VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),
(Affiliated to Directorate of Technical Education, Chennai – 25)

VIRUDHUNAGAR – 626 001.

SYLLABUS

DIPLOMA IN CIVIL ENGINEERING

N1 – SCHEME

(2019-2020 onwards)

OUTCOME BASED EDUCATION

Head of the Department **Principal**

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),
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VIRUDHUNAGAR.

N1 - SCHEME

Regulations [MPEC SYSTEM]

(Implemented from 2019-2020)

Diploma Courses in Engineering / Technology/ Commerce

1. Autonomy and Multi Point Entry and Credit System:

As per G.O Ms 1136 dated 20.11.92 our Institution has been granted Autonomous status from the academic year 1994–95.

The Students admitted for the I Term Engineering at this Institution in Multi Point Entry Credit System (MPEC) will study under Autonomous pattern.

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, Tamil Nadu.

(Or)

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

(Or)

The Matriculation Examination of Tamil Nadu.

(Or)

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

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

3. Admission to Second year (Lateral Entry):

A pass in HSC (Academic) or (Vocational) Courses mentioned in the Higher Secondary Schools in Tamil Nadu affiliated to the Tamil Nadu Higher Secondary Board with eligibility for University Courses of study or equivalent examination and 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 Diploma Courses	Physics, Chemistry & Mathematics/Biology (Botony and Zoology)	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 Secretary ship.

- For the diploma programmes related with Engineering/Technology, the related / alternate courses prescribed along with Practical may also be taken for arriving the eligibility.
- Programme will be allotted according to merit through counseling by the Principal as per communal reservation.
- *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. Courses of Study and Curriculum Outline:

The Courses of study shall be in accordance with the curriculum prescribed by the Autonomous Academic Board from time to time, both in Theory and Practical. The curriculum outline is given in Annexure–I.

7. Description of the Programme:

The Programme for the Full Time Diploma in Engineering & Technology / MOP shall extend over a period of three academic years, consisting of six terms. Each Term will have 15 weeks duration of study.

The Curriculum for all the Six Terms of Diploma Programme have been revised and revised curriculum is applicable for the candidates admitted from 2019–2020 academic year onwards.

8. Requirements of Examination and Attendance:

The Examination shall be conducted at the end of each term by the Autonomous body affiliated to the State Board of Technical Education and Training, Tamilnadu.

A Candidate will be permitted to appear for the Autonomous End Examinations only if he/she secures minimum 80% of attendance in the term concerned.

If the candidate does not appear for at least one of the regular courses in the End Examination, he/she has to attend the same term in the next academic year.

9. Eligibility for the Award of Diploma:

No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed programme of study for a period of not less than **three academic years** in the Institution, when joined in First Year and **two academic years** if joined under Lateral Entry scheme in the second year and passed the prescribed examination. The minimum and maximum periods for completion of Diploma Programme are as given below.

Diploma Courses	Minimum Period	Maximum Period
Full Time	**3 Years**	**6 Years**
Full Time (Lateral Entry)	**2 Years**	**5 Years**

10. Autonomous End Examinations:

Autonomous End Examinations in all Programme of all the terms under the scheme of examinations will be conducted at the end of each term both in theory and practical. The internal assessment marks for all the courses will be awarded on the basis of continuous internal assessment earned during the term concerned. For each course, 25 Marks are allotted for internal assessment and 75 Marks are allotted for End Examination.

11. Continuous Internal Assessment:

I) THEORY

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

Test	**-**	**10 Marks**
Assignment / Drawing Plate	**-**	**10 Marks**
Course Attendance	**-**	**5 Marks**

Total		**25 Marks**

(i) Test **10 Marks**

Two Periodical Tests each of two hours duration for total of 50 Marks each and Model Examination for three hours duration for 75 Marks are to be conducted. The average of two periodical tests (PT) is to be taken for 5 Marks and Model Exam to be taken for another 5 marks. The periodical test mark and model exam marks are to be converted to five marks and awarded with the next higher integer if there is any fraction.

Total test marks (5 + 5) = 10 Marks

TEST	SYLLABUS	MAXIMUM MARKS	DURATION	WHEN TO CONDUCT
Periodical Test – I	I & II Unit	50	2 Hrs.	30 working days from Reopening
Periodical Test – II	III & IV Unit	50	2 Hrs.	30 working days from first periodical test
Model Exam	All Units	75	3 Hrs.	After last working day

(a) [i] Question Paper Pattern for Periodical Test – I & Test – II (First Year)

With No Choice

Part – A	4 Questions x 2 Marks	-	8 Marks
Part – B	4 Questions x 3 Marks	-	12 Marks
Part – C	6 Questions x 5 Marks	-	30 Marks

		Total	50 Marks

[ii] Question Paper Pattern for Periodical Test – I & Test – II (Engineering)

With No Choice:

Part – A	4 Questions x 2 Marks	-	8 Marks
Part – B	4 Questions x 3 Marks	-	12 Marks
Part – C	3 Questions x 10 Marks	-	30 Marks

		Total	50 Marks

[iii] Question Paper Pattern for Periodical Test – I & Test – II

(Modern Office Practice)

With No Choice:

Part – A	4 Questions x 5 Marks	-	20 Marks
Part – B	2 Questions x 15 Marks	-	30 Marks

		Total	50 Marks

(b) Question Paper Pattern for Model Exam:

(First Year, Engineering & Modern Office Practice)

As per Syllabus Book

(ii) Assignment **10 Marks**

For each course, three Assignments are to be given each for 10 Marks and the total marks scored should be converted to 10 Marks and awarded with the next higher integer if there is any fraction.

