”,Charotar Publishing House, VII Edition.
7. Ashokkumar Jain, “Building Construction”, Laxmi publications (p)Ltd Chennai.
8. I S 2185 Part I & II
9. PWD & CPWD Specifications.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 -2016 onwards

SURVEYING I

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31033

Semester : III Semester

Subject Title : **SURVEYING I**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
SURVEYING I	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	INTRODUCTION TO SURVEYING AND CHAIN SURVEYING	13
2	COMPASS SURVEYING	13
3	LEVELLING	13
4	LEVELLING (Contd.)	13
5	CONTOUR SURVEYING AND GLOBAL POSITIONING SYSTEM	13
6	TEST AND REVISION	10
	TOTAL	75

RATIONALE:

The important functions of a diploma civil engineer includes 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.

OBJECTIVES:

On completion of the course, the student will posses knowledge about :

- Chain surveying
- Compass surveying
- Levelling
- Contour surveying
- Global Positioning System

31033 SURVEYING I

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**INTRODUCTION TO SURVEYING AND CHAIN SURVEYING** **1.1 INTRODUCTION TO SURVEYING** Definition – Objectives and uses of surveying – Main Divisions of surveying – Plane and Geodetic surveying – Classification of Surveying - Principles of surveying. **1.2 CHAIN SURVEYING** 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 and Procedure of taking an offset – Conventional signs – Chain surveying: Equipments required, field work and recording field notes – Errors in chaining - Obstacles in chaining: Types – Tape correction and its necessity.	**13 Hrs**
II	**COMPASS SURVEYING** 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 - Local attraction **:** Detection, Correction and Problems - Dip and declination – Compass traversing – Errors in compass surveying.	**13 Hrs**
III	**LEVELLING** Levelling – Definition – Level – Parts – Functions – Accessories – Types of levels **:** Dumpy level, Modern Tilting 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, 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– Theory of Differential levelling (Fly 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.	**13 Hrs**

Unit	Name of the Topic	Hours
IV	**LEVELLING (CONTD.)** Types of levelling - Check levelling **:** Definition, Field Procedure and use - Profile levelling or Longitudinal section(L.S) **:** Definition, use, field procedure and plotting the profile - Cross-sectional levelling(C.S) **:** Definition, use, field procedure and plotting the cross-section – Specimen field book for L.S and C.S - Reciprocal levelling **:** Definition, use and problems on difference in elevation - Curvature and Refraction **:** Effects, correction and problems – Errors in levelling - Fundamental lines and desired relationship between them – Permanent adjustments of a dumpy level **:** Process.	**13 Hrs**
V	**CONTOUR SURVEYING AND GLOBAL POSITIONING SYSTEM** **5.1 CONTOUR SURVEYING** 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 – Calculation of capacity of reservoir **:** Simple problems. **5.2 GLOBAL POSITIONING SYSTEM (GPS)** 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. **TEST & REVISION**	**13 Hrs** **10 Hrs**

Reference Book :

1. Kanetkar.T.P. & S.V.Kulkarni, “Surveying and Levelling Part 1 & 2 ”, Puna vidyarthi griha, Prakashan, 23rd edition, 2008.
2. Punmia.B.C. Ashok K.Jain & Arun K. Jain, ”Surveying Volume I ”, Laxmi Publications Private Limited, 16th edition, 2011.
3. Mimi Das Saikia, Bhargab Mohan Das & Madan Mohan Das, “Surveying”, PHI Learning Private Limited, Edition 2010.
4. S. K. Roy, “Fundamentals of Surveying”, PHI Learning Private Limited, Edition 2010.
5. Learning Material Development Project – NITTTR, Taramani, Chennai, CD programme on GPS and GIS

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 -2016 onwards

CIVIL ENGINEERING DRAWING I

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31034

Semester : III Semester

Subject Title : **CIVIL ENGINEERING DRAWING I**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CIVIL ENGINEERING DRAWING I	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	INTRODUCTION	5
2	PLANNING OF BUILDING	5
3	BASIC DRAWINGS	10
4	BUILDING DRAWINGS	45
5	TEST AND REVISION	10
	TOTAL	75

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 student will be :

- Able to study Conventions and Abbreviations;
- Able to prepare layout of buildings;
- Gain thorough knowledge of the rules, regulations and standards of buildings;
- Able to read the line sketch and prepare plan, sections and elevations of buildings; and gain thorough knowledge of planning various types of buildings**.**

31034 CIVIL ENGINEERING DRAWING I

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**INTRODUCTION** **1. CONVENTIONS, SYMBOLS :** General – Conventions- Title block- Scales- Line work- Lettering- Symbols- Abbreviations **2. BUILDING BYE-LAWS AND SUBMISSION OF DRAWINGS** Objects of bye-laws- Importance of bye-laws- Function of local authority- Set backs- Plot Coverage- Number of floors- Height of building- Built up Area- Floor space index (FSI) - Views and details necessary for the preparation of a civil engineering drawing- Site Plan – Necessity for Approval of plans from local body- Layout plan and key plan-Requirements for submission of drawing for approval.	**5 Hrs**
II	**PLANNING OF BUILDINGS** **1 PLANNING OF RESIDENTIAL BUILDINGS** 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. **2 PLANNING OF INDUSTRIAL STRUCTURES** Planning aspects - Requirements of industrial units - Sheets for pitched roof coverings – Rolling Shutters - Ramps- Stores- Public Toilets/ Bath rooms- Dining / Resting halls- Ventilation and Lighting - Preparation of line drawing for given requirement with measurements (not to scale).	**5 Hrs**

	3 PLANNING OF PUBLIC BUILDINGS Types of public buildings - Miscellaneous public buildings - General requirements of Public Buildings -Landscape architecture-Preparation of line plan with dimensions for the given requirements (not to scale).	
III	**BASIC DRAWINGS** Standard symbols used in Civil Engineering Drawing. Draw the elevation of : 1) Fully panelled double leaf door. 2) Fully Panelled single leaf door 3) Flush door 4) Fully Panelled window with grill 5) Partly glazed and partly panelled window 6) Lean- to – roof 7) King post roof truss 8) Steel roof truss 9) Rain water Harvesting– Recharging into the ground (a) Shallow well system (b) Percolation pit system.	**10 Hrs**
IV	**BUILDING DRAWINGS** Preparation of plan, section and elevation of buildings with specifications for the given line drawing to suitable Scale: 1. A Reading room with R.C.C flat roof 2. A House with single bed room and attached bathroom with R.C.C. flat roof. 3. A residential building with two bed rooms with R.C.C. flat roof 4. A house with single bed and hall with partly tiled and partly R.C.C flat roof. 5. A Two roomed house with RCC slope roof with gable ends 6. A House with fully tiled roof with hips and valleys 7 . A Small workshop with north light steel roof truss (6 to 10m Span) over R.C.C. Columns. 8. A Primary health center for rural area with R.C.C roof. 9. A Village Library building with R.C.C flat roof 10. A small Restaurant building with R.C.C flat roof 11. A Single storeyed School building with R.C.C flat roof 12. A Bank building with R.C.C flat roof **REVISION & TEST**	**45 Hrs** **10 Hrs**

SCHEME OF EXAMINATION

Part A – (Unit I & Unit II - 2 X 3 , Unit III -1 X 9)	-	15 Marks
Part B - (Unit IV)	-	60 Marks

Reference Book :

1. National Building Code (NBC-2012)
2. TamilNadu District Municipal building rules and by-laws
3. B.P. Verma ,"Civil Engineering Drawing and house planning"
4. Dr N. Kumaraswamy and A. Kameswara Rao," Building Planning and Drawing",
5. G. Vaidhyanathan, I. Kulasekaran, G. sathish Kumar "Building Planning and Construction
   Companion",
6. S.C.Rangwala ,"Civil Engineering Drawing ",
7. V.R.Thothathri, "A Guide to Civil Engg Drawing.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 -2016 onwards

MATERIAL TESTING LAB I

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31035

Semester : III Semester

Subject Title : **MATERIAL TESTING LAB I**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
MATERIAL TESTING LAB PRACTICE I	3 Hrs	45Hrs	25	75	100	3 Hrs

RATIONALE:

The understanding of the structure, 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, and cements, Aluminium, Brass and Brick.

OBJECTIVES:

On completion of the course, the student will be familiar with:

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

Unit	Name of the Topic	Hours
Part A	1. Tension test on mild steel **/** deformed steel bars. 2. Deflection test on Simply Supported Beams of (a) wood and (b) steel to find Young's modulus 3. Torsion test on mild steel bar to determine the Modulus Rigidity. 4. Determination of the fineness of cement by Blains Permeability Apparatus or by sieve analysis. 5. Initial and final setting time of cement with Vicat's Apparatus. 6. Determination of normal consistency of cement by Vicat's . Apparatus.	**18 Hrs**
Part B	. 7. Finding Brinnel's / Rockwell's hardness numbers of the following materials.. (a) Mild steel (b) Brass (c) Aluminium. 8. Compression Test on Wooden cube . 9. Double Shear test on M.S.bar. 10. Impact Test on mild steel by performing Izod /Charpy tests 11. Compression test on Bricks /Solid Blocks. 12. Water absorption test on Bricks /pressed tiles. 13. Flexure test on Tiles.	**18 Hrs**
Part C	**(Not for Examination)** **14.** Demonstration of Strain gauges and Strain indicators. **15**. Demonstration of Soundness test on cement by Autoclave method.	**3 Hrs**
	. **REVISION & TEST**	**6 Hrs**

SCHEME OF EXAMINATION:

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

ALLOCATION OF MARKS

S.No	Description	Part - A Max. Marks(40)	Part - B Max.Marks(30)
1	Procedure	5	5
2	Tabulation and Observation	15	10
3	Calculations	10	5
4	Sketch / Graph	5	5
5	Accuracy of result	5	5

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.	Vicat needle apparatus (to conduct cement test)	4 nos
8.	Sieve (test) sets for cement IS sieve no 9(90 microns) made of brace 8 inches dia	2 nos
9.	Compression testing machine 100 tons capacity (electrical operated)	1 no
10.	Flexural Testing Machine for Tiles	1 no
11	Blains Permeability Apparatus	1 no

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 -2016 onwards

SURVEYING PRACTICE I

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31036

Semester : III Semester

Subject Title : **SURVEYING PRACTICE I**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
SURVEYING PRACTICE I	6 Hrs	90 Hrs	25	75	100	3 Hrs

RATIONALE:

The important functions of a diploma civil engineer includes 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 student can check his work and have an idea of the results 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 student:

- will have experience in handling surveying equipments and do practical exercises in Chain surveying, Compass surveying, , Levelling and GPS.

Unit	Name of the Topic	Hours
Part A	**1 CHAIN AND COMPASS SURVEYING** 1.1 Study of chain, tape and accessories used for chain survey. 1.2 Study of Prismatic compass, setting up over a station and observe bearings of lines. 1.3 Running closed traverse and finding the included angles – Use Chain / Tape and Compass. Minimum 5 points. 1.4 Determination of distance between two points when their base is accessible. Use Chain / Tape and Compass. 1.5 Determination of distance between two points when their base is inaccessible. Use Chain / Tape and Compass.	**21 Hrs**
	2 GLOBAL POSITIONING SYSTEM (GPS) 2.1. Reading of various Maps like Taluk map, District Map and Topo sheets. 2.2. Study of Hand held GPS. 2.3. Measurement of Latitude, Longitude and Altitude using hand held GPS. 2.4. Selection and marking of routings (Way points) using hand held GPS.	**15Hrs**
PART B	**3 LEVELLING** 3.1. Study of a Level - Temporary adjustment, taking readings and booking in a field book. 3.2. Fly levelling – Reduction by Height of Collimation method - Minimum 6 points with two change points (Minimum Four exercises) 3.3. Fly levelling – Reduction by Rise and Fall method - Minimum 6 points with two change points (Minimum Four exercises) 3.4. Fly levelling covering minimum 6 points with 2 inverted readings (Minimum Two exercises). 3.5. Check levelling and reduction of levels (Minimum 2 exercises)	**42 Hrs**
	REVISION & TEST	**12 Hrs**

In Board Examination, questions will be chosen as follows:

PART – A	By Lot i) Compass survey	- 25 Marks
	ii) GPS	- 10 Marks
PART – B	Levelling (Compulsory)	- 35 Marks
Viva-Voce		- 5 Marks
Record Marks		- 25 Marks
	TOTAL	**100 Marks**

ALLOCATION OF MARKS

S.No	Description	Part - A		Part - B Max. Marks(35)
		Max. Marks(25)	Max. Marks(10)	
1	Procedure, Handling Instruments / Tools	5	3	5
2	Field works, Observation and Tabulation	10	5	15
3	Calculations and Check / drawings.	7	0	12
4	Accuracy of result	3	2	3

S.NO.	LIST OF THE EQUIPMENTS	QUANTITY REQUIRED
SURVEYING PRACTICE –I		
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

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 -2016 onwards

COMMON TO ALL BRANCHES

COMPUTER APPLICATIONS PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU.

DIPLOMA IN COMPUTER ENGINEERING

M- SCHEME

(to be implemented for the student Admitted from the Year 2015-2016 on wards)

(Implemented from the academic year 2016-2017 onwards)

Course Name : For All Branches

Subject Code : 30001

Semester : III

Subject title : COMPUTER APPLICATIONS PRACTICAL

TEACHING & SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Course	Instruction		Examination			
			Max.			Duration
	Hours/ week	Hours/ Semester	Internal Assessment	Board Examination	Total	
COMPUTER APPLICATIONS PRACTICAL	4Hrs	60 Hrs	25	75	100	3Hrs

RATIONALE:

The application of Computer knowledge is essential the students of all disciplines of Engineering in addition to their respective branch of study. The Computer Application Practical course facilitates the necessary knowledge and skills regarding creating, working and maintaining the documents and presentation of documents with audio visual effects ina computer and produces necessary skills in E- Learning and Chatting tools..

OBJECTIVES:

On completion of the following exercises, the students will be able to

- Use the GUI operating systems
- Familiarize and customize the desktop
- Use the different facilities available in the word processor
- Prepare Power Point presentation with different formats
- Expose E-learning tools and chatting tools
- Analyze the datasheet
- Create and manipulate the database
- Create different types of charts
- Prepare PowerPoint presentation

- Understand Internet concepts and usage of e-mail

GUIDELINES:

- All the experiments given in the list of experiments should be completed and all the experiments should include for the end semester practical examination.
- The computer systems should be 1:1ratioforpracticalclasses

SYLLABUS
LAB EXERCISES
SECTION – A

GRAPHICAL OPEARTING SYSTEM

Introduction to GUI OS; Features and various versions of GUI OS & its use; Working with GUI OS; My Computer & Recycle bin ; Desktop, Icons and Explorer; Screen description & working styles of GUI OS; Dialog Boxes & Toolbars; Working with Files & Folders; simple operations like copy, delete, moving of files and folders from one drive to another, Shortcuts &Autostart; Accessories and Windows Settings using Control Panel- setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & Program lists; Installing and Uninstalling new Hard ware & Software program on your computer - Copying in CD/DVD settings – Recording Audio files.

Exercises

1. a. Installing screen saver and change the monitor resolution by 1280X960
   b. Setting wall papers
   c. Creating, moving, deleting and renaming a folder
   d. Copy, paste and cut a folder/file
   e. Displaying the properties for a file or folder
2. a. Restoring files and folders from Recycle bin
   b. Creating short cuts for folder/file
   c. Finding a file or folder by name
   d. Selecting and moving two or more files/folders using mouse
   e. Sorting folders/files.

WORD PROCESSING

Introduction to Word Processing – Examples- Creation of new documents, opening document, insert a document into another document. Page setup, margins, gutters, font properties, Alignment, page breaks, header footer deleting, moving, replace, editing text in document. Saving a document, spell checker.

Printing a document. Creating a table, entering and editing, Text in tables. Changing format of table, height width of row or column. Editing, deleting Rows, columns in table. Borders, shading, Templates, wizards, drawing objects, mail merge.

Exercises

3. Create the following table and perform the operations given below

DAYS	1	2	3	4	5	6	7	8
MON	←TEST→		**A**: JPP **B**:RDBMS			CA	RDBMS	TUT
TUE	CA	OOP	CN	RDBMS	**A**: RDBMS **B**: JPP			
WED	CN	RDBMS	OOP	RDBMS	COMMUNICATIO N		CN	CA
THU	OOP	**A**: JPP **B**: RDBMS			CA	RDBMS	CN	OOP
FRI	COMMUNICATI ON		**A**: RDBMS **B**: JPP		OOP	CN	RDBMS	CA
SAT	OOPS	RDBMS	CN	CA	---------			

4. Create a standard covering letter and use mail merge to generate the customized letters for applying to a job in various organizations. Also, create a database and generate labels for the applying organizations.
5. Create a news letter of three pages with two columns text. The first page contains some formatting bullets and numbers. Set the document background colour and add 'confidential' as the watermark. Give the document a title which should be displayed in the header. The header/ footer of the first page should be different from other two pages. Also, add author name and date/ time in the header. The footer should have the page number.

SPREADSHEET

Introduction to Analysis Package – Examples - Concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options.

Exercises

6. Create a result sheet containing Candidate's Register No., Name, Marks for six subjects. Calculate the total and result. The result must be calculated as below and failed candidates should be turned to red.

   Result is Distinction if Total >= 70 %

   First Class if Total > = 60 % and < 70 %

   Second Class if Total >= 50 % and < 60 %

Pass if Total >= 35 % and < 50 %

Fail otherwise

Create a separate table based on class by using auto filter feature.

7. Create a table of records with columns as Name and Donation Amount. Donation amount should be formatted with two decimal places. There should be at least twenty records in the table. Create a conditional format to highlight the highest donation with blue color and lowest donation with red colour. The table should have a heading.

8. Create line and bar chart to highlight the sales of the company for three different periods for the following data.

SALES BAR CHART

Period	Product1	Product2	Product3	Total
JAN	35	40	50	125
FEB	46	56	40	142
MAR	70	50	40	160

SECTION – B

DATABASE

Introduction – Menus – Tool bar – Create – Edit – Save – Data types – Insert – Delete – Update – View – Sorting and filtering – Queries – Report – Page setup – Print.