(iii) Course Attendance **5 Marks**

Award of marks for course attendance to each Theory / Practical Course / Project Work and Seminar will be as per the range given below.

Attendance mark reference table

Range of Attendance (%)	Marks
80% - 83%	1
84% - 87%	2
88% - 91%	3
92% - 95%	4
96% - 100%	5

(iv) Total

The Attendance (5 Marks), Assignment (10 Marks) & Test Marks (10 Marks) should be added and the Continuous Internal assessment marks for a total of 25 Marks is arrived.

II) PRACTICAL / DRAWING

The internal assessment mark calculation for Practical courses is given as follows:-

a) Observation and Exercise	:	10 Marks
b) Model Practical Examination	:	10 Marks
c) Attendance	:	5 Marks

Total	:	25 Marks

- After completion of each exercise, record should be submitted in the subsequent practical classes and marks awarded for observation should be carried over to record.
- The mark should be awarded for 10 in each exercise.
- The students have to submit the duly signed Bonafide record note book / file during the End Practical Examinations.
- All the experiments indicated in the syllabus should be completed and the same be given for final End Examinations.

Note: All the marks awarded for Assignments, Tests and Attendance should be entered in the course file / log book of the staff, who is handling the course. This is applicable to both Theory and Practical courses.

For Drawing

For drawing courses, 20 Marks should be awarded for each drawing plate. The total of all drawing plate marks should be converted to 10 marks and awarded with the next higher integer if there is any fraction.

12. Project Work and Seminar:

The students of all the Diploma Programmes have to do a Project Work and Seminar as part of the Curriculum and in partial fulfillment 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 in department, institution wise, region wise and state wise. The selection of Project Work should be taken up in V Term of study.

The Project may be reviewed twice during 4th and 10th week of VI Term.

a) Internal assessment marks for Project Work and Seminar:

Project Review I & II (VI Term) (5+5)	:	10 Marks
Seminar I & II (5+5)/2	:	5 Marks
Project report	:	5 Marks
Attendance (Award of marks same as course pattern)	:	5 Marks
TOTAL	:	25 Marks

b) Mark Allocation for Project Work and Seminar in End Examination:

Viva Voce	:	25 Marks
Demonstration / Presentation	:	50 Marks
(The following Criteria components to be considered- Relevance of topic, Knowledge of methodology, Role of individual in the team, finding the Study etc.)		
TOTAL	:	75 Marks

A neatly prepared **PROJECT REPORT** as per the format has to be submitted by individual student during the Project work End Examination.

Selection of seminar topics should be based on Professional Ethics, Environmental Engineering and Management.

Proper record is **to be maintained for the two project reviews & seminars** and it should be preserved for two terms.

13. Academic Audit:

All Test Papers and assignment note books after getting the signature with date from the students must be kept in the safe custody in the Department for verification and audit for two terms.

14. Criteria for pass:

1. No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed programme of study successfully and pass all the courses prescribed in the curriculum.

2. A candidate shall be declared to have passed the examination in a course if he/she secures not less than 40% in Theory courses and 50% in Practical courses out of the total prescribed maximum marks including both the Internal Assessment and the End Examination marks put together, subject to the condition that he/she has secured at least a **minimum of 30 Marks out of 75 Marks in the End Theory and a minimum of 35 Marks out of 75 Marks in the End Practical Examinations.**

15. Classification of successful candidates:

Classification of candidates who pass out the final examinations from April 2022 onwards (joined in first year 2019-2020) 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 courses and passes all the terms in the first appearance itself and passes all the courses within the stipulated minimum period of study 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 terms put together and passes all the above terms except the I & II Term in the first appearance itself and passes all the courses within the stipulated minimum period of study 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 terms put together and passes all the courses within the stipulated minimum period of study without any break in study.

Second class

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

16. Duration of a period in the Class Time Table:

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

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PROGRAMME: All Programme of Diploma in Engineering and Technology except DMOP

N1–SCHEME

ANNEXURE - I

LIST OF COURSES

I FOUNDATION COURSES

Course Code	Name of the course	Credits	Prerequisites
N1BE101	Communication English-I	2	-
N1BE102	Engineering Mathematics	5	-
N1BE103	Engineering Physics-I	3	-
N1BE104	Engineering Chemistry– I	3	-
N1BE105	Engineering Physics -I Practical	2	-
N1BE106	Engineering Chemistry -I Practical	2	-
N1BE107	Communication Skill Practical	3	-
N1BE108	Computer Application Practical	3	-
N1BE109	Communication English-II	2	N1BE101
N1BE110	Applied Mathematics	4	N1BE102
N1BE111	Engineering Physics –II	2	N1BE103
N1BE112	Engineering Chemistry-II	2	N1BE104
N1BE113	Engineering Physics -II Practical	2	N1BE105
N1BE114	Engineering Chemistry -II Practical	2	N1BE106
Total Credits		37	

II CORE COURSES

Course Code	Name of the course	Credits	Prerequisites
N1BE201	Engineering Graphics	5	-
N1BE202	Engineering Drawing	5	N1BE201
N1BE203	Workshop Practice	3	-
Total Credits		13	