Exercises

9. Create Database to maintain at least 10 addresses of your class mates with the following constraints

- Roll no. should be the primary key.
- Name should be not null

10. create a students table with the following fields: Sr.No, Reg. No, Name, Marks in 5 subjects. Calculate total and percentage of 10 students. Perform the following queries.

- To find the details of distinction student
- To find the details of first class students
- To find the details of second class students

11. Design a report for the above exercise to print the consolidated result sheet and mark card for the student.

PRESENTATION

Introduction - Opening new presentation, Parts of PowerPoint window – Opening -Saving and closing presentations - Features of PowerPoint, Background design, Word art, Clip art, Drawings,3D settings - Animations, Sound, Views, types of views - Inserting and deleting slides, arranging slides, slides show, rehearsal, setup show, custom show - Creating custom presentations, action setting, auto content wizard, working with auto content wizard

Exercises

12. Make a marketing presentation of any consumer product with at least 10 slides.
    Use different customized animation effects on pictures and clip art on any four of the ten slides.
13. Create a Presentation about our institution or any subject with different slide transition with sound effect.

INTERNET

Introduction – Getting acquainted with Internet Connection - Browsers – Website URL - Open a website – Net Browsing - Email: Creating E-mail id – Sending , receiving and deleting E-mail - Email with Attachments – CC and BCC - Chatting – Creating Group mail - Google docs – Search Engines – Searching topics .

Most Popular Social Networking Sites : History – Features – Services – Usage of Face book , Twitter and Linkdln.

Transferring data through wifi / bluetooth among different devices.

Introduction to cybercrime – Software Piracy – Viruses – Antivirus Software

Exercises

14. Create an e-mail id and perform the following
    - Write an e-mail inviting your friends to your Birthday Party.
    - Make your own signature and add it to the e-mail message.
    - Add a word attachment of the venue route
    - Send the e-mail to at least 5 of your friends.

15. Create a presentation on Google docs. Ask your friend to review it and comment onit. Use "Discussion" option for your discussions on the presentation.

Hardware and Software Requirements

Hardware Requirements:

- Computers – 36Nos
    - Intel Core i3 Processor
    - 500 GB Hard Disk, 2 MB RAM
    - 14" Monitor
- Projector – 1 Nos
- Laser Printer – 1 No
- Internet Connection – Minimum of 512 KB

Software Requirement

- Any GUI Operating System
- Open Source Software / MS- Office

1. SemesterEndExamination–75 Marks

Content	Max.Marks
Writing Procedure – One Question from Section A	15
Demonstration	15
Results with Printout	5
Writing Procedure – One Question from Section B	15
Demonstration	15
Results with Printout	5
Viva voce	5
Total	**75MARK**

IV SEMESTER

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 -2016 onwards

THEORY OF STRUCTURES

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31041

Semester : IV Semester

Subject Title : **THEORY OF STRUCTURES**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
THEORY OF STRUCTURES	6 Hrs	90 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	SLOPE AND DEFLECTION OF BEAMS PROPPED CANTILEVERS	16
2	FIXED BEAMS CONTINUOUS BEAMS – THEOREM OF THREE MOMENTS METHOD	16
3	CONTINUOUS BEAMS – MOMENT DISTRIBUTION METHOD PORTAL FRAMES - MOMENT DISTRIBUTION METHOD	16
4	COLUMNS AND STRUTS COMBINED BENDING AND DIRECT STRESSES	16
5	MASONRY DAMS	16

	EARTH PRESSURE AND RETAINING WALLS	
6	TEST AND REVISION	10
	Total	90

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 student will be familiar with:

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

IV SEMESTER

31041 THEORY OF STRUCTURES

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**1.1 SLOPE AND DEFLECTION OF BEAMS** 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 & 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 **1.2 PROPPED CANTILEVERS** 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.	16 Hrs
II	**2.1 FIXED BEAMS – AREA MOMENT METHOD** 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.	16 Hrs

Unit	Name of the Topic	Hours
II	**2.2 CONTINUOUS BEAMS – THEOREM OF THREE MOMENTS METHOD** 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.	
III	**3.1 CONTINUOUS BEAMS – MOMENT DISTRIBUTION METHOD** 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 – 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. **3.2 PORTAL FRAMES – MOMENT DISTRIBUTION METHOD** Definition of Frames – Types – Bays and Storey - Sketches of Single/Multi Storey 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.	16 Hrs

Unit	Name of the Topic	Hours
IV	**4.1 COLUMNS AND STRUTS** 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. **4.2 COMBINED BENDING AND DIRECT STRESSES** 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	16 Hrs
V	**5.1 MASONRY DAMS** 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. **5.2 EARTH PRESSURE AND RETAINING WALLS** 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 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. **REVISION & TEST**	16 Hrs 10 Hrs

REFERENCE:

1. S. Ramamrutham, “Theory of structures”
2. B.C. Punmia, Ashok Jain & Arun Jain,” Theory of structures “,Laxmi Publications, 9th Edition, April1992.
3. S.B. Junnarkar, Mechanics of structures (Vol.II) Charator Publiching,22nd Edition,1997
4. V.N. Vazirani & M.M. Ratwani, “Analysis of structures”
5. R.L. Jindal , “Elementary Theory of Structures”
6. FV. Warnock, “Strength of materials”
7. Madhan Mohan Dass, “ Structural Analysis” PHI Learning Pvt. Ltd., New Delhi.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 -2016 onwards

TRANSPORTATION ENGINEERING

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31042

Semester : IV Semester

Subject Title : **TRANSPORTATION ENGINEERING**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
TRANSPORTATION ENGINEERING	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS :

Sl. No.	TOPIC	Time (Hrs)
1	HIGHWAY ENGINEERING	13
2	HIGHWAY ENGINEERING (Contd.)	13
3	RAILWAY ENGINEERING	13
4	RAILWAY ENGINEERING (Contd.)	13
5	BRIDGE ENGINEERING	13
6	TEST AND REVISION	10
	Total	75

RATIONALE:

Construction of roads is one of the area 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 to 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 student will be familiar with:

- To study about the importance of the roads , Development of roads, Classification of roads
- To know about highway pavements , Geometrical design , Traffic controls , Road Arboriculture and Highway Lighting
- To study about highway alignment , Road machineries and Construction of different types of Roads
- To study about Railway fixtures , Types of stations , Signalling and Control of movement of trains
- To study about Maintenance of Track and Rapid Transport System of Railways
- To Know about Bridges , Classifications and its Components

31042 TRANSPORTATION ENGINEERING

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**HIGHWAY ENGINEERING** **1.1 INTRODUCTION** 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. **1.2 HIGHWAY PAVEMENTS** 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.) **1.3 GEOMETRICAL DESIGN OF HIGHWAYS** 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. **1.4 TRAFFIC ENGINEERING** 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. **1.5 SUB GRADE SOIL** 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. **1.6 ROAD ARBORICULTURE AND LIGHTING** Objects of Arboriculture - Selection of trees - Location of trees - Highway lighting - Benefits.	13 Hrs

II	**HIGHWAY ENGINEERING (Contd.)** **2.1 HIGHWAY ALIGNMENT AND SURVEYS** 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. **2.2 ROAD MACHINERIES** Excavating equipments - Tractor, Bull dozer, Grader, Scraper, J C B - Compaction equipments - Road roller - Types and description - Equipment for Bituminous road. **2.3 LOW COST ROADS** General - Classifications - Earthen road, Gravel road, Water Bound Macadam roads - Construction with sketches - Advantages and disadvantages - Maintenance - Soil stabilization - Methods. **2.4 BITUMINOUS ROADS** General - Advantages and disadvantages - Bituminous materials used - Types of Bituminous roads - Surface dressing - Types - Bituminous Concrete - Maintenance of Bituminous roads. **2.5 CEMENT CONCRETE ROADS** General - Advantages and disadvantages - Methods of construction of cement concrete roads with sketches - Construction procedure for concrete roads. **2.6 HILL ROADS** Factors considered in alignment - Formation of hill roads - Hair pin bends - Retaining and Breast walls.	13 Hrs

III	**RAILWAY ENGINEERING** **3.1 INTRODUCTION** Introduction to Railways - Classifications of Indian Railways - Rail Gauges - Types - Uniformity in gauges - Loading gauge - Construction gauge. **3.2 RAILS** 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. **3.3 SLEEPERS AND BALLAST** 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. **3.4 RAIL FASTENINGS AND PLATE LAYING** 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. **3.5 MAINTENANCE OF TRACK** Necessity - Maintenance of Track, Bridges and Rolling stock.	13 Hrs
IV	**RAILWAY ENGINEERING (Contd.)** **4.1 STATIONS AND YARDS** 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. **4.2 STATION EQUIPMENTS** 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. **4.3 POINTS AND CROSSINGS** Purpose - Some definitions - Turnouts - Right hand and left hand turnouts -Sleepers laid for points and crossings - Types of switches - Crossings - Types of crossings.	13 Hrs

	4.4 SIGNALLING 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. **4.5 INTERLOCKING** Definition - Principles of interlocking - Methods of interlocking - Tappets and locks system - Key system - Route relay system - Improvements in interlocking and signalling. **4.6 RAPID TRANSPORT SYSTEM** General - Underground railways - Advantages - Tube railways - Its features.	
V	**BRIDGE ENGINEERING** **5.1 INTRODUCTION** 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. **5.2 FOUNDATIONS** Functions of foundation - Types of foundations - Selection of foundations - Control of ground water for foundation - Caisson foundation - Coffer dam – Types. **5.3 CLASSIFICATION OF BRIDGES** Classification according to IRC loadings , Materials , Bridge floor , Type of superstructure - Culverts and Cause ways - Classifications with sketches - Conditions to construct causeways. **5.4 SUBSTRUCTURE** Abutments - Types - Piers - Types - Wing walls - Types. **5.5 SUPERSTRUCTURE** 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. **5.6 BRIDGE BEARINGS** Definition - Purpose - Importance of bearings - Types of bearings – Elastomer bearings. **TEST & REVISION**	13 Hrs 10 Hrs

REFERENCE:

1. RANGWALA, “Highway Engineering” , Charotor Publishing House Pvt. Ltd., Edition 2010
2. RANGWALA, “Railway Engineering” , Charotor Publishing House Pvt. Ltd., Edition 2010
3. RANGWALA, “Bridge Engineering” , Charotor Publishing House Pvt. Ltd., Edition 2009
4. S P CHANDOLA, “A Text Book of Transportation Engineering” S Chand & Company Ltd.,
5. G V RAO, “Principles of Transportation & Highway Engineering” Tata McGraw-Hill Publishing Company Ltd.,
6. Madhan Mohan Dass, “Structural Analysis” PHI Learning Pvt. Ltd., New Delhi.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 -2016 onwards

SURVEYING II

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31043

Semester : IV Semester

Subject Title : **SURVEYING II**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
SURVEYING II	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	THEODOLITE SURVEYING	16
2	TACHEOMETRIC SURVEYING	13
3	TRIGONOMETRICAL LEVELLING REMOTE SENSING, PHOTOGRAMMETRIC SURVEYING AND HYDROGRAPHIC SURVEYING	13
4	CURVES	12
5	TOTAL STATION AND GIS	11
6	TEST AND REVISION	10
	Total	75

RATIONALE:

The important functions of a civil technician includes 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, Tacheometric surveying, Trigonometric surveying that the Civil Engineering diploma holder will normally be called upon to perform.

OBJECTIVES:

On completion of the course, the student will posses knowledge about :

- Theodolite surveying
- Tacheometric surveying
- Trignometric Surveying
- Curve setting
- Basics of Remote sensing
- Photogrammetric surveying
- Hydrographic surveying
- Total Station
- Geographical Information system

31043 SURVEYING II

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**THEODOLITE SURVEYING** 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 – Fundamental lines and relationship between them – 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 – Balancing the traverse - Omitted measurements – Problems	**16 Hrs**
II	**TACHEOMETRIC SURVEYING** 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 – Simple problems – Distomats (Description only) – Direct reading tacheometers - Determination of constants of a tacheometer : Problems – Tacheometric traverse – Errors in tacheometric surveying.	**13 Hrs**
III	**3.1 TRIGONOMETRICAL LEVELLING** Introduction – Finding elevation of objects – Base accessible - Base inaccessible: Single Plane and Double Plane methods – Problems on determination of elevation of objects. **3.2 REMOTE SENSING, PHOTOGRAMMETRIC SURVEYING AND HYDROGRAPHIC SURVEYING** Remote sensing – Definition – Basic Process – Methods of remote sensing – Applications -Photogrammetric Surveying –	**13 Hrs**

	Definition – Terrestrial and Aerial photographs – Applications - Hydrographic surveying – Definition- Uses – Sounding: Definition, Purpose, Instruments needed – Steps in hydrographic surveying.	
IV	**CURVES** Introduction – Types of curves – Designation of curves – Elements of simple circular curve – Setting out simple circular curve by: Offsets from long chords, Offsets from tangents, Offsets from chords produced and Rankine's method of deflection angles – Simple problems – Transition curves : Objectives – Vertical curves : Definition and types.	**12 Hrs**
V	**TOTAL STATION AND GEOGRAPHICAL INFORMATION SYSTEM** **5.1 TOTAL STATION** 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 – Instrument preparation, Setting and Measurement (Distance, Angle, Bearing etc.) – Field procedure for co-ordinate measurement – Field procedure to run a traverse survey - Linking data files for various Applications. **5.2 GEOGRAPHICAL INFORMATION SYSTEM (GIS)** Introduction – Geographical information – Development of GIS – Components of GIS – Steps in GIS mapping - Ordinary mapping to GIS – Comparison of GIS with CAD and other system – Fields of Applications : Natural resources, Agriculture, Soil, Water resources, Wasteland management and Social resources – Cadastral survey and Cadastral records – Land Information System(LIS). **REVISION AND TEST**	**11 Hrs** **10 Hrs**

Reference Book:

1. Kanetkar.T.P. & S.V.Kulkarni, "Surveying and levelling part 1 & 2 ", Puna vidyarthi griha, Prakashan,23rd edition, Reprint 2008.
2. Punmia.B.C, Ashok K.Jain & Arun K. Jain,"Surveying Volume I", Laxmi, Publications Private Limited., 16the edition, 2011.
3. Punmia.B.C, Ashok Jain & Arun K. Jain,"Surveying Volume II & III", Laxmi, Publications Private Limited., 15th edition, 2011.
4. Mimi Das Saikia, Bhargab Mohan Das & Madan Mohan Das, "Surveying", PHI Learning Private Limited, Edition 2010.
5. S. K. Roy, "Fundamentals of Surveying", PHI Learning Private Limited, Edition 2010.
6. Sathesh Gopi, R.Sathikumar & N.Madhu, Advanced Surveying, (Total Station, GIS, Remote Sensing), Pearson Education, Chennai, 2007.

7. M.Anji Reddy, Remote sensing and Geographical information system, B.S Publications, Edition 2006.
8. Burrough P A, Principles of GIS for Land Resources Assessment, Oxford Publication, 2000.
9. Learning Material Development Project – NITTTR, Taramani,Chennai, CD programme on GPS and GIS.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 -2016 onwards

ESTIMATING AND COSTING I

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31044

Semester : IV Semester

Subject Title : **ESTIMATING AND COSTING I**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
ESTIMATING AND COSTING I	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS :

Sl. No.	TOPIC	Time (Hrs)
1	INTRODUCTION APPROXIMATE ESTIMATES	12
2	AREAS AND VOLUMES EMBANKMENTS AND CUTTINGS	12
3	ANALYSIS OF RATES	15
4	TAKING OFF QUANTITIES BY TRADE SYSTEM	13
5	TAKING OFF QUANTITIES BY GROUP SYSTEM	13
6	TEST AND REVISION	10
	Total	75

RATIONALE:

Diploma holders in Civil Engineering are supposed to prepare material 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, contracting principles of valuation. Therefore, this subject has great importance for diploma holders in Civil Engineering.

OBJECTIVES:

On completion of the course, the student will be familiar with:

- Different types of estimates, different systems of estimating in use;
- To determine the quantity of earth work in embankment and cuttings;
- To determine the rates for different items of works;
- To determine the quantities of different items of works in the construction of buildings using Trade and Group systems

31044 ESTIMATING AND COSTING I

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**1.1 INTRODUCTION** Estimation- Definition of Estimate- Necessity of Estimates- Importance of fair estimation- Duties and requirements of a good Quantity Surveyor- Types of Estimates- Approximate and Detailed Estimates- Main and Sub Estimates- Revised Estimates-Supplementary Estimates – Maintenance/Repair Estimates-Taking off Quantities- Trade and Group Systems- Merits of Trade/ Group systems- Stages in Detailed Estimation- Units of measurements for materials and works-Degree of accuracy in measurements- Measurement Books- Deduction for openings in masonry/plastering/colour washing works- Painting Coefficients- Categories of Labourers- Material requirements for different items of works- Labour requirement for different items of works- Standard Data Book- Task or Out turn of labourers - Cost of materials and wages of labour- Schedule of Rates- Revision of rates- Market Rates- Lead- Cost of conveyance- Handling charges –Lump sum and Contingency provisions in Estimates- Abstract Estimates. **1.2 APPROXIMATE ESTIMATES** Necessity of Approximate Estimates- Types – Service Unit method- Plinth Area method- Carpet Area method- Cubical Content method- Typical Bay method- Rough Quantity method- Examples for each method- Problems on preparation of Preliminary/Approximate Estimates for building projects.	**12 Hrs**
II	**2.1 AREAS AND VOLUMES** Areas of regular and irregular sections- Computation of Areas of Irregular figures- End Ordinate rule, Mid Ordinate rule, Average Ordinate rule, Trapezoidal rule, Simpson's rule- Problems- Volumes of regular and irregular solids- Computation of Volumes of Irregular solids- End Area rule, Mid Area rule, Average Area or Mean Area rule, Trapezoidal rule, Simpson's or Prismoidal rule. **2.2 EMBANKMENTS AND CUTTINGS** Areas of cross sections of embankments of roads, tank bunds etc – Level Section and Two level Section- Areas of cross	**12 Hrs**

	sections of cuttings of canals, drains etc- Level Section and Two level Section- Determination of Volume of Earth work in Embankment / Cutting with level sections of varying heights/ depths or with two level sections of uniform height/ depth.	
III	**ANALYSIS OF RATES** Analysis of Rates or Preparation of Data for the following Building works using Standard Data Book: 1) Cement/ Lime mortars; 2) Plain Cement Concrete in Foundation/ Leveling Course; 3) Flooring with cement concrete, plastered with cement mortar; 4) Flooring with PCC finished with ellis pattern cement concrete surface; 5) Flooring with Cuddapa slabs; 6) Mosaic/ Ceramic tiled flooring; 7) Brickwork in cement mortar in foundation; 8) Brickwork in CM in super structure; 9) Brickwork in CM in partition with plastering; 10) Random rubble masonry in CM; 11) Coursed rubble masonry in CM; 12) Lime-Surki concrete in Weathering course finished with pressed tiles in CM; 13) Reinforced cement concrete in Slabs (per unit volume/unit area); 14) R.C.C in Beams; 15) R.C.C in Columns; 16) R.C.C in Sunshades; 17) Plastering Brick masonry with CM; 18) Pointing Stone masonry with cement mortar; 19) Painting the wood work; 20) Painting Steel work; 21) White/ Colour washing the plastered surfaces; 22) Form works (strutting, centering, shuttering etc) for Slabs/Beams/ Columns; 23) Fabrication of Steel Reinforcement; 24) A.C Sheet roofing; 25) Supplying and fixing Rain water pipes – Exercises.	**15 Hrs**
IV	**TAKING OFF QUANTITIES BY TRADE SYSTEM** General- Methods of taking off quantities- Individual wall method- Centre line method- Examples- Entering the dimensions- Standard forms for entering Detailed measurements and Abstract estimates- Rounding of quantities. Preparing Detailed Estimate using Trade System and Take off quantities for all items of works in the following types of Buildings: A small Residential building with Two/Three rooms with RCC flat roof A small Residential building with Two/Three rooms with RCC sloped roof A Two Storied Commercial building (framed structure) with RCC	**13 Hrs**

	flat roof A Community hall with RCC columns and T-beams A small Industrial building with AC/ GI sheet roof on Steel Trusses	
V	**TAKING OFF QUANTITIES BY GROUP SYSTEM** General- Standard method of measurement- Taking off and Recording the dimensions- Order of Taking off- Dimension Paper- Entering dimension paper- Spacing dimensions- Descriptions - Cancellation of Dimensions - Squaring Dimensions- Method of Squaring- Checking the Squaring- Casting up the dimensions- Abstracting and Billing-Function of abstract- Use of Abstract sheets- Order of Abstracting- Preparing the Abstract –Checking the Abstract – Casting and Reducing the Abstract- Writing the bill- Method of writing the bill- Checking the Bill. Preparing Detailed Estimate using Group System and Take off quantities for all items of works in the following types of Buildings: A small Residential building with Two/Three rooms with RCC flat roof A small Residential building with Two/Three rooms with RCC sloped roof A Community hall with RCC columns and T-beams (Note: The same drawings of Unit 4 may be practiced and quantities compared) REVISION AND TEST	13 Hrs 10 hrs

Reference Book :

1. Rangawala, “Estimating & Costing” , Charotor Publishing;
2. N.A.Shaw, “Quantity Surveying & Valuation”, Khanna Publishers;
3. L.N.Dutta, “Estimating & Costing”, Dhanpat Rai & Sons
4. Bridie, “Estimating & Costing”
5. Indian Standard Code of Practice, IS:1200.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 -2016 onwards

MATERIAL TESTING LAB II

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31045

Semester : IV Semester

Subject Title : **MATERIAL TESTING LAB II**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
MATERIAL TESTING LAB PRACTICE II	3 Hrs	45 Hrs	Internal Assessment	Board Examination	Total	
			25	75	100	3 Hrs

RATIONALE:

The understanding of the structure, 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 sand, clay, fine aggregates, course aggregates and water.

OBJECTIVES:

On completion of the course, the student will be familiar with:

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

LIST OF EXPERIMENTS

PART A 18 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 clay.
6. Direct shear test on sand.
7. Field Density of Soil by core cutter method / sand replacement method.

PART B 12 Hours

8. Attrition test on Aggregate.
9. Abrasion test on Aggregate.
10. Aggregate crushing value test.
11. Aggregate impact value test.

PART C 12 Hours

12. Determination of Total solids present in the given sample of water.
13. Determination of Turbidity of water by "Jackson candle turbidity meter."
14. Determination of settleable solids present in the given sample of water/ waste water by "Imhoff cone."
15. Determination of Water absorption of coarse aggregate.

REVISION & TEST 3 Hours

SCHEME OF EXAMINATION :

In the examination, each student has to be given either a Single question from Part A (or) TWO questions, ONE from Part B and ONE from Part C.

ALLOCATION OF MARKS

PART A	70 marks
OR	
PART B	40 marks
PART C	30 marks
VIVA VOCE	05 marks
RECORD	25 marks
Total	100 Marks

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
12.	Core Cutter	1 no
13.	Oven	1 no

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 -2016 onwards

SURVEYING PRACTICE II

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31046

Semester : IV Semester

Subject Title : **SURVEYING PRACTICE II**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
SURVEYING PRACTICE II	6 Hrs	90 Hrs	25	75	100	3 Hrs

RATIONALE:

The important functions of a civil technician includes 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 experience in handling surveying equipments
- Do practical exercises in Theodolite surveying,
- Do Tachometric surveying
- Do surveying using Total station.

31046 SURVEYING PRACTICE II

LIST OF EXPERIMENTS

PART A: THEODOLITE SURVEYING 42 Hrs

1. Study of a Theodolite - Temporary adjustments – Reading horizontal angles.
2. Measurement of horizontal angle by:
    a. Reiteration method (not for Exam)
    b. 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 Thedolite 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. Run closed theodolite traverse - Measuring length, included angles, and bearing at initial station. Plot the traverse.
6. Measurements of vertical angles to different points.
7. Determination of Elevation of an object when the base is accessible.
8. Determination of Elevation of an object when the base is inaccessible by :
    a) Single plane method
    b) Double plane method.

PART B: TACHEOMETRIC SURVEYING 18 Hours

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

PART C: TOTAL STATION **18 Hrs**

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

REVISION & TEST **12 Hours**

SURVEY CAMP : (Outside the Campus)

Duration: 7 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 30 acres outside 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.

15 marks to be allotted for Survey file in the Board Examination.

Works to be conducted 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.

ALLOCATION OF MARKS

PART- A & B By Lot One question **- 35 Marks**
(Either Theodolite surveying or in Tacheometry surveying)

PART- C One question **- 20 Marks**

Survey Camp **- 15 Marks**

Viva-Voce **- 5 Marks**

Record Marks **- 25 Marks**

TOTAL **100 Marks**

S.No	Description	Part – A & B Max. Marks (35)	Part – C Max. Marks (20)
1	Procedure, Handling Instruments / Tools	5	3
2	Field works, Observation and Tabulation	15	7
3	Calculations and Check	10	7
4	Accuracy of result	5	3

SURVEYING PRACTICE-II		
Sl.No.	LIST OF EQUIPMENTS REQUIRED	QUANTITY REQUIRED
1.	Vernier Theodolite	6 nos
2.	Total Station	3 nos

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 -2016 onwards

CAD IN CIVIL ENGINEERING DRAWING I

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name **:** Diploma in Civil Engineering

Subject Code **:** 31047

Semester **:** IV Semester

Subject Title **:** **CAD IN CIVIL ENGINEERING DRAWING I**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CAD IN CIVIL ENGINEERING DRAWING PRACTICE I	4 Hrs	60 Hrs	25	75	100	3 Hrs

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 student will be able:

- To know about CAD commands
- To understand building components
- To draw building drawing using CAD software
- To prepare approval drawing for submission to authority

31047 CAD IN CIVIL ENGINEERING DRAWING PRACTICE I

LIST OF EXPERIMENTS

Preparation of drawing using CAD Software

Introduction of CAD software for Preparation of Drawings **4 Hours**

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

PART A **12 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 **40 Hours**

Draw the building drawing using available CAD software

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

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

a) Site Plan (Land boundary, Building boundary, Car Parking, Passage, sanitary layout, septic tank location etc.
b) G.F. Plan, F.F. Plan, Section and Elevation(line diagram is enough)
c) Key Plan
d) Septic tank Plan and section (line diagram)
e) Rain water harvesting pit (with all detail)
f) Typical foundation details (Column foundation or spread footing)
g) Title block showing – joinery details, Specification, Area statement, colour Index, Title of the property, space for owners Signature and Licensed Surveyor's Signature with address.

REVISION & TEST **4 Hours**

IN BOARD EXAMINATION, QUESTIONS WILL BE CHOSEN AS FOLLOWS

PART –A	By lot one question	30 marks
PART – B	By lot one question	40 marks
Viva - voce		5 marks
Record works		25 marks
Total		100 marks

S.NO.	LIST OF THE EQUIPMENTS	QUANTITY REQUIRED
1.	Computers	30 Nos.
2.	Laser printer	3 Nos.
3.	CAD software	30 Users

V SEMESTER

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 -2016 onwards

STRUCTURAL ENGINEERING

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name **:** Diploma in Civil Engineering

Subject Code : 31051

Semester **:** V Semester

Subject Title **:** **STRUCTURAL ENGINEERING**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
STRUCTURAL ENGINEERING	6 Hrs	90 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	REINFORCED CEMENT CONCRETE STRUCTURES	16
2	DESING OF T-BEAMS AND LINTELS FOR FLEXURE BY LSM DESIGN OF CONTINUOUS BEAMS FOR FLEXURE AND SHEAR BY LSM	16
3	DESIGN OF ONE WAY SLABS AND STAIR CASES BY LSM DESIGN OF TWO WAY SLABS BY LSM	16
4	DESIGN OF COLUMNS BY LSM DESIGN OF COLUMN FOOTINGS	16
5	STEEL STRUCTURES	16

6	TEST AND REVISION	10
	TOTAL	90

RATIONALE:

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise RCC construction. He may also be required to design simple structural elements, make changes in design depending upon 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.

21051 STRUCTURAL ENGINEERING

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**REINFORCED CEMENT CONCRETE STRUCTURES** **1.1 INTRODUCTION TO WORKING STRESS AND LIMIT STATE METHOD** 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. 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). 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. **1.2 DESIGN OF RECTANGULAR BEAMS FOR FLEXURE BY L.S.M** Design requirements-Effective spans of cantilever and simply supported beams – Breadth and depth requirements of beams – Control of deflection – Minimum depth requirement for stiffness – Minimum concrete cover to reinforcement steel for durability and fire resistance – Minimum and maximum areas/ spacing for main reinforcement and side face reinforcement as per IS 456 -2000 - Development Length-Anchorage values of bends and hooks - Curtailment of reinforcements- Design bending moments –	**16 Hrs**

	Design of singly and doubly reinforced rectangular beams (Cantilevers and Simply supported beams carrying point loads and u.d.l only)- Problems- Practice on using Design Aids, SP16 (not for examination).	
II	**2.1 DESIGN OF T-BEAMS AND LINTELS FOR FLEXURE BY L.S.M** Cross sections of Tee and L-beams- Effective width of flange- Neutral Axis and M.R of Singly Reinforced T-Sections- Design of singly reinforced T-beams/L-beams for flexure–Problems on Cantilevers (Inverted-T) and Simply supported T- beams – Loads on Isolated Lintels over openings of masonry walls - Design B.M for isolated lintels carrying rectangular/triangular loads- Design of Lintel- Simple problems **2.2 DESIGN OF CONTINUOUS BEAMS FOR FLEXURE AND SHEAR BY L.S.M** Methods of analysis of continuous beams- Effective Span- Arrangement of Loading for Critical Bending Moments- B.M coefficients specified by IS:456-200-Design of rectangular continuous beams (Singly and Doubly Reinforced) using B.M. coefficients (equal spans & u.d.l only) for sagging and hogging moments. Limit state of collapse in shear – Design shear strength of concrete – Design shear strengths of vertical / inclined stirrups and bent up bars –Principle of shear **design –** Critical sections for shear- S.F Coefficients specified by IS:456- 2000– Nominal shear stress –Minimum shear reinforcement- Design of vertical stirrups, inclined stirrups and bent up bars for rectangular beams using limit state method –Simple problems- Practice on use of Design Aids (not for examination).	**16 Hrs**
III	**3.1 DESIGN OF ONE WAY SLABS AND STAIRCASES BY L.S.M** Classification of Slabs – Effective spans – Loads (DL and IL) on floor/roof slabs and stairs (IS: 875-1987) – Strength and Stiffness requirements –Minimum and maximum permitted size, spacing and area of main and secondary reinforcements as per IS 456 - 2000- Cover requirement to reinforcements in slabs- Design of cantilever/simply supported one way slabs and sunshades by limit state method – Design of continuous slabs using B.M coefficients- Check for shear and stiffness – Curtailment of tension reinforcement –Anchoring of reinforcement– Practice in designing slabs using design aids (not for examination). Types of stairs according to structural behaviour- Requirements of Stairs- Planning a staircase – Effective span of stairs –	**16 Hrs**

	Effective breadth of flight slab- Distribution of loads on flights – Design of cantilever steps – Design of doglegged and Open well stairs spanning parallel to the flight. **3.2 DESIGN OF TWO WAY SLABS BY L.S.M** Introduction –Effective spans –Thickness of slab for strength and stiffness requirements - Middle and Edge strips – B.M coefficients as per IS:456 – Design B.Ms for Simply supported, Restrained and Continuous slabs – Tension and Torsion reinforcement requirement– Design of two way slabs using B.M. coefficients – Curtailment of reinforcement – Check for stiffness only.	
IV	**4.1 DESIGN OF COLUMNS BY L.S.M** 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 (not for examination). **4.2 DESIGN OF COLUMN FOOTINGS** 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.	**16 Hrs**
V	**STEEL STRUCTURES** **5.1 DESIGN OF TENSION AND COMPRESSION MEMBERS BY L.S.M** 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 Tension members against Yielding of Gross section, Rupture of Critical section and Block Shear- Design Strength of given Plates/ Angles connected to gussets by bolts/welds- Design	**16 Hrs**

	of ties using single/ double angles, T-sections and channels. 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) with or without cover plates. (Lacing and battens not included). **5.2 DESIGN OF SIMPLE BEAMS AND WELDED CONNECTIONS BY L.S.M** 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). 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 plates and angles – Problems on design of welded connections for Plates and Angles (Moment resistant connections not included). **REVISION AND TEST**	**10 Hrs**

Reference Book:

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. I S 456-2000 ; I S 875-1987; I S 800 -2007.
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

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 -2016 onwards

ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name **:** Diploma in Civil Engineering

Subject Code **:** 31052

Semester **:** V Semester

Subject Title **: ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	WATER SUPPLY ENGINEERING	13
2	WATER SUPPLY ENGINEERING (Contd.)	13
3	SANITARY ENGINEERING	13
4	SANITARY ENGINEERING (Contd.)	13
5	POLLUTION CONTROL	13
6	TEST AND REVISION	10
	Total	75

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.
- To select suitable sources of water supply and pipe materials.
- To determine the quality of water, testing procedures and standards for drinking water.
- To understand the methods of purification of water.
- To understand the systems of distribution for a water supply scheme.
- To understand the basic facts of sanitary engineering, the methods of collection and conveyance of sewage.
- To understand the primary and secondary treatment of sewage and disposal.
- To know the methods of disposal of sludge and solid wastes.
- To identify the various pollution and their prevention.
- To create awareness about environmental impact assessment.

31052 ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**PART I - WATER SUPPLY ENGINEERING** **1.1 QUANTITY OF WATER** 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 - sources of water - surface and subsurface sources. **1.2 INTAKES AND CONVEYANCE** Intakes - types of intakes-description of intakes-infiltration galleries and infiltration wells in river beds - necessity of pumps - types of pumps - 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 - pipe corrosion - corrosion control. **1.3 QUALITY OF WATER** Impurities in water - testing of water - collection of water sample - physical, chemical, bacteriological tests - standards of drinking water - water borne diseases and their causes.	**13 Hrs**
II	**2.1 TREATMENT OF WATER** Object of water treatment - flow diagram of treatment plants – sedimentation – purpose - types of sedimentation - coagulation - coagulants and their choice - types of sedimentation tanks – filtration - theory of filtration - types and description of filters - disinfection of water – methods - water softening –miscellaneous water treatment(names only) - mineral water – requirements - R.O process. **2.2 DISTRIBUTION SYSTEM** 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.	**13 Hrs**
III	**PART II - SANITARY ENGINEERING** **3.1 COLLECTION AND CONVEYANCE OF SEWAGE** 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	**13 Hrs**

	sewers.	
	3.2 SEWER APPERTENANCES 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).	
IV	**4.1 TREATMENT AND DISPOSAL OF SEWAGE** Objects of sewage treatment - flow diagram of sewage treatment plants - treatment of sewage - primary and secondary treatments - screens - skimming tanks - grit chambers - sedimentation tanks – filters - types and description of filters - activated sludge process - septic tanks for isolated buildings - construction and working of septic tanks - disposal of septic tank effluent – soak pits, dispersion trenches - oxidation ponds – sludge – types - methods of sludge disposal. **4.2 SOLID WASTE MANAGEMENT** Solid waste – classification - collection and conveyance of solid waste - disposal of solid waste – necessity - reduction and reuse of solid wastes - methods of solid waste disposal - incineration, dumping, sanitary landfill , composting - energy from waste	**13Hrs**
V	**PART III - POLLUTION CONTROL** **5.1 ENVIRONMENTAL POLLUTION** 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 - green house effect - acid rain. **5.2 ENVIRONMENTAL IMPACT ASSESSMENT** 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. **REVISION AND TEST**	**13 Hrs** **10 Hrs**

Reference Book :

1. N.N. BASAK- Environmental Engineering,Tata McGraw hill publishing company Ltd.,New Delhi, 2010
2. A.KAMALA,D.L.KANTHRAO- Environmental engineering, Tata McGraw hill publishing company Ltd.,New Delhi
3. GURCHARAN SINGH- Water supply and sanitary engineering vol.I &II,Standard publishers & distributors,Delhi
4. Dr.SURESH K.DHAMEJA- Environmental engineering and management,S.K.Kataria &Sons, New Delhi.
5. S.K.GARG- Water supply and sanitary engineering,Khanna publishers, Delhi.
6. M.ANJI REDDI- Text book of Environmental science and technology,BS Publications, Hyderabad.
7. P.VENUGOPALA RAO – Principles of Environmental science and engineering, PHI learning pvt. Ltd., New Delhi.
8. B C Punmia, “Environmental Engineering”, Laxmi Publications, 2010
9. B C Punmia, “Waste Water Engineering”, Laxmi Publications, 2010

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 -2016 onwards

ADVANCED CONSTRUCTION TECHNOLOGY

(ELECTIVE THEORY I)

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31071

Semester : V Semester

Subject Title : **ADVANCED CONSTRUCTION TECHNOLOGY (ELECTIVE THEORY I)**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
ADVANCED CONSTRUCTION TECHNOLOGY	5 Hrs	75 Hrs	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

TOPICS AND ALLOCATION OF HOURS :

Sl. No.	TOPIC	Time (Hrs)
1	PILE FOUNDATIONS MODIFIED CONCRETE	13
2	PRE-FABRICATION SYSTEM AND METHODS	13
3	FIRE PROTECTION IN BUILDINGS EARTH QUAKE RESISTING CONSTRUCTION	13
4	MAINTENANCE AND REHABILITATION OF BUILDINGS PRECAUTIONS TO PREVENT CRACKS IN BUILDINGS	13

5	HOUSING MODERNIZATION LIFT MODERNIZATION	13
6	TEST AND REVISION	10
	Total	75

RATIONALE:

This subject aims at imparting knowledge and skill in the use of advanced construction technologies for low cost housing, foundations, Pre-fabrication systems and Earthquake proof construction.