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III APPLIED COURSE

Course Code	Name Of the Course	Credits	Prerequisite
N1CE301	Theory of Structures	6	N1CE204
N1CE302	Transportation Engineering	5	N1CE205
N1CE303	Surveying – II	5	N1CE206
N1CE304	Structural Engineering	6	N1CE301
N1CE305	Environmental Engineering & Pollution Control	5	-
N1CE306	Construction Management with MIS	5	-
N1CE307	Estimating & Costing – II	5	N1CE207
N1CE308	Material Testing Lab - I	2	N1CE204
N1CE309	Material Testing Lab - II	2	N1CE308
N1CE310	Surveying Practice - II	4	N1CE210
N1CE311	CAD in Civil Engineering Drawing - I	3	N1CE209
N1CE312	Civil Engineering Drawing - II	4	N1CE209
N1CE313	Construction Practice Lab	2	N1CE205
N1CE314	CAD in Civil Engineering Drawing - II	3	N1CE312
N1CE315	Hydraulics Lab	2	N1CE208
N1CE316	Computer Applications in Civil Engineering	3	
N1CE317	Environmental Engineering Practical	2	N1CE305
	Total	64	60

IV DIVERSIFIED COURSE

Course Code	Name Of the Course	Credits	Prerequisite
	Elective Theory – I	5	
N1CE401	Water Resources Management		N1CE208
N1CE402	Remote Sensing and GIS		N1CE303
N1CE403	Building Services		-
N1CE404	Soil Mechanics and Foundation Engineering		
	Elective Theory – II	5	
N1CE405	Advanced Construction Technology		N1CE205
N1CE406	Town Planning		-
N1CE407	Steel Structures		N1CE304
N1CE408	Earthquake Engineering		
N1CE409	3-D CAD in Civil Engineering Drawing	2	N1CE311
N1CE410	Project Work and Seminar	4	N1CE304, N1CE307
	Total	16	

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PROGRAMME: CIVIL ENGINEERING

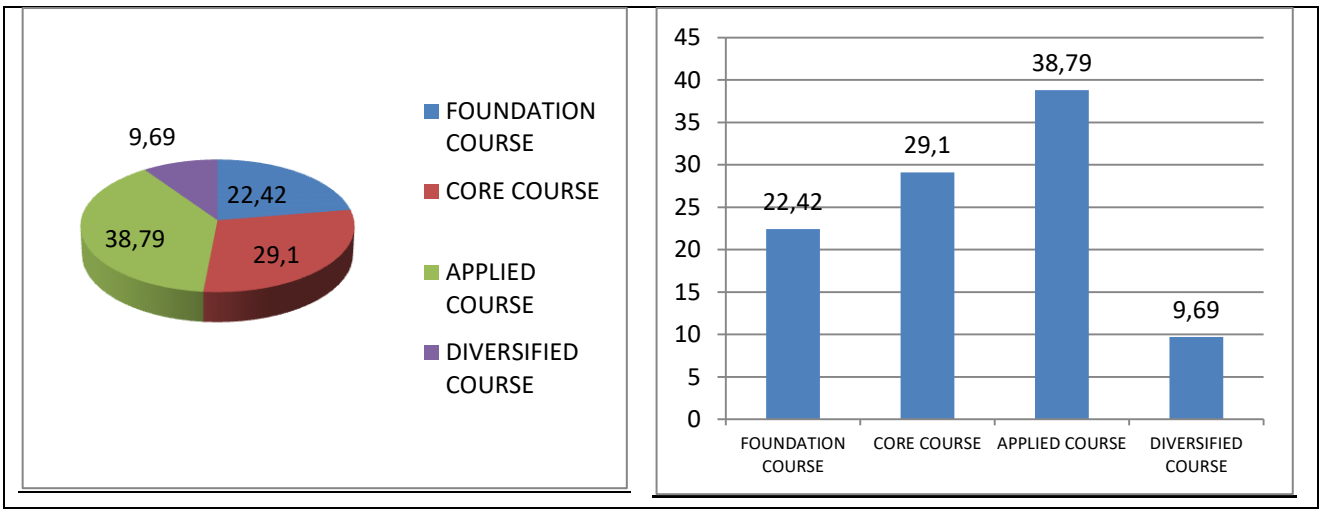
M P E C SYSTEM

TOTAL CREDITS FOR THE COURSES

Courses	Credits	Percentage (%)
FOUNDATION COURSE	**37**	**22.42**
CORE COURSE	**48**	**29.10**
APPLIED COURSE	**64**	**38.79**
DIVERSIFIED COURSE	**16**	**9.69**
TOTAL	**165**	**100.00**

No of Credits	
I Term	25
II Term	25
III Term	29
IV Term	29
V Term	27
VI Term	30
TOTAL	**165**

A summary of the new curricular structure for the Diploma in Civil Engineering is illustrated below:—



Distribution of Different Courses of the N1 Curriculum

COURSES OF PROGRAMME	1ST Term	2ND Term	3rd Term	4th Term	5th Term	6th Term	TOTAL (%)
FOUNDATION COURSES	20	17	—	—	—	—	37 (22.42%)
CORE COURSES	5	8	26	5	—	6	48 (29.10%)
APPLIED COURSES			3	22	22	15	58 (35.15%)
DIVERSIFIED COURSES	—	—	—	2	5	9	22 (13.33%)
T O T A L	25	25	29	29	27	30	165 (100.00%)

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CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS

PROGRAMME: All Programme of Diploma in Engineering and Technology except DMOP

N1–SCHEME

I TERM

Course Code	Course Name	Col No	Hours Per week			Credits	Duration of Exam in hours	Examination Marks			Minimum Marks for pass
			Theory	Drawing	Tutorial Practical			Internal Assessment marks	External Exam Marks	Total Marks	
N1BE101	Communication English-I	1	4	-	-	2	3	25	75	100	40
N1BE102	Engineering Mathematics	2	7	-	-	5	3	25	75	100	40
N1BE103	Engineering Physics-I	3	5	-	-	3	3	25	75	100	40
N1BE104	Engineering Chemistry– I	4	5	-	-	3	3	25	75	100	40
N1BE201	Engineering Graphics	5	-	6	-	5	3	25	75	100	40
N1BE105	Engineering Physics -I Practical	6	-	-	2	2	3	25	75	100	50
N1BE106	Engineering Chemistry -I Practical	7	-	-	2	2	3	25	75	100	50
N1BE107* N1BE108^	Communication Skill Practical* Computer Application Practical^	8	-	-	3	3	3	25	75	100	50
	Library				1						
	Total		21	6	8	25		200	600	800	-

* For Circuit Programme only
^ For Non-Circuit Programme only

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PROGRAMME: All Programme of Diploma in Engineering and Technology except DMOP

N1–SCHEME

II TERM

Course Code	Course Name	Col No	Hours Per week			Credits	Duration of Exam in hours	Examination Marks			Minimum Marks for pass
			Theory	Drawing	Tutorial Practical			Internal Assessment marks	External Exam Marks	Total Marks	
N1BE109	Communication English-II	1	4	-	-	2	3	25	75	100	40
N1BE110	Applied Mathematics	2	6	-	-	4	3	25	75	100	40
N1BE111	Engineering Physics-II	3	4	-	-	2	3	25	75	100	40
N1BE112	Engineering Chemistry– II	4	4	-	-	2	3	25	75	100	40
N1BE202	Engineering Drawing	5	-	6	-	5	3	25	75	100	40
N1BE113	Engineering Physics -II Practical	6	-	-	2	2	3	25	75	100	50
N1BE114	Engineering Chemistry –II Practical	7	-	-	2	2	3	25	75	100	50
N1BE203	Workshop Practice	8	-	-	3	3	3	25	75	100	50
N1BE107^ N1BE108*	Communication Skill Practical^ Computer Application Practical*	9	-	-	3	3	3	25	75	100	50
	Library				1						
	Total		**18**	**6**	**11**	**25**		**225**	**675**	**900**	

* For Circuit Programme only
^ For Non-Circuit Programme only

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CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS
PROGRAMME: CIVIL ENGINEERING

N1–SCHEME

III TERM

Course Code	Course Name	Column No	Hours Per Week			Credits	Prerequisites	Duration of Exam	Marks			Minimum for Pass
			Theory	Drawing	Practical				Int	Ext	Total	
N1CE204	Engineering Mechanics	1	6	-	-	6	N1BE103	3	25	75	100	40
N1CE205	Construction Materials and Construction Practice	2	5	-	-	5	-	3	25	75	100	40
N1CE206	Surveying – I	3	5	-	-	5	-	3	25	75	100	40
N1CE209	Civil Engineering Drawing – I	4	-	6	-	4	N1BE201	3	25	75	100	40
N1CE308	Material Testing Lab – I	5	-		3	2	N1CE204	3	25	75	100	50
N1CE210	Surveying Practice – I	6	2		4	4	N1CE206	3	25	75	100	50
N1CE311	CAD in Civil Engineering Drawing - I	7	1		3	3	N1CE209	3	25	75	100	50
TOTAL			19	6	10	29			175	525	700	

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CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS
PROGRAMME: CIVIL ENGINEERING

N1–SCHEME

IV TERM

Course Code	Course Name	Column No	Hours Per Week			Credits	Prerequisites	Duration of Exam	Marks			Minimum for Pass
			Theory	Drawing	Practical				Int	Ext	Total	
N1CE301	Theory of Structures	1	6	-	-	6	N1CE204	3	25	75	100	40
N1CE302	Transportation Engineering	2	5	-	-	5	-	3	25	75	100	40
N1CE303	Surveying - II	3	5	-	-	5	N1CE206	3	25	75	100	40
N1CE207	Estimating and Costing -I	4	5	-	-	5	-	3	25	75	100	40
N1CE309	Material Testing Lab - II	5	-	-	3	2	N1CE302	3	25	75	100	50
N1CE310	Surveying Practice -II	6	2	-	4	4	N1CE210	3	25	75	100	50
N1CE409	3-D CAD in Civil Engineering Drawing	7	-	-	5	2	N1CE311	3	25	75	100	50
TOTAL			23		12	29			175	525	700	

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CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS

PROGRAMME: CIVIL ENGINEERING

N1–SCHEME

V TERM

Course Code	Course Name	Column No	Hours Per Week			Credits	Prerequisites	Duration of Exam	Marks			Minimum for pass
			Theory	Drawing	Practical				Int	Ext	Total	
N1CE304	Structural Engineering	1	6	-	-	6	N1CE301	3	25	75	100	40
N1CE305	Environmental Engineering and Pollution Control	2	5	-	-	5	-	3	25	75	100	40
N1CE401	**Elective Theory –I** a)Water Resources Management	3	5	-	-	5	N1CE208	3	25	75	100	40
N1CE402	b)Remote Sensing and GIS						N1CE303	3	25	75	100	40
N1CE403	c)Building Services						-	3	25	75	100	40
N1CE404	d) Soil Mechanics and Foundation Engineering						-	3	25	75	100	40
N1CE312	Civil Engineering Drawing -II	4		6	-	4	N1CE209	3	25	75	100	40
N1CE313	Construction Practice Lab	5	-		3	2	N1CE205	3	25	75	100	50
N1CE314	CAD in Civil Engineering Drawing - II	6	-		6	3	N1CE312	3	25	75	100	50
N1CE317	Environmental Engineering Practical	7	-		4	2	N1CE305	3	25	75	100	50
TOTAL			16	6	13	27			175	525	700	