OBJECTIVES:

On completion of the course, the student will be familiar with:

- Pile foundations
- Modified Concrete
- Pre fabrication systems and methods
- Fire protection in buildings
- Earthquake proof construction
- Maintenance and Rehabilitation of buildings
- To take precautionary measures to prevent cracks in buildings
- House modernisation
- Lift modernisation

31071 ADVANCED CONSTRUCTION TECHNOLOGY (ELECTIVE THEORY I)

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**1.1 PILE FOUNDATIONS** Definition – uses of piles – types of piles – Bearing piles and Friction piles - classification based on material – stone piles- Encased piles - Reinforced cement concrete piles cast-in situ pile and pre cast piles description, advantages and disadvantages - load bearing piles and friction piles - purpose - sheet piles-types-description - choice of type of pile - factors to be considered – pile cap and pile shoe – description - load test on piles – description - Pile driving – equipments - types of hammer - choice of hammer - causes of failure of piles – Reinforcement requirements for R C piles. **1.2 MODIFIED CONCRETE** Admixtures – definition – function – classification - uses of different types - quantity to be used - light weight concrete - light weight aggregate - production of light weight aggregate - shot crete or guniting – definition - typical arrangement for gunite system - special concrete – Ferro cement- production process – curing - advantages and limitations - fibre reinforced concrete - production process – uses - Pre-stressed concrete - General principle of pre stressing - advantages of pre stressed Concrete - materials used - methods of pre-stressing - steel used - pretension method - post tension method - system of pre-stressing - freyssinet system - Magnel Blaton system - Lee-mc-call system - Causes for losses in pre-stress – remedial measures – Composite member	**13 Hrs**
II	**2.1 PRE FABRICATION SYSTEM:** Advantages and Disadvantages of Prefabrication system - Terms defined : prefabricated building, module, composite members, modular co-ordination, system; - Basic module - planning modules grid – modules in horizontal plane for residential buildings and industrial buildings - other consideration - Module for components:- flooring scheme, Beams, columns, walls; Staircase,- lintel, sunshade - Tolerance on dimensions:- length, cross sectional dimension, straightness, squareness, twist, flatness **2.2 PRE FABRICATION METHODS** Characteristics to be considered in devising a system - Types of pre fabricated building - load bearing wall type - frame type; Design considerations - bearing for pre cast units, joints; Requirements of an ideal structural joint - manufacture of	**13 Hrs**

	precast concrete elements- place - process - main, auxiliary and subsidiary process; Stages of pre-casting –preparation and storage of materials - moulding and curing; Pre fabrication methods: individual method, battery form method, tilting mould method , Flow line production method- extension method - Handling during transport and storage - Handling arrangement - Transport - inside the factory - stacking yard to erection site, Erection works to be carried out - Equipment required	
III	**3.1 FIRE PROTECTION IN BUILDINGS** General - causes and effects of fire - precautionary measures to minimize dangers of fire – limiting fire spread – factors to be considered - Fire resisting properties of common building material - general rules for fire resisting buildings - alarm system - protection of openings - common wall stair-floor fire extinguishing arrangement – fire protection systems – types - Emergency exit arrangements - Strong room construction **3.2 EARTH QUAKE RESISTING CONSTRUCTION** Indian Seismicity – Earthquake History - Definition of terms used - Behavior of structures in the past Earthquakes – Seismic forces – Effect of seismic forces on Buildings – Planning of Earthquake resistant Buildings - Roofs and Floors- Articulation joints – Expansion Joints – I.S. code provision – Alterations to Buildings – Foundation – Permissible increase in the allowable Bearing capacity of soils - Seismic coefficient for different zones – Construction of framed buildings in Earthquake zones – Walls – Beams etc.	**13 Hrs**
IV	**4.1 MAINTENANCE AND REHABILITATION OF BUILDINGS** Rehabilitation of buildings - demolition of buildings - safety aspects – general - precautions during demolitions - sequence of demolition of operation – demolition process of trusses, girders and beams, walls, flooring - catch plat form – lowering removal and disposal of materials - mechanical demolition - Repairs to building – repairing of plastering works - fixing doors in – Making opening in masonry and fixing doors and windows - Renewing glass panes with wooden fillets – fixing fan clamps in existing R.C.C slab - repair to terrazzo (mosaic) flooring	**13 Hrs**

	4.2 PRECAUTIONS TO PREVENT CRACKS IN BUILDINGS Cracks - general – Hair crack – Structural crack – Horizontal crack in masonry – Vertical/ diagonal cracks at walls - R.C.C beams or pillars - transverse cracks in R.C.C slab and sunshade - Repairs – Methods- materials used for filling cracks.	
V	**5.1 HOUSING MODERNIZATION** Housing modernization and management (building and construction safety, energy efficiency in housing, Property Refurbishment / Upgrade / Modernization / Renovation - Modular kitchens, bathrooms, New windows, doors and timber floors, Roof insulation, dry lining and BER (Building Energy Rating) - Certificates – Plumbing and Electrical to heating efficiency Landscaping and driveways to patios and decking - Drafting a Construction Contract – Transforming from Traditional to Modern Style - Case Studies – Strengthening of Old buildings -Energy-saving houses, Green House, Passive house, Passive house construction, Low-energy house, Zero-energy house, Energy consulting, Energy efficiency: Passive house standard, Quality-tested commercial passive house construction, Office building construction, Residential building construction - Consulting, planning, supervising – Green Building Concepts – materials – ratings. **5.2 LIFT MODERNIZATION** Independent Lifting Services - Mechanical Modernization - escalators or pathways - Aesthetic Modernization -Lift Car Interior-Eco-friendly Modernization – lift construction - Installation and modernization and maintenance. **REVISION AND TEST**	**13 Hrs** **10 Hrs**

Reference Book :

1. Concrete Technology – M.S. Shetty
2. Fire Resistant Construction – Building Construction by S.P.Arora and S.P.Bindra
3. Earth quake Proof - Building Construction by Dr.Janardhanjha and Prof.Suresh Kumar
4. Sinha IS Code of Practice for Earth quake , IS Code of Practice for Fire resistance, IS Code of Practice for pre stressing (2005)

5. Pile foundation – RD Chellis, MIS
6. Construction and foundation Engg – Sinha & Janatha Shau.
7. Principle Fine safety standards for building Construction – M.Ya Roytman

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 -2016 onwards

REMOTE SENSING AND GIS

(ELECTIVE THEORY I)

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31072

Semester : V Semester

Subject Title : **REMOTE SENSING AND GIS (ELECTIVE THEORY I)**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
GIS AND REMOTE SENSING	5 Hrs	75 Hrs	Internal Assessment	Board Examination	Total	
			25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	FUNDAMENTALS OF REMOTE SENSING	13
2	PHOTOGRAMMETRY	13
3	IMAGE INTERPRETATION AND ANALYSIS	13
4	FUNDAMENTALS OF GIS	13
5	GIS - DATA ENTRY, STORAGE AND ANALYSIS	13
6	TEST AND REVISION	10
	Total	75

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 student will be familiar :

- To understand the basic concepts of remote sensing
- To 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

21072 REMOTE SENSING AND GIS (ELECTIVE THEORY I)

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**FUNDAMENTALS OF REMOTE SENSING** 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	**13 Hrs**
II	**PHOTOGRAMMETRY** Geometric elements of a vertical photograph – Stereoscopic plotting instruments, Ortho photos, Flight planning	**13 Hrs**
III	**IMAGE INTERPRETATION AND ANALYSIS** 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	**13 Hrs**
IV	**FUNDAMENTALS OF GIS** 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).	**13 Hrs**
V	**GIS - DATA ENTRY, STORAGE AND ANALYSIS** 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. REVISION AND TEST	**13 Hrs** **10 Hrs**

Reference Book :

- 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.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 -2016 onwards

SOIL MECHANICS AND FOUNDATION ENGINEERING

(ELECTIVE THEORY I)

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31073

Semester : V Semester

Subject Title : **SOIL MACHANICS AND FOUNDATION ENGINEERING (Elective Theory I)**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hour / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
SOIL MACHANICS AND FOUNDATION ENGINEERING	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	SOIL MECHANICS AND INDEX PROPERTIES HYDRAULIC PROPERTIES OF SOIL	12
2	CLASSIFICATION AND STRENGTH OF SOIL STABILIZATION OF SOIL AND SUB-SOIL SAMPLING	14
3	SEEPAGE ANALYSIS AND SEEPAGE BELOW HYDRAULIC STRUCTURES BEARING CAPACITY AND SETTLEMENT OF FOUNDATIONS	12
4	FOUNDATIONS FOUNDATIONS IN EXPANSIVE SOIL	14

5	MACHINE FOUNDATION FOUNDATIONS OF TRANSMISSION LINE TOWERS	13
6	TEST AND REVISION	10
	Total	75

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 the 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 aspect rather than theory.

OBJECTIVES:

On completion of the course, the student will be familiar with:

- To study the Properties of Soil , Classification and Strength of soils
- To describe about the Sub-soil Sampling
- To study about the Seepage analysis , Bearing Capacity of soil and Settlement of Foundations
- To study about the Types of Foundations , Pile foundations and Pile Groups
- To understand about the Foundations on Expansive soil and Machine Foundations
- To know about the Foundations of Transmission Line Towers

31073 SOIL MECHANICS AND FOUNDATION ENGINEERING

(ELECTIVE THEORY I)

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**1.1 SOIL MECHANICS AND INDEX PROPERTIES** Introduction - Development of Soil Mechanics - Fields of application of Soil Mechanics - Soil formation - Cohesive and Cohesionless soil - Soil Properties - 3 Phase System - General, Index and Engineering properties - Detailed description - Atter Berg limits - Simple problems **1.2 HYDRAULIC PROPERTIES OF SOIL** Introduction - Permeability - Co-efficient of permeability - Darcy's law - Factors affecting permeability - Permeability tests - Simple problems - Quick sand conditions	**12 Hrs**
II	**2.1 CLASSIFICATION AND STRENGTH OF SOIL** 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 **2.2 STABILIZATION OF SOIL AND SUB-SOIL SAMPLING** 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 - Geophysical methods - Sub-soil Sampling - Disturbed and Undisturbed samples - Types of samplers - Split spoon sampler - Thin-walled sampler - Chunk sampling	**14 Hrs**

III	**3.1 SEEPAGE ANALYSIS AND SEEPAGE BELOW HYDRAULIC STRUCTURES** 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 **3.2 BEARING CAPACITY AND SETTLEMENT OF FOUNDATIONS** 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 - Settlement of foundation - Introduction - Causes and Effect of settlement - Plate load test - Simple problems	**12 Hrs**
IV	**4.1 FOUNDATIONS** Foundation - Introduction - Definitions - Objectives - Requirements of foundation - Criteria for selection of type of foundation - Types of foundations - Shallow and 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 - Settlement of pile group **4.2 FOUNDATIONS IN EXPANSIVE SOIL** 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	**14Hrs**

V	**5.1 MACHINE FOUNDATION** 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 - Steps to design - Couzen theory - In-situ dynamic investigation of soil - Methods - IS code of practice - Design criteria - Isolation of foundation - Simple problems **5.2 FOUNDATIONS OF TRANSMISSION LINE TOWERS** Introduction - Necessity - Forces on Tower Foundations - General design criteria - Choice and type of foundations - Design procedures - Stability conditions - Description – No problems REVISION AND TEST	**13 Hrs** **10Hrs**

Reference Book:

- B C PUNMIA , "Soil Mechanics and Foundation Engineering", Laxmi publications (P) Ltd., 2005
- SWAMI SARAN , "Analysis and Design of Substructures" (LSD) – Second Edition 2010
- V N S MURTHY , "Soil Mechanics & Foundation Engineering"–Sai Kripa Technical Consultants
- Dr S B SEHGAL, "A Text Book of Soil Mechanics", CBS Publishers & Distributors
- WAYNE C.TENG, "Foundation Design", Prentice Hall of India (P) Ltd.,

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 -2016 onwards

WATER RESOURCES MANAGEMENT

(ELECTIVE THEORY I)

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name **:** Diploma in Civil Engineering

Subject Code **:** 31074

Semester **:** V Semester

Subject Title **: WATER RESOURCES MANAGEMENT**
(ELECTIVE THEORY I)

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
WATER RESOURCES MANAGEMENT	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	INTRODUCTION HYDROLOGY	13
2	GROUND WATER MANAGEMENT OF GROUND WATER	13
3	RIVERS AND RIVER TRAINING WORKS STORAGE WORKS	13
4	DISTRIBUTION WORKS MANAGEMENT OF CANAL IRRIGATION	13
5	WATER SHED MANAGEMENT	13

	WATER HARVESTING AND RECYCLING	
6	TEST AND REVISION	10
	Total	75

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 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 student will be familiar with:

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

31074 WATER RESOURCES MANAGEMENT (ELECTIVE THEORY I)

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**1.1 INTRODUCTION** 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. **1.2 HYDROLOGY** 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	**13 Hrs**
II	**2.1 GROUND WATER** 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. **2.2 MANAGEMENT OF GROUND WATER** 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.	**13 Hrs**

III	**3.1 RIVERS AND RIVER TRAINING WORKS** 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. **3.2 STORAGE WORKS** 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.	**13 Hrs**
IV	**4.1 DISTRIBUTION WORKS** 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. **4.2 MANAGEMENT OF CANAL IRRIGATION** 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.	**13 Hrs**
V	**5.1 WATER SHED MANAGEMENT** 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. **5.2 WATER HARVESTING AND RECYCLING** 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. REVISION AND TEST	**13 Hrs** 10 Hrs

Reference Book :

- Santhosh Kumar Garg, Hydrology and water resources engineering, khanna publishers,Delhi.
- G.L.Asawa,Irrigation and Water Resources Engineering ,New age international(p) ltd.,publishers, New Delhi.
- David Keith Todd.,Ground water Hydrology,John wiley &sons,Singapore.
- Dilip Kumar Majumdar, Irrigation water management - Principles and Practice, PHI Pvt.Ltd.NewDelhi-1.
- Madan Mohan Das&Mimi Das Saikia, Irrigation and water power Engineering,PHI learning pvt. Ltd., NewDelhi-1
- K.Subramanya, Engineering hydrology,Tata McGraw-Hill publishing company ltd.,New Delhi.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 -2016 onwards

CIVIL ENGINEERING DRAWING II

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31054

Semester : V Semester

Subject Title : **CIVIL ENGINEERING DRAWING II**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hour / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CIVIL ENGINEERING DRAWING II	6Hrs	90 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	PUBLIC HEALTH ENGINEERING DRAWING	24
2	BRIDGE DRAWING	12
3	STRUCTURAL ENGINEERING DRAWING WITH BAR BENDING SCHEDULE	42
4	TEST AND REVISION	12
	Total	90

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

Civil Engineers must be able to read and interpret structural drawings of different elements. This subject thus deals with elementary design principles as per BIS code of practice BIS: 456 – 2000 and their relevant drawings.

OBJECTIVES:

On completion of the course, the student will be :

- Able to Prepare Public Health Engineering Drawing
- Able to Prepare Bridge Drawing
- Able to Prepare Structural Engineering Drawing With Bar Bending schedule.

31054 CIVIL ENGINEERING DRAWING II

LIST OF DRAWINGS

PUBLIC HEALTH ENGINEERING DRAWING 24 Hours

1. Infiltration gallery (with one infiltration well, one straight gallery pipe, one inspection well and one jack well)
2. Rapid Sand Filter
3. Septic Tank with dispersion Trench / Soak pit
4. Bio gas plant with floating type

BRIDGE DRAWING 12 Hours

5. Two span Pipe Culvert
6. Two span Tee Beam Bridge with square returns.

STRUCTURAL ENGINEERING DRAWING WITH BAR BENDING SCHEDULE 42 Hours

7. Simply supported one-way slab
8. Simply supported two-way slab
9. Restrained two-way slab
10. Singly reinforced Simply supported beam
11. Doubly reinforced Continuous beam with two spans
12. Tee Beams supporting continuous slab
13. Dog-legged staircase

14. Lintel cum Sunshade
15. R.C.C Column with square Isolated footing

REVISION & TEST 12 Hours

REFERENCE:

1. Drawing manual - N.I.T.T.T.R – Chand & Co.
2. Structural Drawing and Detailing - Krishnamoorthy

31054

CIVIL ENGINEERING DRAWING II

SCHEME OF EXAMINATION :

GROUP A: PUBLIC HEALTH ENGINEERING DRAWING

GROUP B: BRIDGE DRAWING

GROUP C: STRUCTURAL ENGINEERING DRAWING WITH BAR BENDING SCHEDULE

Questions will be asked from any **TWO GROUPS** as **either … or** pattern from the above mentioned groups and the students have to answer **ANY ONE** of the questions. **– 75 Marks**

Reference Book :

1. M Chakraborti, “Civil Engineering Drawing”
2. Gurucharan singh & Subhash Chandar Sharma, “Civil Engineering Drawing”
3. S Chand & Company (pvt) Ltd., “Civil Engineering Drawing Manual”

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 -2016 onwards

CONSTRUCTION PRACTICE LAB

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31055

Semester : V Semester

Subject Title : **CONSTRUCTION PRACTICE LAB**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CONSTRUCTION LAB PRACTICE	3 Hrs	45 Hrs	25	75	100	3 Hrs

RATIONALE:

Diploma holders in Civil Engineering are supposed to supervise construction of buildings. To perform 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 Practiceis very important for Civil Engineering diploma holders

OBJECTIVES:

On completion of the course, the student will be familiar:

- To Prepare centre line plan and foundation plan for a building.
- For Setting out foundation in the field for spread footing and column footing for a building.
- To determine the Workability of concrete by Compacting factor, slump cone test and Vee – Bee consistometer test.
- To cast Concrete cubes and to test for compressive strength.

- To determine the fineness Modulus of fine and coarse aggregate.
- For Shape test on coarse aggregate.
- To determine the bulking characteristics of the given sand.
- For Non - Destructive test on hardened concrete.

ALLOCATION OF MARKS

PART A	20 marks
PART B	50 marks
VIVA VOCE	05 marks
RECORD	25 marks
Total	100 Marks

31055 CONSTRUCTION PRACTICE LAB

LIST OF EXPERIMENTS

PART A 18 Hours

1. 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.
2. 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).
3. Arrangement of bricks using English bond for one brick thick wall and one and half brick thick wall for right angled corner junction.
4. Arrangement of bricks using English Bond for one brick thick wall, one and half brick thick wall for Tee junction.
5. Arrangement of bricks using English bond for one brick thick, one and half and two brick thick square pillars.
6. Cutting, hooking, cranking and arrangement of reinforcement for:
    a Beam
    b Lintel and sunshade
    c Column and footing

PART B 21 Hours

7. Determination of workability of concrete by slump cone test.
8. Determination of workability of concrete by compaction factor test.
9. Casting of concrete cube and compression test on concrete cube.

10. 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.
11. Determination of Fineness Modulus of coarse aggregate sample and plot a particle size distribution curve and also find the effective size and uniformity co-efficient.
12. Vee- Bee Consistometer Test on concrete.
13. Non Destructive Test on concrete - Rebound Hammer Test.
14. Determination of bulking characteristics of the given sand sample .
15. Shape Test for Coarse aggregate.
    a. Flakiness Index test
    b. Elongation Index test
    c. Angularity number test

Revision & Test **6 Hours**

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	3sets(9no)
4.	Concrete cube mould 100*100*100 3sets	3sets(9no)
5.	Sieve test for fine aggregate made of brace 200mm dia complete set	2sets
6.	Sieve test for coarse aggregate made of brace 200mm dia complete set	2sets
7.	Concrete mixing tray	2no
8.	Vee Bee Consistometer	1no
9.	Rebound Hammer	1no
10.	Weigh balance-digital upto 10kg capacity with 1gm accuracy battery backup with 8 hours	1no
11.	Apparatus to find Flakiness index, Elongation index and Angularity number for Coarse Aggregate	1no each
12.	Bar bending tool/machine	1 no

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 -2016 onwards

CAD IN CIVIL ENGINEERING DRAWING II

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name **:** Diploma in Civil Engineering

Subject Code **:** 31056

Semester **:** V Semester

Subject Title **:** **CAD IN CIVIL ENGINEERING DRAWING II**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CAD IN CIVIL ENGINEERING DRAWING II	5 Hrs	75 Hrs	25	75	100	3 Hrs

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 Public Health Engineering, bridge engineering and structural Engineering.

OBJECTIVES:

On completion of the course, the student will be familiar:

- To prepare Public Health Engineering drawings using CAD
- To know about RCC and Steel bridge structures and draw views using CAD
- To understand and draft structural Engineering drawings using CAD

31056 CAD IN CIVIL ENGINEERING DRAWING II

LIST OF EXPERIMENTS

PREPARATION OF DRAWINGS USING CAD SOFTWARE

I PUBLIC HEALTH ENGINEERING 15 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 10 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 40 Hours

Draw plan, cross section and longitudinal section

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

REVISION & TEST 10 Hours

ALLOCATION OF MARKS

In Board examination, questions will be chosen as follows
By lot one question

Plan / Elevation	-	40 marks
Cross section / longitudinal section	-	30 marks
Viva – voce	-	5 marks
Record works	-	25 marks
Total	**-**	**100 marks**

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 free hand sketch in the observation book based on the given specifications. The drawings to be drawn using computer and CAD Software.
3. In examination any one of drawings from 1 to 14 can be asked by lot.

S.NO.	LIST OF THE EQUIPMENTS	QUANTITY REQUIRED
1.	Computers	30 Nos.
2.	Laser printer	3 Nos.
3.	CAD software	30 Users

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 -2016 onwards

COMMON TO ALL BRANCHES

LIFE AND EMPLOYABILITY SKILL PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING – SYLLABUS – M Scheme

(Being implemented from the Academic Year 2016-2017 onwards)

Course Name : **All Branches of Diploma in Engineering and Technology and Special Programmes**

Subject Code : **30002**

Semester : **V**

Subject Title : **LIFE AND EMPLOYABILITY SKILLS PRACTICAL**

Teaching and Scheme of Examination: **No. of Weeks per Semester: 15 Weeks**

Subject	Instruction		Examination			
			Marks			
	Hours/ Week	Hours/ Semester	Internal assessment	Board Examination	Total	Duration
Life and Employability Skills	4 Hours	60 Hours	25	75	100	3 Hours

Topics and Allocation of Hours:

Sl. No.	Section	No. of Hours
1	**Part – A** Communication	**30**
2	**Part – B** Entrepreneurship, Project Preparation, Productivity, Occupational Safety, Health, Hazard, Quality Tools& Labour Welfare	**20**
3	**Part – C** Environment, Global Warming, Pollution	**10**
TOTAL		**60**

RATIONALE

Against the backdrop of the needs of the Industries, as wells as based on fulfilling the expectations of the Industries, the Diploma Level students have to be trained directly and indirectly in toning up their competency levels. Proficiency in Communication only, equips them with confidence and capacity to cope with the employment. Hence, there is a necessity to focus on these in the curriculum. At the end of the Course, the student is better equipped to express himself in oral and written communication effectively.

SPECIFIC INSTRUCTIONAL OBJECTIVES

1. Emphasize and Enhance Speaking Skills

2. Increase Ability to Express Views & Opinions

3. Develop and Enhance Employability Skills

4. Induce Entrepreneurship and Plan for the Future

5. Expose & Induce Life Skills for Effective Managerial Ability

LIFE AND EMPLOYABILITY SKILLS PRACTICAL

SYLLABUS

Unit	Topics	Activity	Hours
I	**Communication, Listening, Training, Facing Interviews, Behavioural Skills**	-- instant sentence making – say expressions/phrases-- self- introduction/another higher official in company – describe/explain product – frame questions based on patterns – make sentences based on patterns	**30**
II	**Entrepreneurship, Project Preparation, Marketing Analysis, Support & Procurement**	-- prepare an outline of a project to obtain loan from bank in becoming an entrepreneur – prepare a resume	**10**
III	**Productivity – comparison with developed countries, Quality Tools, Circles, Consciousness, Management, House Keeping**	-- search in the website -- prepare a presentation – discuss & interact	**05**
IV	**Occupational Safety, Health Hazard, Accident & Safety, First-Aid,Labour Welfare Legislation, Welfare Acts**	-- search in the website -- prepare a presentation – discuss & interact	**05**

V	**Environment, Global Warming, Pollution**	-- taking down notes / hints – answering questions -- fill in blanks the exact words heard	**10**

LEARNING STRUCTURE **100 Marks**

-- Focus more on Speaking & Listening Skills
-- Attention less on Reading & Writing Skills
-- Apply the skills in fulfilling the Objectives on Focused Topics

a) Listening **25 Marks**

1. Deductive Reasoning Skills (taking down notes/hints) **10**
2. Cognitive Skills (answering questions) **10**
3. Retention Skills (filling in blanks with exact words heard) **05**

b) Speaking Extempore/ Prepared **30 Marks**

1. Personality/Psychological Skills (instant sentence making) **05**
2. Pleasing & Amiable Skills (say in phrases/expressions) **05**
3. Assertive Skills (introducing oneself/others) **05**
4. Expressive Skills (describe/explain things) **05**
5. Fluency/Compatibility Skills (dialogue) **05**
6. Leadership/Team Spirit Skills (group discussion) **05**

c) Writing & Reading **20 Marks**

1. Creative & Reasoning Skills (frame questions on patterns) **05**
2. Creative & Composing Skills (make sentences on patterns) **05**
3. Attitude & Aim Skills (prepare resume) **05**
4. Entrepreneurship Skills (prepare outline of a project) **05**

d) Continuous Assessment (Internal Marks) **25 Marks**

(search,read, write down, speak, listen, interact & discuss)

1. Cognitive Skills (Google search on focused topics)
2. Presentation Skills& Interactive Skills (after listening, discuss)

Note down and present in the Record Note on any 5 topics **10 Marks**
Other activities recorded in the Record note **10 Marks**
Attendance **05 Marks**

INTERNAL MARKS **25 MARKS**

EXTERNAL MARKS AT END EXAMINATION **75 MARKS**

MODEL QUESTION

Time: 3 Hours **Maximum Marks: 75**

A. LISTENING **25 Marks**

1. Listen to the content and take down notes/hints 10
2. Listen to the content and answer the following questions. 10
3. Listen to the content and fill in the blanks the exact words heard. 05

B. SPEAKING **30 Marks**

1. Say in a sentence instantly on hearing the word(5 words, one after another). 05
2. Say any five expressions commonly used in communication. 05
3. Imagine, a consultant has come to your department.
   Introduce him to your subordinates. 05
4. Explain/describe the product you are about to launch in the market. 05
5. Speak with your immediate boss about the progress you have made. 05
6. Discuss within the group on the topic of focus in the syllabus. 05

C. WRITING & READING **20 Marks**

1. Frame new questions from the pattern given by changing sets of words with your own. 05

a.	When	do	you	return?
b.	How	is	his performance?	
c.	Where	has	the manager	gone?
d.	What	is	the progress	today?
e.	Why	are	the machines	not functioning?

2. Make sentences from the pattern given by changing sets of words with your own. 05

a.	The workers	are	on strike		
b.	The labourers	are paid	well	in this factory	
c.	There	is	a rest room	for the workers	

d.	These	are	the new products	launched	by our company
e.	Almost everyone	come	to the company	on motorbikes	

3. Prepare a resume for the post of Department Manager. 05

4. Prepare an outline of a project to obtain a loan. (Provide headings and subheadings) 05

I. Guidelines for setting the question paper:

A. LISTENING :

ONLY TOPICS related to
POLLUTION /
ENVIRONMENT /
GLOBAL WARMING are to be taken.
These topics are common for all the three types of evaluation.

B. SPEAKING :

1. WORDS of common usage
2. Fragments – expression of politeness, courtesy, cordiality
3. Introduce yourself as an engineer with designation or
   Introduce the official visiting your company/department

4. Describe/Explain the product/machine/department
5. Dialogue must be with someone in the place of work.
6. Group of six/eight
   Discuss the focused topic prescribed in syllabus

C. WRITING & READING:

1. Provide five different structures.
   Students are to substitute at least one with some other word/words
2. Provide five different structures.
   Students are to substitute at least one with some other word/words
3. Provide some post related to industries.
4. Outline of the project (skeleton/structure)
   Only the various headings and subheadings
   Content is not needed

II. Guidelines for recording the material on the Focused Topics in the Record note.

Write in the record note, **on any five topics**, from the list of topics given below. **10 Marks**
(5 topics x 10 marks = 50 marks. Thus, the **Average of 5 topics is 10 Marks)**

1. Productivity in Industries – Comparison with developed countries
2. Quality Tools, Quality Circles and Quality Consciousness
3. Effective Management
4. House Keeping in Industries
5. Occupational Safety and Hazard
6. Occupational Accident and First Aid
7. Labour Welfare Legislations
8. Labour Welfare Acts and Rights
9. Entrepreneurship
10. Marketing Analysis, Support and Procurement

LABORATORY REQUIREMENT:

1. An echo-free room
2. Necessary furniture and comfortable chairs
3. A minimum of two Computers with internet access
4.A minimum of two different English dailies
5. A minimum of Three Mikes with and without cords
6. Colour Television (minimum size – 29")
7. DVD/VCD Player with Home Theatre speakers
8. Smart board
9. Projector

Suggested Reading:

1. Production and Operations Management by S.N. Chary, TMH
2. Essentials of Management by Koontz &Weihrich, TMH
3. Modern Production / Operations Management by E.S. Buffa and R.K. Sarin, John Wiley & Sons
4. Production Systems: Planning, Analysis and Control by J.L.Riggs, 3rd ed., Wiley.
5. Productions and Operations Management by A.Muhlemann, J.Oakland and K.Lockyer, Macmillan
6. Operations Research - An Introduction by H.A.Taha, Prentice Hall of India
7. Operations Research by J.K.Sharma, Macmillan
8. Business Correspondence & Report Writing by R.C. Sharma and K.Mohan, TMH
9. How to prepare for Group Discussion & Interview (With Audio Cassette) by Prasad, TMH
10. Spoken English – A self-learning guide to conversation practice (with Cassette)
11. Introduction to Environmental Engineering by Mackenzie, L. Davis and A. David, Cornwell, McgrawHill, 3rd Ed.
12. Environmental Engineering by Peary, Rowe and Tchobanoglous, McgrawHill
13. Total Quality Management – An Introductory Text by Paul James, Prentice Hall
14. Quality Control and Applications by Housen&Ghose
15. Industrial Engineering Management by O.P. Khanna

VI SEMESTER

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards

CONSTRUCTION MANAGEMENT WITH MIS

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31061

Semester : VI Semester

Subject Title : **CONSTRUCTION MANAGEMENT WITH MIS**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
CONSTRUCTION MANAGEMENT WITH MIS	5 Hrs	75 Hrs	Internal Assessment	Board Examination	Total	
			25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	CONSTRUCTION SECTOR IN INDIA FEASIBILITY STUDY PLANNING OF CIVIL ENGINEERING PROJECT CONTRACT MANAGEMENT	13
2	CONSTRUCTION ORGANISATION AND THEIR SUPERINTENDENCE DEPARTMENTAL PROCEDURE AND ACCOUNTING	13
3	SCHEDULING AND TIME MANAGEMENT RESOURCE MANAGEMENT	13
4	QUALITY MANAGEMENT AND SAFETY	13

	CONSTRUCTION DISPUTES AND THEIR SETTLEMENT CONSTRUCTION LABOUR AND LEGISLATION ETHICS IN ENGINEERING	
5	ENTREPRENEURSHIP INFORMATION MANAGEMENT AND COMPUTERS FINANCIAL MANAGEMENT	13
6	TEST AND REVISION	10
	Total	75

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 above field becomes essential. Hence this subject is of great importance to diploma engineers.

OBJECTIVES:

On completion of the course, the student 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
- Understands 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.
- Understands the concepts and requirement of Entrepreneurship
- Perform the Computation of Net present value.

31061 CONSTRUCTION MANAGEMENT WITH MIS

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**1.1 CONSTRUCTION SECTOR IN INDIA** 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. **1.2 FEASIBILITY STUDY** 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. **1.3 PLANNING OF CIVIL ENGINEERING PROJECT** 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. **1.4 CONTRACT MANAGEMENT** 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.	**13 Hrs**

II	**2.1 CONSTRUCTION ORGANISATIONS AND THEIR SUPERINTENDENCE** 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). **2.2 DEPARTMENTAL PROCEDURE AND ACCOUNTING** 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)	**13 Hrs**
III	**3.1 SCHEDULING AND TIME MANAGEMENT** 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. **3.2 RESOURCE MANAGEMENT** 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 (not for examination)	**13 Hrs**

IV	**4.1 QUALITY MANAGEMENT AND SAFETY** 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. **4.2 CONSTRUCTION DISPUTES AND THEIR SETTLEMENT** Introduction – Development of disputes – Categories of disputes – Modes of settlements - Arbitration **4.3 CONSTRUCTION LABOUR AND LEGISTATION** Need for legislation - Payment of wages Act - Factories Act – Contract labour(Regulation and abolition) Act – Employees Provident Fund (EPF) Act. **4.4 ETHICS IN ENGINEERING** 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.	**13 Hrs**
V	**5.1 ENTREPRENEURSHIP** Definition – Role and Significance – Risks and Rewards – Concepts of Entrepreneurship – Profile and requirement of entrepreneur - Programmes existing in India – SISI, DIC, TANSIDCO – Funding and technical assistance to Entrepreneurship- NIDCO,ICICI,IDBI,IFCI,SFC **5.2 INFORMATION MANAGEMENT AND COMPUTERS** 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. **5.3 FINANCIAL MANAGEMENT** 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. **REVISION AND TEST**	**13 Hrs** **10 Hrs**

Reference Book:

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.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards

HYDRAULICS

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31062

Semester : VI Semester

Subject Title : **HYDRAULICS**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
HYDRAULICS	6 Hrs	90 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	INTRODUCTION MEASUREMENT OF PRESSURE HYDROSTATIC PRESSURE ON SURFACES	18
2	FLOW OF FLUIDS FLOW THROUGH ORIFICES AND MOUTHPIECES FLOW THROUGH PIPES	18
3	FLOW THROUGH NOTCHES FLOW THROUGH WEIRS	14

4	FLOW THROUGH OPEN CHANNELS	14
5	GROUND WATER PUMPS	16
6	TEST AND REVISION	10
	Total	90

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 student will be able to:

- To define the properties of fluids and their physical quantities.
- To list different types of pressures and various pressure measuring devices.
- To calculate hydrostatic forces on plane surfaces immersed in water.
- To explain types of forces, energy and application of Bernoulli's theorem.
- To describe different types of Orifices and Mouthpieces and to derive discharge formulae and their practical applications.
- To state the different losses of head of flowing liquids in pipes and their equations.
- To describe different types of Notches and Weirs, and deriving the discharge formulas and their Practical applications.
- To describe different types of Channels and their discharge formulas and to determine the condition for maximum discharge ;.
- To explain the procedure of Canal Linings and explain the different forms of ground water resources
- To explain the construction details, specifications and efficiencies of Reciprocating Pumps and Centrifugal Pumps.