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CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS

PROGRAMME: CIVIL ENGINEERING

N1–SCHEME

VI TERM

Course Code	Course Name	Column No	Hours Per Week			Credits	Prerequisites	Duration of Exam	Marks			Minimum for pass
			Theory	Drawing	Practical				Int	Ext	Total	
N1CE306	Construction Management with MIS	1	5	-	-	5	-	3	25	75	100	40
N1CE208	Hydraulics	2	6	-	-	6	-	3	25	75	100	40
N1CE405	**Elective Theory – II** a)Advanced Construction Technology	3	5	-	-	5	N1CE205	3	25	75	100	40
N1CE406	b)Town Planning				-		-	3	25	75	100	40
N1CE407	c)Steel Structures				-		N1CE304	3	25	75	100	40
N1CE408	d) Earthquake Engineering				-			3	25	75	100	40
N1CE307	Estimating and Costing - II	4	5	-	-	5	N1CE207	3	25	75	100	40
N1CE315	Hydraulics Practical	5		-	3	2	N1CE208	3	25	75	100	50
N1CE316	Computer Applications in Civil Engineering	6		-	5	3	N1CE311	3	25	75	100	50
N1CE410	Project Work and Seminar	7		-	4	4	N1CE304 N1CE307	3	25	75	100	50
TOTAL		23		-	12	30			175	525	700	

INSTITUTE MISSION

" Our Mission is to produce disciplined and Quality
technocrats through academic programme of
noted e xcellence to serve the society"

INSTITUTE VISION

"To be an institute of Excellence in Technical Education
and Training of Individuals focusing on the needs of the Nation and Society
in Tune with Technological Developments"

DEPARTMENT MISSION

" Our Mission is to produce disciplined and Quality
Civil Engineering through academic programme of
noted excellence to serve the society"

DEPARTMENT VISION

"To be an institute of Excellence in Civil Engineering
and Training of Individuals focusing on the needs of the Nation and Society
in Tune with Technological Developments"

PROGRAM OUTCOMES (POs)

1. **Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.

2. **Problem analysis:** Identify and analyse well-defined engineering problems using codified standard methods.

3. **Design/ development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

4. **Engineering Tools, Experimentation and Testing:** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

5. **Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.

6. **Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

7. **Life-long learning:** Ability to analyse individual needs and engage in updating in the context of technological changes.

PROGRAM SPECIFIC OUTCOMES (PSOs)

1. Appreciate and apply modern techniques, materials and tools for civil engineering construction works.
2. Ensure quality materials and workmanship as per specifications

Sl. No.	Term	Course Name	Programme Outcomes (PO's)							Programme Specific Outcome (PSO 's)	
			1	2	3	4	5	6	7	1	2
1.	III	Engineering Mechanics	3	3	3	3	-	1	1	-	-
2.		Construction Materials And Construction Practice	3	3	3	2	-	-	-	-	-
3.		Surveying - I	3	3	3	3	-	-	-	-	-
4.		Civil Engineering Drawing-I	3	3	3	-	-	3	-	-	-
5.		Material Testing Lab –I	3	3	3	3	-	3	-	-	-
6.		Surveying Practice - I	3	3	3	3	1	3	-	-	-
7.		Cad In Civil Engineering Drawing - I	3	2	3	3	3	-	-	-	-
1.	IV	Theory Of Structures	3	3	3	3	-	1	1	-	-
2.		Transportation Engineering	3	3	3	3	-	-	-	-	-
3.		SURVEYING - II	3	3	3	2	-	-	-	-	-
4.		Estimating And Costing – I	3	3	3	3	3	-	3	-	-
5.		MATERIAL TESTING LAB -II	3	3	3	3	-	3	-	-	-
6.		SURVEYING PRACTICE - II	3	3	3	3	1	3	-	-	-
7.		3-D CAD In Civil Engineering Drawing	3	-	3	3	3	-	-	-	-

Sl. No.	Term	Course Name	Programme Outcomes (PO's)							Programme Specific Outcome (PSO 's)	
			1	2	3	4	5	6	7	1	2
1.	V	Structural Engineering	3	3	3	3	-	1	1	-	-
2.		Environmental Engineering & Pollution Control	2	3	2	1	2	1	2	-	-
3.		Elective Theory – I a) Water Resource Management	3	3	3	3	3	-	-	-	-
4.		b) Remote Sensing And Gis	3	1	3	-	2	2	-	-	-
5.		c) Building Services	3	3	3	3	-	-	-	-	-
6.		d) Soil Mechanics And Foundation Engineering	3	3	3	3	3	3	1	-	-
7.		Civil Engineering Drawing-II	3	3	3	-	-	3	-	-	-
8.		Construction Practice Lab	3	3	1	3	1	1	3	-	-
9.		Cad In Civil Engineering Drawing - II	3	3	3	-	3	2	-	-	-
10.		Environmental Engineering Practical	3	3	3	3	3	3	-	-	-
1.	VI	Construction Management With MIS	3	3	3	-	-	3	-	-	-
2.		Hydraulics	3	3	3	2	2	1	3	-	-
3.		Elective Theory - II a) Advanced Construction Technology	3	3	3	3	-	-	-	-	-
4.		b) Town Planning	3	3	3	-	3	-	-	-	-
5.		c) Steel Structures	3	1	3	1	2	3	2	-	-
6.		d) Earthquake Engineering	3	3	3	3	-	-	-	-	-
7.		Estimating And Costing-II	3	3	3	-	-	-	-	-	-
8.		Hydraulics Lab	3	3	1	3	1	2	3	-	-
9.		Computer Applications in Civil Engineering	3	3	3	2	-	3	-	-	-
10.		Project Work And Seminar	3	3	3	3	3	3	3	-	-