31062 HYDRAULICS

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**1.1 INTRODUCTION** 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. **1.2 MEASUREMENT OF PRESSURE** 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. **1.3 HYDROSTATIC PRESSURE ON SURFACES** 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.	**18 Hrs**
II	**2.1 FLOW OF FLUIDS** 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. **2.2 FLOW THROUGH ORIFICES AND MOUTHPIECES** 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.	**18 Hrs**

	2.3 FLOW THROUGH PIPES 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.	
III	**3.1 FLOW THROUGH NOTCHES** Definitions- Types of notches – Rectangular, Triangular and Trapezoidal notches – Derivation of equations for discharges - Simple problems - Comparison of V-Notch and Rectangular Notch. **3.2 FLOW THROUGH WEIRS** 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 and Siphon spillway - Definition.	**14 Hrs**
IV	**4.1 FLOW THROUGH OPEN CHANNELS** 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 –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.	**14 Hrs**
V	**5.1 GROUND WATER** Aquifer - Water table – Exploring the availability of ground water - Taping of ground water - Open well - Bore well-Types of well construction - Yield of a open well – Equation - Specific capacity or specific yield of a well -Test for yield of well – Methods of rain water harvesting - Sanitary protections – No problems. **5.2 PUMPS** Pumps – Definition – Difference between a pump and a turbine-	**16 Hrs**

	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 – 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. **REVISION AND TEST**	**10 Hrs**

Reference Book:

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

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards

STEEL STRUCTURES

(ELECTIVE THEORY II)

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31081

Semester : VI Semester

Subject Title : **STEEL STRUCTURES (ELECTIVE THEORY II)**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
STEEL STRUCTURES	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	INTRODUCTION TO PLASTIC ANALYSIS AND LSD	13
2	DESIGN OF TENSION AND COMPRESSION MEMBERS BY LSM	13
3	DESIGN OF FLEXURAL MEMBERS FOR BM AND SF BY LSM	13
4	DESIGN OF SECTIONS FOR COMBINED ACTIONS	13
5	DESIGN OF CONNECTIONS AND DETAILING	13
6	TEST AND REVISION	10
	Total	75

RATIONALE:

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise steel construction and fabrication. He may also be required to design simple structural elements, make changes in design depending upon availability of materials. He must be able to read and interpret structural drawings of different elements. This subject thus deals with elementary design principles as per BIS code of practice BIS: 800 and their relevant drawings

OBJECTIVES:

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

- To understand the behaviour of structural steel in its plastic stage;
- To learn plastic analysis of simple members;
- To design simple steel members to resist axial forces;
- To design simple flexural members;
- To design welded / bolted connections for steel members.

31081 STEEL STRUCTURES (ELECTIVE THEORY II)

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**INTRODUCTION TO PLASTIC ANALYSIS AND LIMIT STATE DESIG** **Plastic Analysis*:*** Analysis of Steel Structures– Methods– Elastic, Plastic and Dynamic Analysis and Advanced method of analysis based on IS:800-2007– Idealized Stress vs Strain curve for Structural Steel– Requirements and Assumptions of Plastic method of analysis– Formation of Plastic hinges in Flexural members– Plastic Moment of Resistance and Plastic Modulus of Sections– Shape Factors of rectangular / circular/ I / T-Sections– Collapse load– Determination of Collapse loads for Cantilever, Simply supported and Fixed beams by any (Statical or Kinematical method– Problems. **Limit State Design:** Advantages of Limit State Design of Steel structures– Basis for design– Classification of Limit States– Characteristic and Design Actions– Ultimate and Design Strengths- Partial Safety Factors for Loads and Materials– Design requirements– Strength requirements: Stability, Fatigue and Plastic collapse– Serviceability requirements: Deflection limits, Vibration, Durability and Fire resistance –Geometrical properties of gross and effective cross sections– Classification of Cross Sections as per IS:800-2007– Internal, external(outstands) and tapered elements of sections– Maximum Effective Slenderness Ratio of members – Necessity of Bracings and Expansion joints in Steel Structures	**13 Hrs**

II	**DESIGN OF TENSION AND COMPRESSION MEMBERS BY L.S.M** **Tension Members**- Design Strength of Tension members against yielding of gross section, against rupture of critical section and due to block shear– Design requirements–Problems on determination of design strength of given members and designing tension members using rolled steel sections for given loads– Design of bolted and welded connections for tension members –Problems. **Compression Members**- Effective Length and Effective Sectional Area of Compression members – Design Stress and design strength– Buckling Class of cross sections– Imperfection factor– Stress reduction factor– Thickness of elements– Eccentricity of loads on columns– Single angle and double angle struts–Bolted and welded connections for struts– Design of Built up Columns– Connecting the components of built up columns by tacking bolts/ welds– Requirements of connections– Laced Columns– Single and Double laced systems– Requirements of lacing bars- Design of Lacings– Battened Columns– Requirements of battens– Design of battens– Problems **Column Bases**- Slab base and Gusseted base – Code Provisions (IS:800-2007) – Minimum thickness and Effective Area of Base plate– Design of Slab base and Gusseted base for Axially loaded columns using bolts / welds.	**13 Hrs**
III	**DESIGN OF FLEXURAL MEMBERS FOR BM AND SF BY L.S.M** **Laterally Supported Beams**– Classification of Steel beams – Effective span– Design principles- Web Buckling and Web Crippling– Minimum thickness of Web – Sections with webs susceptible /not susceptible to buckling under shear before yielding– Design Bending Strength of sections with Low shear – Effect of holes in Tension zone– Nominal shear strength and Design shear strength of sections– Limiting deflection of beams – Design of laterally supported Simple beams for Bending moment and Shear force using single / double rolled steel sections (symmetrical cross sections only) – Problems – Un symmetrical (Bi-Axial) bending – Design of laterally supported Purlins for sloped roof trusses (for given vertical UDL with BM coefficient 0.085) – Simple problems. **Laterally Un-Supported Beams**- Lateral Torsional Buckling of	**13 Hrs**

	compression flange – Maximum permitted Slenderness Ratio of Compression flange – Design Bending Strength of laterally un supported beams – Bending stress reduction factor–Imperfection parameter–Elastic lateral buckling moment of doubly symmetric sections– End Torsional Restraints and Intermittent Bracing of Compression flange– Requirements, Types and their Effects– Design of laterally un supported beams for bending and shear using symmetrical rolled steel sections– Problems.	
IV	**DESIGN OF SECTIONS FOR COMBINED ACTIONS** ***Sections subjected to Bending moment and High Shear force***-– Effect of high shear on flexural capacity of sections– Limiting value of shear force for full moment capacity of sections– Reduced design strength of Plastic/Compact/Semi Compact sections subjected to high shear– Design of support sections of cantilevers and continuous beams– Problems **Sections subjected to Bending moment and Axial Compression (Beam-Column)**- Columns carrying eccentric loads, Columns subjected to vertical and horizontal loads (wind loads), Columns of frames, Principal rafters with purlins at non nodal points – Material failure and Buckling failure– Interaction equations – Overall buckling– Design problems(with axial compression and uni-axial BM only).	**13 Hrs**
IV	**Sections subjected to Bending moment and Axial Tension**– Bottom chord members of Bridge girders–Tie members of trusses with hanging loads–Reduced effective moment– Interaction equations– Design Problems	
V	**DESIGN OF CONNECTIONS AND DETAILING** **General**- Types of connections– Bolted, Riveted and Welded connections– Rigid and Flexible connections– Components of connections– Basic requirements of connections- Clearance for holes– Minimum and Maximum spacing of fasteners– Minimum edge/ end distances– Requirements of Tacking fasteners. **Bolted Connection**– Types of bolts– Bearing type Bolts– Nominal and Design shear strengths of bolts– Reduction factors for Long joints, Large grip lengths, Thick packing plates– Nominal and Design bearing strengths of bolts– Reduction factors for over sized and slotted holes– Nominal and Design tensile strengths (tension capacity) of bolts – Friction grip type Bolts– Advantages– Requirements as per IS 3757– Nominal and Design Slip resistance of bolts in shear– Slip factors– Nominal and Design tensile strengths of friction bolts– Simple design	**13 Hrs**

	problems (Combined actions not included). **Welded Connection**- Types of welds– Fillet welds– Minimum and maximum sizes– Effective length of weld- Fillet welds on inclined faces–- Design strengths of shop/site welds– Butt welds– Effective throat thickness and effective length of butt weld– Strength of butt weld- Intermittent welds–-Slot or plug welds– Reduction factor for long joints– Stress in the weld due to individual forces– Design requirements of connections– Simple Design problems (Combined actions not included). **Detailing**- Beam to Beam and Beam to Column connections – Seat angle and Web angle connections– Designing and detailing of simple connections for vertical forces (Moment resisting connections are not included) – Simple problems –Connection details of Truss members at Joints(neat sketches). **REVISION AND TEST**	**10 Hrs**

Reference Book:

1. M.R.Shiyekar "Limit State Design in Structural Steel", PHI Learning Pvt Ltd, 2011
2. K.S.Sai Ram "Design of Steel Structures" Pearson-Porling Kindersley Pvt Ltd
3. Dr.Subramaniam "Steel Structures"

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards

TOWN PLANNING

(ELECTIVE THEORY II)

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31082

Semester : VI Semester

Subject Title : **TOWN PLANNING (ELECTIVE THEORY II)**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
TOWN PLANNING	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	TOWN PLANNING PRINCIPLES SURVEYING ZONING	13
2	HOUSING SLUMS	13
3	PUBLIC BUILDINGS PARKS AND PLAY GROUNDS MASTER PLAN RE-PLANNING EXISTING TOWNS	13

4	URBAN ROADS TRAFFIC MANAGEMENT	13
5	BUILDING BYE-LAWS MISCELLANEOUS TOPICS	13
6	TEST AND REVISION	10
	Total	75

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 student will be familiar:

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

31082 TOWN PLANNING (ELECTIVE THEORY II)

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**1.1 TOWN PLANNING PRINCIPLES** 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. **1.2 SURVEYS** General – Necessity - Collection of Data - Types of surveys for planning a new town - Uses of surveys. **1.3 ZONING** 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.	**13 Hrs**
II	**2.1 HOUSING** 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. **2.2 SLUMS** General - Causes of slums - Characteristics of slums - Effects of 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.	**13 Hrs**
III	**3.1 PUBLIC BUILDINGS** 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.	**13 Hrs**

	3.2 PARKS AND PLAY GROUNDS 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.	
III	**3.3 MASTER PLAN** 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. **3.4 RE-PLANNING EXISTING TOWNS** 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.	
IV	**4.1 URBAN ROADS** 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. **4.2 TRAFFIC MANAGEMENT** General - Object – Traffic survey - Traffic congestion – Traffic control - Traffic diversion - Road junction –Parking - Traffic capacity of road - One way traffic - Road traffic problems – Use of islands and flyovers at crossings – causes of road accidents - Traffic signal – Advantages and disadvantages of Automatic Light signals – Road sign – Road marking - Name boards of streets - Direction boards - Street lighting in a town – Traffic problem of existing towns – Peculiarities of traffic.	**13 Hrs**
v	**5.1 BUILDING BYE -LAWS** General - Objects of bye-laws - Importance of bye-laws - Function of local authority - Responsibility of owner - Applicability of bye-laws - Set backs to buildings – Necessity of setbacks - Light plane – Plot coverage - Floor space index- Maximum Height of buildings - Off-street parking – Fire protection - Minimum width of streets and plot sizes – Some other terms - Principles underlying in framing building bye-laws – Building bye-laws for residential area of a typical town planning scheme – Building bye-laws for other types of buildings -Development control rules - General rules of	**13 Hrs**

	metropolitan Area - CMDA rules. **5.2 MISCELLANEOUS TOPICS** Airports – Location - size - Noise control - Parts of an airports - Betterment and compensation – City blocks –Conurbations - Cul-de-sac streets - Focal point - Green belt - Public utility services - Rapid transit –Remote sensing application – Urban planning using remote sensing – Site suitability analysis Location of Bus Terminus, Whole sale markets, Exhibition Centres etc., – Location for water/sewage treatment plants, location for waste disposal etc.,– Transportation planning. **REVISION AND TEST**	**10 Hrs**

Reference Book:

1. Town Planning - S.C. Rangwala,: Charotar Publisher (2011), Publisher
2. K.S.Rangwala and P.S.Rangwala,. 'Town Planning ",Charotar Publishing House,15th 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

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards

EARTHQUAKE ENGINEERING

(ELECTIVE THEORY II)

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31083

Semester : VI Semester

Subject Title : **EARTHQUAKE ENGINEERING (ELECTIVE THEORY II)**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
EARTHQUAKE ENGINEERING	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	INTRODUCTION TO EARTHQUAKE	13
2	SEISMIC EFFECTS ON STRUCTURES	13
3	BEHAVIOUR OF STRUCTURES DURING EARTHQUAKES	13
4	CONCEPTS OF DESIGN OF EARTHQUAKE RESISTING BUILDINGS	13
5	RETROFITTING OF BUILDINGS	13
6	TEST AND REVISION	10
	Total	75

RATIONALE:

Diploma holders in civil engineering have to supervise construction of various earthquake resistant buildings. Therefore, the students should have requisite knowledge regarding terminology of earthquake and the precautions to be taken while constructing earthquake resistant buildings

OBJECTIVES:

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

- To know the causes and consequences of earthquakes;
- To understand the magnitude and effects of earthquakes on structures;
- To understand the behaviour of various types of buildings during earthquakes;
- To know about the design concepts of earthquake resisting buildings;
- To know the methods of evaluation and retrofitting of damaged structures.

31083 EARTHQUAKE ENGINEERING (ELECTIVE THEORY II)

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**INTRODUCTION TO EARTH QUAKE** Objective of earthquake engineering - Engineering Seismology - Structure of the earth - Temperatures and Pressures with respect to depth - Plate Tectonics - Evolution of Indian Sub Continent - Seismotectonics of India - Severe earthquakes in Indian sub continent - Causes of earthquake - Definition of terms : Fault line, Active Fault, Focus or Hypo centre, Epicentre, Epicentre distance, Focal depth, Peak ground acceleration, Foreshocks, Aftershocks, Aseismic, Isoseismal, Seismic gap - Ground shaking - Seismic waves - Body waves - P-waves and S-waves - Surface waves - Reyleigh and Love waves – Earthquake Intensity - Earthquake size - Magnitude - Wave magnitude, Duration magnitude, Moment magnitude - Energy released - Classification of Earthquake based on magnitude - Consequences of earthquake - Ground motion, Ground rupture, Liquefaction, Landslides, Fire, Tsunamis, etc- Seismic Zoning Map of India (2002) - Earthquake frequency - Prediction of Earthquake risk -Measurement of Earthquake - Instruments used - Various scales - Richter's Magnitude Scale .	**13 Hrs**
II	**SEISMIC EFFECTS ON STRUCTURES** Nature of ground motion - Effects of source, path and site - Ground shaking effect on structures - Effects of Amplitude, Duration and Distance of Earth quake - Damage potential of earthquakes -Effects of Inertia forces, Seismic load, Deformations in structures, Horizontal and Vertical shaking of structures, Transfer of inertia forces from top to bottom - Effects of Soil - Influence of ground condition on earthquake motion - Causes for Seismic damages in buildings: Soft storey failure, Floating columns, Plan irregularity, Vertical irregularity, Lack of confinement of concrete, Long cantilevers with heavy dead loads, Insufficient shear reinforcements in columns, Poor quality construction, Poor quality materials, Corrosion of reinforcement, Pounding of adjacent buildings - Short column effect - Effects of size and shape of buildings - Horizontal and vertical layout of buildings - Effect of shifting of filler wall locations from floor to floor, non uniform rigidity distribution - Ductility and flexibility of buildings.	**13 Hrs**

III	**BEHAVIOUR OF STRUCTURES DURING EARTHQUAKES** Characteristics of buildings affecting their behavior - Symmetry, regularity, stiffness, flexibility, strengthtime period, damping, ductility, materials and method of construction - Ductile, Brittle and Fatigue fractures - Behavior of structures on sloped ground - Behaviour of Structures with load bearing walls – Brick / Stone /Mud masonry - Large inertia forces due to heavy weight, Very low tensile / shear strengths and brittleness of walls, Stress concentration at corners of openings, Unsymmetrical openings, Poor mortars, Free standing masonry walls, Wall enclosures without roof – Cracks in load bearing walls due to flexure and shear caused by earthquake – Improvements in the behavior of reinforced masonry structures - Behaviour of RCC Structures – Framed / Shear wall / Dual structures - Shear failure of columns - Types of damages in beams - Functions of stirrups in seismic beams - Outward bulging of concrete and buckling of compression reinforcement of beams - Effect of joints on the ductile behaviour of RCC / Steel members - Behaviour of Steel structures - Types of joints, Joint collapse, Joint ductility - Behaviour of Non-Structural elements in buildings during earthquakes - Behaviour of brittle elements - Behaviour of structural members under cyclic loading - Soil characteristics and its impact on various types of structures during earth quake – Twisting of buildings	**13 Hrs**
IV	**CONCEPTS OF DESIGN OF EARTHQUAKE RESISTING BUILDINGS** EarthQuake proof building - EarthQuake resisting building - Acceptable damages to building elements under minor and frequent earth quakes, moderate and occasional earthquakes, and strong but rare earth quakes - General requirements of structures for earthquake resistance and structural safety - Concepts of ductility, deformability and damageability - Concept of base isolation - Ductile performance of structures - Reinforcement detailing for ductility of RC structures - Flexible building elements - Special requirements for RC columns and beams to resist earthquake - Confining steel in columns - Special confining reinforcement for Short columns - Maximum spacing of ties and minimum lapping length of main bars in columns - Ductile detailing of RC buildings - Joints of framed structures – Reinforcements in Beam Column Joints - Providing Shear walls – Arrangement of shear walls - Boundary elements of shear walls – Reinforcements for shear walls - Advantages of shear walls in stilt floors of RC buildings - Earthquake resistant features for masonry buildings - Protection of openings in masonry walls - Masonry bond - Horizontal bands or Ring beams at	13 Hrs

	plinth / lintel / roof levels in masonry - Horizontal / Vertical reinforcements in masonry walls - Framing of thin load bearing walls – Reinforcement for hollow block masonry - Reduction of earthquake effects - Base isolation technique - Types - Seismic dampers - Types of Dampers: Viscous, Friction, Yielding dampers – Seismic vibration control.	
V	**RETROFITTING OF BUILDINGS** Evaluation, Repair, Restoration and Seismic Strengthening of Buildings: Assessment of structural and non structural damages caused by earthquakes, major and minor damages, Feasibility study for retrofitting – Structural level retrofitting method and Member level retrofitting method - Repair materials: Shotcrete, Epoxy resins, Epoxy mortar, Gypsum Cement mortar, Quick setting mortars, Mechanical Anchors - Techniques to restore original strength: Repair of minor and medium cracks, Repair of major cracks , crushed concrete and fractured / excessively yielded / buckled reinforcement - Seismic strengthening techniques: Modification of roofs or floors, Insertion of new slab, Stiffening existing slab, Anchoring the slab to supporting walls / beams - Inserting new walls - Strengthening existing walls: Grouting, Use of wire mesh, Connecting the walls, Pre stressing, Providing buttress - Strengthening of RC members: Reinforced concrete rings around existing columns, Jacketing the existing weak beams, Welding new steel to the old steel and replacing the cover, Pre stressing of old beams - Introduction of additional load bearing elements in the structure - Strengthening of Foundations : Improving drainage, Providing apron, Adding RC strips with keys – Strengthening of soft or weak stories of Existing buildings - Bracing of roof truss frames, Anchoring of roof trusses to supporting walls . **REVISION AND TEST**	**13 Hrs** **10 Hrs**

Reference Book:

1. Earthquake Resistant Design of Structures by Pankaj Agarwal and Manish Shrikhande (2010) PHI Learning Pvt Ltd
2. Guidelines for Earthquake Resistant Non Engineered Construction by The Associated Cement Companies Ltd
3. Criteria for Earthquake Resistant Design of Structures - General Provisions and Buildings, IS: 1893 (Part 1) - 2002
4. Code of practice for ductile detailing of RC structures subjected to Seismic forces, IS:13920-1993.
5. Earthquake Tips by C.V.R.Murty, IIT, Kanpur, Sponsored by BMTPC, New Delhi.
6. Geotechnical Earthquake Engineering Hand Book by Robert W.Day – McGRAW - HILL

7. Introduction to Earthquake Engineering by Shunzo Okamoto – University of Tokyo Press
8. Repair and Seismic strengthening of buildings - Guidelines, IS:13935 - 2002
9. Dr Kamalesh Kumar, “Basic Geotechnical Earthquake Engineering”, New Age International Publications, New Delhi, 2009
10. Robert W. Day, “Geotechnical Earthquakes Engineering Hand Book, Tata McGraw-Hill, New Delhi, 2002

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards

BUILDING SERVICES

(ELECTIVE THEORY II)

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31084

Semester : VI Semester

Subject Title : **BUILDING SERVICES (ELECTIVE THEORY II)**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
BUILDING SERVICES	5 Hrs	75 Hrs	Internal Assessment	Board Examination	Total	
			25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl. No.	TOPIC	Time (Hrs)
1	ELECTRICAL SERVICES ELECTRICAL LAYOUT	13
2	MECHANICAL SERVICES AIR-CONDITIONING	13
3	LIGHTING VENTILATION	13
4	FIRE-PROTECTION ACOUSTICS AND SOUND INSULATIONS	13

5	MAINTENANCE OF BUILDINGS DEFECTS AND REPAIR WORKS IN BUILDINGS	13
6	TEST AND REVISION	10
	Total	75

RATIONALE:

One of the major concerns of a civil engineer is to take care of the building works, already constructed, in order to keep these buildings in utmost workable conditions. Usually it is being felt that the buildings deteriorate faster for want of care and proper maintenance. The buildings usually have a shabby appearance due to cracks, leakage from the roofs and sanitary/water supply fittings. Thus the need for teaching the subject is proper perspective has arisen making students aware of importance of maintenance of buildings

OBJECTIVES:

On completion of the course, the student will be familiar with:

- To know principles of electrical services in buildings
- To describe electrical layout
- To explain mechanical services
- To know the principles of air conditioning
- To explain lighting in building
- To describe ventilation system
- To know fire protection in building
- To describe acoustics and sound installations
- To explain the types of maintenance work in building
- To describe defects and repair works in building

31084 BUILDING SERVICES (ELECTIVE THEORY II)

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**1.1 ELECTRICAL SERVICES** Conventional symbols for electrical Installations – Main – Submain – Wiring accessories – Wire, Cable, Switches, Wall plugs, Fuses and Cutouts – H.R.C type, round type, cartridge type – Distribution boxes, circuit breaker, Junction boxes – 2 pin and 3 pin sockets, lamp holder, ceiling roses, change over switches –Various systems of wiring – wooden casing wiring, cleat wiring, CTS wiring, conduit wiring – Insulation – Earthing – Electrical meters – Use of generators, inverters, emergency lamps. **1.2 ELECTRICAL LAYOUT** Planning of Electrical Installations and distribution – Preparation of Electrical layout for a small residence, small work shop, show room, school building etc – Estimation of load.	**13 Hrs**
II	**2.1 MECHANICAL SERVICES** Lifts – Definition – Location – Sizes – Component parts – Lift well, Travel, Pit, Hoist way, Machine, Buffer, Door Locks – Suspended rope, Lift car, Landing Door, Call Indicator, Call Push - Different types of Elevators – Freight elevators, Passengers elevators, Hospital elevators – Dumbwaiters and vertical conveyors – Escalators – Locations and Functions – Advantages of Escalators. **2.2 AIR CONDITIONING** Definition – Purpose – Principles – Temperature control, Air velocity control,. Humidity control – Air Conditioning Systems – Component parts – Air pumps, Air delivery system, Air Distribution system – Cleaners – Filters, Spray washers, Electric precipitators – Types of Air Conditioners – Central type – Window Type –Split unit.	**13 Hrs**
III	**3.1 LIGHTING** Natural and Artificial Lighting – Requirements of good lighting – Day light factors – Day light Penetration – Aims of good lighting – General Principles of openings to afford good lighting – Reflection factors – Illumination – Units of measurement – Lux, candela, Luminous flux – Orientation of buildings – External reflected component – Internal reflected component – Necessity of artificial lighting – Arrangement of luminaries – Distribution of Illumination – Utilization factor – Temperature rise due to artificial lighting – Remedial measures.	**13 Hrs**

	3.2 VENTILATION Definition - Necessity – Types – Natural / Mechanical Ventilation – wind effect – Factors to be considered in the design of Ventilation – respiration, vitiation of air, air changes, heat balance of body – General rules for Natural ventilation – Advantages and Disadvantages of Mechanical Ventilation – Methods of Mechanical Ventilation – Combined Systems.	
IV	**4.1 FIRE PROTECTION** Causes and Effects of fire – Precautionary Measures – Factors to be considered for limiting fire spread area – Characteristics of fire resisting materials – General requirements for fire resisting buildings – Fire protection systems – Fire exits – General requirements as per NBC 2005 – maximum travel distance – Horizontal exit, roof exit / fire lifts, external stairs – Fire fighting installations. **4.2 ACOUSTICS AND SOUND INSULATIONS** Acoustics of Buildings – Characteristics of Sound – Pitch or frequency, intensity, tone – Measurement of intensity of sound - Bel & Decibel – Behavior of sound and its effects - Transmission, reflection, absorption - Echoes, reverberation – common acoustical defects - Requirements of good Acoustics – Principles and factors to be considered in acoustical designs – Sound absorbents – Types – Absorption coefficients - Sound Insulation of buildings - General factors to be considered and constructional measures to be followed for noise control in residential buildings.	**13 Hrs**
V	**5.1 MAINTENANCE OF BUILDINGS** Introduction - Maintenance works in buildings - Painting – Flooring – sinking of floors – Doors and windows – Termite attack – Sanitary appliances – Water supply and drainage system – leakages – Cracks in concrete – Types – Cracks in walls – types - Common methods of crack repair – preventive maintenance - corrosion of steel elements - special precautions for repairs of building **5.2 DEFECTS AND REPAIR WORKS IN BUILDINGS** Defects in buildings - Prevention of defects in buildings – Major causes of defects – Treatment of toilet sunken portion – Improper laying of weathering course - Maintenance works - Specification for weathering course - Lime jelly concrete with tiles - Thermal insulation combined with water proofing for flat concrete roofs - Water proofing - Expansion joints - Repair of rain water leakage in buildings. REVISION AND TEST	**13 Hrs** 10 Hrs

Reference Book:

1. National Building code of India – 2005, Bureau of Indian Standards, New Delhi
2. Building construction, P.C.Varghese, PHI Learning Pvt. Ltd, New Delhi
3. Building construction, Dr.B.C.Punmia, Laxmi Publications (p) Ltd, New Delhi
4. A text book on Building services, R.Udyakumar, Eswar Press, Chennai
5. Building repair and maintenance management, P.S.Gahlot, CBS Publishers & distributors (p) Ltd.
6. Maintenance of Buildings, A C Panchdhari, New Age International Publications, Chennai.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards

ESTIMATING AND COSTING II

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31064

Semester : VI Semester

Subject Title : **ESTIMATING AND COSTING II**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
ESTIMATING AND COSTING II	5 Hrs	75 Hrs	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS :

Sl. No.	TOPIC	Time (Hrs)
1	SPECIFICATION WRITING REPORT WRITING	10
2	VALUATION RENT CALCULATION	16
3	ANALYSIS OF RATES FOR SANITARY AND WATER SUPPLY WORKS ANALYSIS OF RATES FOR BRIDGE / ROAD WORKS AND MISCELLANEOUS ITEMS	13
4	TAKING OFF QUANTITIES OF P H ENGINEERING STRUCTURES USING TRADE SYSTEM	13

5	TAKING OFF QUANTITIES OF ROAD / BRIDGE STRUCTURES USING TRADE SYSTEM	13
6	TEST AND REVISION	10
	Total	75

RATIONALE:

Diploma holders in Civil Engineering are supposed to prepare material 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, contracting principles of valuation. Therefore, this subject has great importance for diploma holders in Civil Engineering.

OBJECTIVES:

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

- To write specifications for various materials and for different items of works.
- To write Technical reports on the proposed projects
- To prepare data for various items of works using Standard data & Schedule of Rates.
- To prepare detailed estimate of quantities of various items of works for P.H.Engineering structures using Trade System.
- To prepare detailed estimate of quantities of various items of works for Bridges and Road works using Trade System.
- To calculate the value of a building / property; to fix rent for a building adopting suitable method.

31064 ESTIMATING AND COSTING II

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**1.1 Specification Writing** Specification – Necessity – Importance of specifications- Types of specifications – General specification , Detailed specification and Standard specification - Essential requirements of specifications – General and Technical provisions of detailed specifications - Specifications for various materials like Cement, Sand, Brick, Timber, Stone aggregate, Reinforcement steel, Tiles, Bitumen, Water etc- General specification for a building – General specification for a Culvert - General specification for a Concrete / Tar Road project - Examples—Detailed specifications for works such as Earth work excavation, Foundation concrete, Stone / Brick masonry, Doors / Windows, RCC in columns / beams / slabs, Plastering, Flooring, Painting / Varnishing, DPC, A.C sheet roofing, Rain water pipes, Centering for roofing, Weathering course, Under reamed Piles, Water bound macadam / Tar roads, Surface dressing with bitumen, Revetments, etc- Examples - Steps involved in writing Standard specification – Advantages of Standard specifications - Writing standard specifications with reference to Tamil Nadu Building Practice / Indian Standards / NBC - Examples **1.2 Report writing** Definition of report – Types – Necessity - Documents to accompany the report - Points to be considered while writing technical reports Writing typical Technical reports for the proposed projects such as: Construction of Buildings (Residential / Hospital / School/ Community Hall) Laying a village road (WBM / Tar / Concrete road) Construction of a bridge/ culvert across a river Construction of a Pedestrian Sub-way/ Foot over bridge across a City road Water supply system for a village Sewage treatment plant for a residential colony in a sub urban area Construction of a new bus terminus in a developing town	**10 Hrs**

II	**2.1 Valuation** Value - Difference between Cost and Value - Purpose of valuation – Definition of terms: Capital cost, Gross income and Net income, Outgoings, Capitalized value and Capital value, Scrap value, Salvage value, Obsolescence, Sinking fund, Depreciation, Years purchase, Book value, Market value, Rateable value, Deferred value of land, Lease, Mortgage, Annuity, Amortization - Factors affecting the value of a property - Classification of Properties - Types of Leases - Problems on determination of Sinking Fund - Problems on calculation of Depreciation - Methods of valuation of Buildings - Valuation based on Comparision / Rent / Profit / Present value - Methods of valuation of Lands - Mathematics of Valuation – Valuation Tables - Problems on Valuation of Buildings / Properties **2.2 Rent Calculation** Fixation of rent – Definition of terms: Standard rent, Fair rent or Reasonable rent, Economical rent, Market rent, Rent certificate - Rent control – Factors influencing the rent of a building - Problems on rent calculation – Fixing rent of a Private building used by Government – Fixing rent of a Government building used by its employees – Fixing rent of a Government building rented to Private parties	**16 Hrs**
III	**3.1 Analysis of rates for Sanitary and Water supply works** Earth work in trenches - Timbering of trenches - Laying stone ware / RCC / GI pipes – Lead joint for cast iron pipes - Cutting and jointing G.I.Pipes, PVC Pipes and Stoneware Pipes - Constructing a man hole in the sewage line of a residence - Providing a dispersion trench for the septic tank of a residential flat – Supplying a Ferro cement circular ring for well sinking - Laying PVC Plumbing lines concealed in to brick masonry walls - Supplying and fixing Indian type water closets with flushing tanks - Supplying and fixing European type water closet with flushing tank - Supplying and fixing a wash basin with tap **3.2 Analysis of rates for Bridge/ Road works and Miscellaneous items** Random Rubble Stone masonry in Abutments and Piers - Providing form work for Deck slabs - R.C.C for Columns / Beams / Deck Slab – Parapets - Hand rails - Earth filling in embankments - Soling for a WBM road - Laying WBM road over the existing soling - Surface dressing - Surface Blinding - Providing Pre mix carpet - Laying Concrete roads - Apron and Revetment works in Canals -Wooden frames for doors - Paneled	**13 Hrs**

	doors - Glazed windows - Steel Grill gates – Steel grills for windows - Supplying and fixing Aluminum partitions - Providing wooden shutters to lofts - Expansion joint in R.C roof (Exposure to use of software in Analysis of rates - not for examination)	
IV	**Taking Off Quantities of P.H.Engineering Structures using Trade System** Preparing detailed estimate using Trade system and Take off quantities for all items of works in the following P.H. Engineering Structures: 1 Septic tanks with dispersion trench / soak pit 2 Open Well with Masonry Steining 3 Rain water harvesting- Shallow Recharge Well 4 Square RCC Over Head Tank on Four columns with Staging	**13 Hrs**
V	**Taking off Quantities of Road / Bridge Structures using Trade System** Preparing detailed estimate using Trade system and Take off quantities for all items of works in the following Road / Bridge Structures: 1 Water Bound Macadam Road 2 Cement Concrete Road with side drains 3 Single span Slab Culvert 4 Tee Beam Bridge **REVISION AND TEST**	**13 Hrs** **10 Hrs**

Reference Book :

1. Rangawala, “Estimating & Costing” , Charotor Publishing;
2. N.A.Shaw, “Quantity Surveying & Valuation”, Khanna Publishers;
3. L.N.Dutta, “Estimating & Costing”, Dhanpat Rai & Sons
4. Bridie, “Estimating & Costing”
5. Indian Standard Code of Practice, IS:1200.
6. Civil Estimating, Casting and Valuation – Kalson Publication Ludhiuyana.
7. Vazirani & Chandolu,” Estimating and Costing” 2001.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards

HYDRAULICS LAB

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31065

Semester : VI Semester

Subject Title : **HYDRAULICS LAB**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
HYDRAULICS LAB	4 Hrs	60 Hrs	25	75	100	3 Hrs

RATIONALE:

Subject of hydraulics lab is a practical 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 student will be familiar with:

- measuring the fluid pressure using manometers
- determination of co-efficient of discharges of Orifice, mouthpiece, orifice meter, venturimeter, notches etc.,
- determination of pipe friction factor
- drawing characteristic curves for centrifugal and Reciprocating pumps.