Course Prerequisites for the curriculum of Department of Civil Engineering

Communication English-I	Communication English-II	Engineering Mechanics	Theory of Structures	Structural Engineering	Construction Management with MIS
Engineering Mathematics	Applied Mathematics	Construction Materials and Construction Practice	Transportation Engineering	Environmental Engineering and Pollution Control	Hydraulics
Engineering Physics-I	Engineering Physics-II	Surveying – I	Surveying - II	**Elective Theory –I**	**Elective Theory – II**
Engineering Chemistry– I	Engineering Chemistry– II	Civil Engineering Drawing – I	Estimating and Costing -I	a)Water Resources Management	a)Advanced Construction Technology
Engineering Graphics	Engineering Drawing	Material Testing Lab – I	Material Testing Practical - II	b)Remote Sensing and GIS	b)Town Planning
Engineering Physics -I Practical	Engineering Physics -II Practical	Surveying Practice – I	Surveying Practice -II	c)Building Services	c)Steel Structures
Engineering Chemistry -I Practical	Engineering Chemistry –II Practical	CAD in Civil Engineering Drawing - I	3-D CAD in Civil Engineering Drawing	d) Soil Mechanics and Foundation Engineering	d) Earthquake Engineering
Computer Application Practical	Workshop Practice			Civil Engineering Drawing -II	Estimating and Costing -II
	Communication Skill Practical			Construction Practice Lab	Hydraulics Practical
				CAD in Civil Engineering Drawing -II	Computer Applications in Civil Engineering
				Environmental Engineering Practical	Project Work and Seminar

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS)

(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : CIVIL ENGINEERING

Course code : N1CE204

Term : III

Course Name : ENGINEERING MECHANICS

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Term	Marks			Duration
Engineering Mechanics	15	90	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	SIMPLE STRESSES AND STRAINS	20
2	SHEAR FORCE AND BENDING MOMENT	18
3	GEOMETRICAL PROPERTIES OF SECTIONS	16
4	STRESSES IN BEAMS AND SHAFTS	18
5	PIN JOINTED FRAMES	18
	Total	90

Course Outcomes:

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

C204.1	Know about the mechanical properties and describe the different types of stress, strains and elastic constants and compute the factor of safety in sustainability of material aspects.
C204.2	Correlate the concept of free body diagram, &analyze the different types of end conditions in supports for various loads &beams developing shear force diagram& bending moment diagram.
C204.3	Compute geometrical properties of the sections knowing the importance of geometry in structural engineering.
C204.4	To understand Pure bending theory and applying geometrical properties of beam to calculate strength parameters& develop flexural stress and shear stress diagram of structural members (beams) for different loading conditions.
C204.5	Analysis of perfect frames for vertical loads by analytical as well as graphical methods.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C204.1	Know about the mechanical properties and describe the different types of stress, strains and elastic constants and compute the factor of safety in sustainability of material aspects.	***R/U/A***	1,2	20
C204.2	Correlate the concept of free body diagram, &analyze the different types of end conditions in supports for various loads &beams developing shear force diagram& bending moment diagram.	***R/U/A***	3,4	18
C204.3	Compute geometrical properties of the sections knowing the importance of geometry in structural engineering.	***R/U/A***	1,2,6,7	16
C204.4	To understand Pure bending theory and applying geometrical properties of beam to calculate strength parameters& develop flexural stress and shear stress diagram of structural members (beams) for different loading conditions.	***R/U/A***	1,2,3,4	18
C204.5	Analysis of perfect frames for vertical loads by analytical as well as graphical methods.	***R/U/A***	1,2,3,4	18
		Total sessions		90

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	SIMPLE STRESSES AND STRAINS	20	30	***4***	***21***	***5***	*22*
II	SHEAR FORCE AND BENDING MOMENT	18	30	***4***	***21***	***5***	*22*
III	GEOMETRICAL PROPERTIES OF SECTIONS	16	30	***4***	***21***	***5***	*22*
IV	STRESSES IN BEAMS AND SHAFTS	18	25	***2***	***18***	***5***	*17*
V	PIN JOINTED FRAMES	18	25	***2***	***18***	***5***	*17*
	Total	**90**	**140**	**16**	**99**	**25**	**100**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
Engineering Mechanics	**3**	**3**	**3**	**3**	**-**	**1**	**1**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

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	20

	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)	
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)	18

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.	16
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, $T / J = \tau_{max} / R = G\Theta / l$ - 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	18
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	18

	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 TENSION COEFFICIENT METHOD Space frame-tension coefficient- tension coefficient method applied to space frames.	

Text Book:

1. R.S.Khurmi "Strength of Materials", S.Chand&CompanyLtd, New Delhi
2. S.Ramamirtham, "Strength of Materials", DhanpatRai (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.,

Reference Book:

1. Rajput.R.K. "Strength of Materials", S.Chand and Co, New Delhi, 2007.
2. Bhavikatti. S., "Solid Mechanics", Vikas publishing house Pvt. Ltd, New Delhi, 2010.

MODEL QUESTION PAPER - I

Term	:	III	Time	:	3Hrs
Programme	:	Diploma in Civil Engineering	Max.Marks	:	75
Course	:	Engineering Mechanics	Code	:	N1CE204

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART - A

1. State the Hooke's law
2. Define point of contra flexure
3. How many points of contra flexure are there in a double overhanging beam.
4. Define section modulus
5. Define neutral axis
6. Mention any two methods of analysis of truss.
7. Define stress. Give the unit.
8. Define Tie member

PART - B

9. What are elastic constants? Explain any two elastic constants.
10. Sketch the fixed support with its reaction components.
11. State parallel and perpendicular axis theorem
12. What are the assumptions made in theory of simple bending?
13. Determine the elongation of the bar of length 1m, diameter 300mm subjected to a tension 300kN. Take E= 2 x 10^5N/mm^2.
14. Determine the maximum shear force for a cantilever beam subjected to an udl 30kN/m for entire span 3m.
15. Resolve a force of 150kN inclined at 45^o to horizontal
16. What are the assumptions made while analyzing the pin jointed frames?

PART - C

17. (a) A steel rod of10mmdiameter and length 200mm elongates 0.5mm under an axial load of 50kN. If the change in diameter is 0.01mm, calculate the values of Poisson's ratio and three elastic constants.

(Or)

(b) A mild steel rod of 20mm diameter was tested for tensile strength with the gauge length of 60mm. Following were the observations. Final length = 78mm; Final diameter = 12mm; Yield load =34kN; Ultimate load = 61kN. Calculate (i) Yield stress (ii0 Ultimate stress (iii) Percentage elongation and (iv) Percentage reduction in area.

18. (a) A cantilever of 4mlength is fixed at the left end. It carries point loads of 40kN, 30kNand 20kN at 1m, 2m and 3m respectively from the fixed end in addition to an udl of 10kN/m throughout its length. Draw SFD and BMD.

(Or)

(b) A beam ABC is supported at A and B. The length AB is 4m and over hanging portion BC is 2m. It carries 3 concentrated loads of 20kN, 30kN and 20kN at 1m, 3m and 6m respectively from A. Draw SFD and BMD.

19. (a) Locate the centroid of the I section

Top flange = 150mmx 20mm

Bottom flange = 200mm x 20mm

Web = 100mm x 20mm

(Or)

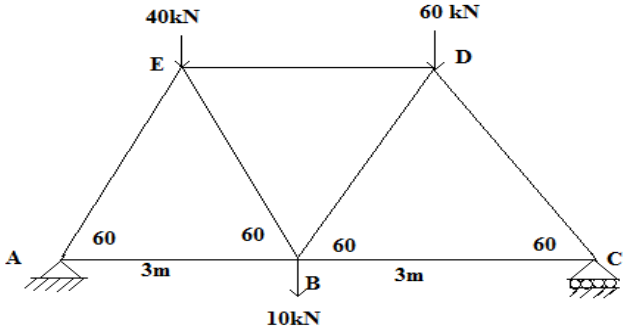
(b) Find the moment of inertia of the T section of size 100mm x 100 mm x 10mm

20. (a) A beam of rectangular section 80mm x 120mm is simply supported over a span of 3m. The beam carries a concentrated load of 120 kN at mid span. Calculate (i) maximum fibre stress (ii) the stress at 20mm above N.A

(Or)

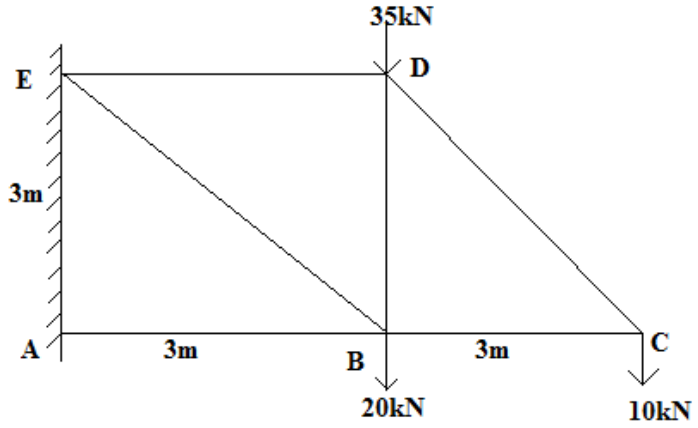
(b) Determine the diameter of the shaft to transmit 45KW at 120 rpm if the max permissible torque is likely to exceed the mean by 30% for a maximum permissible shear stress of 55N/mm2. Also calculate the angle of twist for the length of 2m. G = 80kN/mm^2

21. (a) Determine the forces in the members of the frame shown in figure by method of joints.



(Or)

(b) Determine the forces in the members of the cantilever frame shown in figure by tension coefficient method.



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MODEL QUESTION PAPER - II

Term	:	III	Time	:	3Hrs
Programme	:	Diploma in Civil Engineering	Max.Marks	:	75
Course	:	Engineering Mechanics	Code	:	N1CE204

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART - A

1. Define : Stress and Strain
2. State the Hooke's law
3. Define: Point of Contraflexure
4. What is meant by statically determinate beam?
5. Define: Section modulus
6. Define: Torsional Rigidity.
7. Define: Moment of resistance
8. Define Tension coefficient

PART - B

9. Write the relations between the elastic constants.
10. Explain any three mechanical properties of material.
11. Explain any three types of beam based on support conditions with sketch.
12. State the assumptions made in deriving the torsion equation
13. Define Tie member
14. Explain symmetrical and anti symmetrical shapes with examples.
15. Resolve a force of 300 kN inclined at 45^{o} to horizontal.
16. Draw the SFD for a cantilever beam subjected to an udl of 30kN/m for entire span 3m