31065 HYDRAULICS LAB

LIST OF EXPERIMENTS

50 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.
11. Centrifugal pump – To draw characteristic curves

REVISION &TEST **10 Hrs**

REFERENCE:

1. Hydraulic Lab Manual Compiled - T.T.T.I. - Chennai – 113
2. Ghosh and Talapohia - Experimental Hydraulic - Khanna Publishers - New Delhi

ALLOCATION OF MARKS

S.No	Description	Marks
1	Procedure	10
2	Tabulation and Observation	25
3	Calculations	20
4	Sketch / Graph	10

5	Accuracy of result	5
6	Viva-Voce	5
7	Record	25
	Total	100

S.No.	LIST OF EQUIPMENTS REQUIRED	QUANTITY REQUIRED
HYDRAULICS LAB		
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.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards

COMPUTER APPLICATIONS IN CIVIL ENGINEERING PRACTICE

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name: Diploma in Civil Engineering

Subject Code **:** 31066

Semester **:** VI Semester

Subject Title **: COMPUTER APPLICATIONS IN CIVIL ENGINEERING PRACTICE**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hour / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
COMPUTER APPLICATIONS IN CIVIL ENGINEERING PRACTICE	5 Hrs	75 Hrs	25	75	100	3 Hrs

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.

GUIDELINES:

- All the experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

31066 COMPUTER APPLICATIONS IN CIVIL ENGINEERING PRACTICE

LIST OF EXPERIMENTS

PART A

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
   i) Calculate Area and Elongation using Formula bar
   ii) Calculate Effective depth'd' and Area of Steel 'Ast 'using Formula Bar
4. 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
5. Finding centre of gravity; I_{ZZ} and I_{YY} 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**	**http://download.openoffice.org/**
	LibreOffice	**http://www.libreoffice.org/**

PART B

II RCC DETAILING USING SOFTWARE 12 Hours

Generation of detailed drawings for given specification and Preparation of Bar Bending schedule using one of the packages mentioned below or any other suitable packages for the following exercises.

Cross section and longitudinal section of:

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 rectangular beam with two equal span
11. Dog-legged staircase
12. R.C.C Column with square Isolated footing

AICTE - Autodesk ARC educational grant software	**Download Link**
Advance Concrete	**http://www.autodesk.com/education/free-software/advance-concrete**

III RCC STRUCTURES - ANALYSIS USING SOFTWARE 18 Hours

13. Carry out the analysis and design of RCC structures using any one of the available packages mentioned below or any other suitable packages.

Commercial Softwares	***AICTE - Autodesk ARC educational grant software***	**Download Link**
STAADPRO, STRUDD, CADS3D etc.	**Robot Structural Analysis Professional**	**http://www.autodesk.com/education/free-software/robot-structural-analysis-professional**

IV CONSTRUCTION PROJECT MANAGEMENT USING SOFTWARE 10 Hours

14. 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**	**http://www.ganttproject.biz/**

V DRAWING MAPS USING GIS SOFTWARE **5 Hours**

(FOR PRACTICE ONLY – NOT FOR EXAMINATION)

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

AICTE - Autodesk ARC educational grant software	**Download Link**
AUTOCAD MAP 3D	**http://www.autodesk.com/education/free-software/autocad-map-3d**

Commercial Software	**Similar Open source**	**Download Link**
ARCGIS	**QGIS**	**http://www.qgis.org/en/site/**
	GRASS GIS	**http://grass.osgeo.org/**

REVISION & TEST **10 Hours**

References:

1. **http://www.aicte-india.org/downloads/Commercial%20Software.pdf**
2. **http://www.aicte-india.org/downloads/Autodesk%20Program%20Briefing%20Document.pdf**

IN BOARD EXAMINATION, QUESTIONS WILL BE CHOSEN AS FOLLOWS

By lot one question each in Part A & Part B

Part A	-	30 marks
Part B	-	40 marks
Viva - voce	-	5 marks
Record works	-	25 marks
	Total -	**100 marks**

S.NO.	LIST OF THE EQUIPMENTS	QUANTITY REQUIRED
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

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CIVIL ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 -2016 onwards

PROJECT WORK

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN CIVIL ENGINEERING

M-SCHEME

(To be implemented to the student admitted from the year 2015-2016 onwards)

Course Name : Diploma in Civil Engineering

Subject Code : 31067

Semester : VI Semester

Subject Title : **PROJECT WORK**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15 weeks

Subject Title	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
PROJECT WORK	4 Hrs	60 Hrs	25	75	100	3 Hrs

RATIONALE:

As far as possible 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 firsthand 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.

WORKS INVOLVED IN PROJET 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 and Abstract Estimate – Structural Drawings – Preparation of Report about the project.

IMPORTANT DOCUMENTS TO BE REFERRED FOR THE ABOVE ACTIVITIES:

Sl. No	Activity	Reference
1.	Preparation of Architectural Drawings	1. Building Regulations of Locality 2. National Building Code , etc.
2.	Structural design steel etc. Concrete. reinforcement	1. Relevant IS code for masonry, structures 2. IS 456 for Reinforced Cement 3. Hand book on detailing for (SP-34)
3.	Specification of material and work procedure State Govt. Highways, etc. Central Govt. Railways, etc.	1. Construction procedure by organization viz. PWD , 2. Construction procedure by organization viz. CPWD , 3. Specification by Architect etc.,

Minimum Marks for Pass is 50 out of which minimum 35 marks should be obtained out of 75 marks in the board Examination alone.

- 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.
- Understand the facts and importance of environmental management.
- Understand and gain knowledge about disaster management

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.

Detail of assessment	**Period of assessment**	**Max. Marks**
First Review	6^{th} week	10
Second Review	14^{th} week	10
Attendance	Entire semester	5
Total		**25**

EVALUATION FOR BOARD EXAMINATION:

Details of Mark allocation	**Max Marks**
Marks for Report Preparation, Demo, Viva-voce	65
Marks for answers of 4 questions which is to be set by the external examiner from the given question bank consisting of questions in the following two topics Disaster Management and Environmental Management. Out of four questions two questions to appear from each of the above topics i.e. 2 questions x 2 topics = 4 questions 4 questions x 2 ½ marks = 10 Marks	10
Total	**75**

DETAILED SYLLABUS

ENVIRONMENTAL & DISASTER MANAGEMENT

1. ENVIRONMENTAL MANAGEMENT

Introduction – Environmental Ethics – Assessment of Socio Economic Impact – Environmental Audit – Mitigation of adverse impact on Environment – Importance of Pollution Control – Types of Industries and Industrial Pollution.

Solid waste management – Characteristics of Industrial wastes – Methods of Collection, transfer and disposal of solid wastes – Converting waste to energy – Hazardous waste management Treatment technologies.

Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health.

Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management.

Noise pollution management – Effects of noise on people – Noise control methods.

2. DISASTER MANAGEMENT

Introduction – Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life..

Disaster Mitigation measures – Causes for major disasters – Risk Identification – Hazard Zones – Selection of sites for Industries and residential buildings – Minimum distances from Sea – Orientation of Buildings – Stability of Structures – Fire escapes in buildings - Cyclone shelters – Warning systems.

Disaster Management – Preparedness, Response, Recovery – Arrangements to be made in the industries / factories and buildings – Mobilization of Emergency Services - Search and Rescue operations – First Aids – Transportation of affected people – Hospital facilities – Fire fighting arrangements – Communication systems – Restoration of Power supply – Getting assistance of neighbors / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances – Rehabilitation.

LIST OF QUESTIONS

1. ENVIRONMENTRAL MANAGEMENT

1. What is the responsibility of an Engineer-in-charge of an Industry with respect to Public Health?
2. Define Environmental Ethic.
3. How Industries play their role in polluting the environment?
4. What is the necessity of pollution control? What are all the different organizations you know, which deal with pollution control?

5. List out the different types of pollutions caused by a Chemical / Textile / Leather / Automobile / Cement factory.
6. What is meant by Hazardous waste?
7. Define Industrial waste management.
8. Differentiate between garbage, rubbish, refuse and trash based on their composition and source.
9. Explain briefly how the quantity of solid waste generated in an industry could be reduced.
10. What are the objectives of treatments of solid wastes before disposal?
11. What are the different methods of disposal of solid wastes?
12. Explain how the principle of recycling could be applied in the process of waste minimization.
13. Define the term 'Environmental Waste Audit'.
14. List and discuss the factors pertinent to the selection of landfill site.
15. Explain the purpose of daily cover in a sanitary landfill and state the minimum desirable depth of daily cover.
16. Describe any two methods of converting waste into energy.
17. What actions, a local body such as a municipality could take when the agency appointed for collecting and disposing the solid wastes fails to do the work continuously for number of days?
18. Write a note on Characteristics of hazardous waste.
19. What is the difference between municipal and industrial effluent ?
20. List few of the undesirable parameters / pollutants anticipated in the effluents from oil refinery industry / thermal power plants / textile industries / woolen mills / dye industries / electroplating industries / cement plants / leather industries (any two may be asked)
21. Explain briefly the process of Equalization and Neutralization of waste water of varying characteristics discharged from an Industry.
22. Explain briefly the Physical treatments "Sedimentation" and "Floatation" processes in the waste water treatment.
23. Explain briefly when and how chemical / biological treatments are given to the waste water.
24. List the four common advanced waste water treatment processes and the pollutants they remove.
25. Describe refractory organics and the method used to remove them from the effluent.
26. Explain biological nitrification and de-nitrification.
27. Describe the basic approaches to land treatment of Industrial Effluent.
28. Describe the locations for the ultimate disposal of sludge and the treatment steps needed prior to ultimate disposal.
29. List any five Industries, which act as the major sources for Hazardous Air Pollutants.

30. List out the names of any three hazardous air pollutants and their effects on human health.
31. Explain the influence of moisture, temperature and sunlight on the severity of air pollution effects on materials.
32. Differentiate between acute and chronic health effects from Air pollution.
33. Define the term Acid rain and explain how it occurs.
34. Discuss briefly the causes for global warming and its consequences
35. Suggest suitable Air pollution control devices for a few pollutants and sources.
36. Explain how evaporative emissions and exhaust emissions are commonly controlled.
37. What are the harmful elements present in the automobile smokes? How their presence could be controlled?
38. What is the Advantage of Ozone layer in the atmosphere? State few reasons for its destruction.
39. Explain the mechanism by which hearing damage occurs.
40. List any five effects of noise other than hearing damage.
41. Explain why impulsive noise is more dangerous than steady state noise.
42. Explain briefly the Source – Path – Receiver concept of Noise control.
43. Where silencers or mufflers are used ? Explain how they reduce the noise.
44. Describe two techniques to protect the receiver from hearing loss when design / redress for noise control fail.
45. What are the problems faced by the people residing along the side of a railway track and near to an Airport? What provisions could be made in their houses to reduce the problem?

2. DISASTER MANAGEMENT

1. What is meant by Disaster Management? What are the different stages of Disaster management?
2. Differentiate Natural Disasters and Man made Disasters with examples.
3. Describe the necessity of Risk identification and Assessment Surveys while planning a project.
4. What is Disasters recovery and what does it mean to an Industry?
5. What are the factors to be considered while planning the rebuilding works after a major disaster due to flood / cyclone / earthquake? (Any one may be asked)
6. List out the public emergency services available in the state, which could be approached for help during a natural disaster.
7. Specify the role played by an Engineer in the process of Disaster management.
8. What is the cause for Earthquakes? How they are measured? Which parts of India are more vulnerable for frequent earthquakes?
9. What was the cause for the Tsunami 2004 which inflicted heavy loss to life and property along the coast of Tamilnadu ? Specify its epicenter and magnitude.

10. Specify the Earthquake Hazard Zones in which the following towns of Tamilnadu lie: (a) Chennai (b) Nagapattinam (c) Coimbatore (d) Madurai (e) Salem.
11. Which parts of India are experiencing frequent natural calamities such as (a) heavy rain fall (b) huge losses due to floods (c) severe cyclones
12. Define basic wind speed. What will be the peak wind speed in (a) Very high damage risk zone – A, (b) High damage risk zone, (c) Low damage risk zone.
13. Specify the minimum distance from the Sea shore and minimum height above the mean sea level, desirable for the location of buildings.
14. Explain how the topography of the site plays a role in the disasters caused by floods and cyclones.
15. Explain how the shape and orientation of buildings could reduce the damages due to cyclones.
16. What is a cyclone shelter ? When and where it is provided ? What are its requirements ?
17. What Precautionary measures have to be taken by the authorities before opening a dam for discharging the excess water into a canal/river ?
18. What are the causes for fire accidents ? Specify the remedial measures to be taken in buildings to avoid fire accidents.
19. What is a fire escape in multistoried buildings ? What are its requirements ?
20. How the imamates of a multistory building are to be evacuted in the event of a fire/Chemical spill/Toxic Air Situation/ Terrorist attack, (any one may be asked).
21. Describe different fire fighting arrangements to be provided in an Industry.
22. Explain the necessity of disaster warning systems in Industries.
23. Explain how rescue operations have to be carried out in the case of collapse of buildings due to earthquake / blast / Cyclone / flood.
24. What are the necessary steps to be taken to avoid dangerous epidemics after a flood disaster?
25. What relief works that have to be carried out to save the lives of workers when the factory area is suddenly affected by a dangerous gas leak / sudden flooding ?
26. What are the difficulties faced by an Industry when there is a sudden power failure? How such a situation could be managed?
27. What are the difficulties faced by the Management when there is a group clash between the workers? How such a situation could be managed?
28. What will be the problems faced by the management of an Industry when a worker dies because of the failure of a mechanical device due to poor maintenance? How to manage such a situation ?
29. What precautionary measures have to be taken to avoid accidents to labourers in the Industry in a workshop / during handling of dangerous Chemicals / during construction of buildings / during the building maintenance works.
30. Explain the necessity of medical care facilities in an Industry / Project site.
31. Explain the necessity of proper training to the employees of Industries dealing with hazardous products, to act during disasters.

32. What type of disaster is expected in coal mines, cotton mills, Oil refineries, ship yards and gas plants?
33. What is meant by Emergency Plan Rehearsal? What are the advantages of such Rehearsals?
34. What action you will take when your employees could not reach the factory site because of continuous strike by Public Transport workers?
35. What immediate actions you will initiate when the quarters of your factory workers are suddenly flooded due to the breach in a nearly lake / dam, during heavy rain?
36. What steps you will take to avoid a break down when the workers union of your Industry have given a strike notice?
37. List out few possible crisis in an organization caused by its workers? What could be the part of the middle level officials in managing such crisis?
38. What types of warning systems are available to alert the people in the case of predicted disasters, such as floods, cyclone etc.
39. Explain the necessity of Team work in the crisis management in an Industry / Local body.
40. What factors are to be considered while fixing compensation to the workers in the case of severe accidents causing disability / death to them?
41. Explain the legal / financial problems the management has to face if safely measures taken by them are found to be in adequate.
42. Describe the importance of insurance to men and machinery of an Industry dealing with dangerous jobs.
43. What precautions have to be taken while storing explosives in a match/ fire crackers factory?
44. What are the arrangements required for emergency rescue works in the case of Atomic Power Plants?
45. Why residential quarters are not constructed nearer to Atomic Power Plants?

****

LIST OF SUGGESTED PROJECTS

COMPARITIVE 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 concete

MIX DESIGN

- Comparative study of mix design by different methods

SPECIAL TYPES OF CONCRETE CONSTRUCTION

- Bamboo as a reinforcing material
- Ferro cement products – water Tanks, Septic tank
- Fibre reinforced concrete
- Self Compacting concrete

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

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

- Using Factory waste (such as steel, flyash, thermo cool etc) as substitute for Building materials
- Low cost Housing
- Rehabilitation of structures

A neatly prepared PROJECT REPORT in the following format has to be submitted individually during the Project Work & Viva Voce Board examination.

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 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

(iii) 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.

REFERENCES

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. 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

SANDHYA. A 10200382
GAYATHRI. R 10293990
MUTHUSAMY. G 10293991
RAJA. D 10289898

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 2018

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 >>
College >>

<<Signature of the Guide>>
SIGNATURE

<<Name>>
GUIDE
<<Academic Designation>>
<<Department>>
<<Full address of the Dept &

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

CHAPTER NO. NO.	TITLE	PAGE
	ABSTRACT	**iii**
	LIST OF TABLE	**xvi**
	LIST OF FIGURES	**xviii**
	LIST OF SYMBOLS	**xxvii**
1.	**INTRODUCTION**	**1**
	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
2.	**CAHPTER I**	**69**
	2.1 GENERAL	75
	2.2	99
	2.2 …….	100

SANDWICH DIPLOMA COURSE-INDUSTRIAL TRAINING

31091 Industrial Training I (Report writing & Viva Voce)

31092 Industrial Training II (Report writing & Viva Voce)

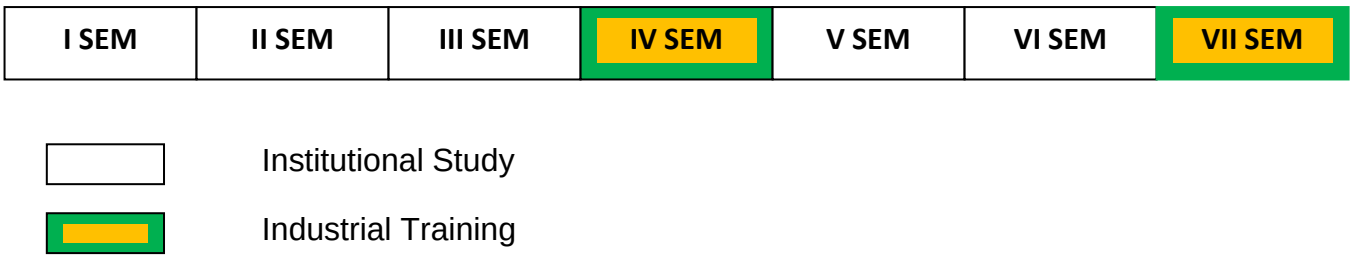
1. Introduction

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 3years-Full Time Diploma Course being regrouped for academic convenience.

While in the 4th 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 7th 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.



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.

a. Scheme of Evaluation

1.1 Internal Assessment Marks

First Review (during 3rd month)	: 10 marks
Second Review (during 5th month)	: 10 marks
Attendance *	: 05 marks (Awarded same as in Theory)
Total	: 25 marks

1.2 Board Examination

Presentation about Industrial Training	: 20 marks
Comprehensive Training Report	: 30 marks
Viva-voce	: 25 marks
Total	: 75 marks

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

****