PART - C

17. (a) A steel flat 150mm wide and 12mm thick is 1m long. It is subjected to an axial tension of 180kN. Determine the elongation of the flat, the contraction in the width and thickness. E = 2 x10^5N/mm^2, Poisson's ratio = 0.33

(Or)

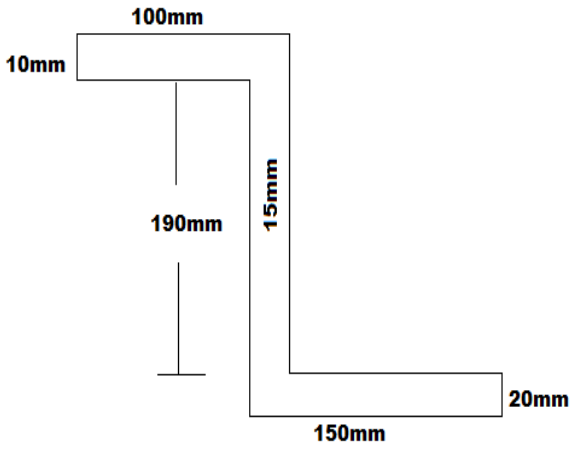
(b) A bar of 300mm long is 50mm square in section for 120mm of its length,25mm diameter for 80mm and 40mm diameter for remaining length. If a tensile load of 100kN is applied to the bar at both ends. Calculate the maximum and minimum stress induced in the bar and the total elongation of the member. Assume E=2 x10^5N/mm^2

18. (a) A simply supported beam of 6m span carries three point loads of 25kN, 35kN and 40kN at 1.5m, 2.5m and 4m from the left support respectively. Draw SFD and BMD.

(Or)

(b) A cantilever of 6m span carries a point load of 16kN at the free end and an udl of 4kN/m over the half of the beam from the fixed end. Draw SFD and BMD

19. (a) Find the centroid about the two axes



(Or)

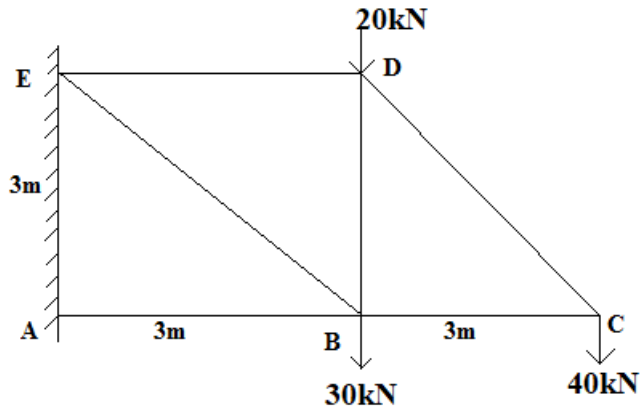
(b) Find the moment of inertia of the T section about the axes
Flange: 150mm X 20mm ; Web: 100mm X 20mm

20. (a) A beam of symmetrical section is 350mm deep and has a M.I of 131.6 x10^6mm^4 about its principal axis.To what radius may it be bent. If the maximum stress is not to exceed 126 N/mm^2. Take E= 2 x 10^5 N/mm^2. What would be the moment of resistance at this stress?

(Or)

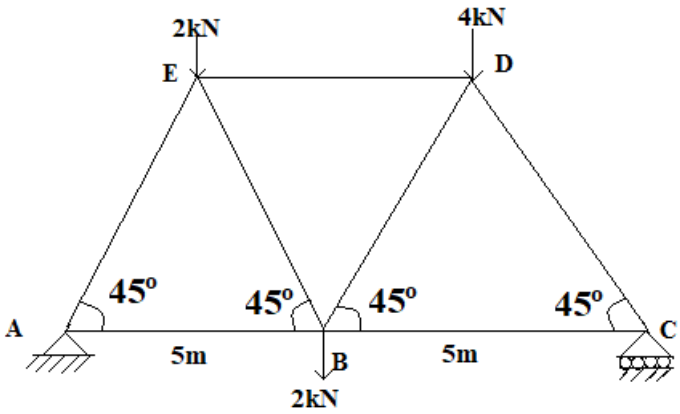
(b) A solid circular shaft is 60mm in diameter and transmits 60kW at 140rpm. Taking G = 0.8 x 10^5N/mm^2. Calculate the maximum intensity of shear stress and angle of twist in degrees for a length of 6m.

21. (a) Determine the forces in the members of the frame shown in figure by method of joints.



(Or)

(b) Determine the forces in the members of the cantilever frame shown in figure by tension coefficient method.



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VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS)

(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE205

Term : III Term

Course Name : CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE	Hours / Week	Hours / Term	Marks			Duration
	5 Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	BUILDING MATERIALS	15 Hours
2	BUILDING MATERIALS (Cont.)	15 Hours
3	FOUNDATIONS AND MASONRIES	15 Hours
4	DOORS, FLOORS, ROOFS, etc.,	15 Hours
5	POINTING, PLASTERING , PAINTING, FORMWORK	15 Hours
	Total	75 Hours

Course Outcomes:

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

C205.1	Determine proper methods and materials for a given project
C205.2	Explain various methods of building construction.
C205.3	Achieve mastery of the fundamental knowledge of construction materials
C205.4	To impart knowledge of various types of properties, uses and variety of materials important in construction
C205.5	To provide hand son, research and collaborative activities to vary and deepen the study of construction materials

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C205.1	Determine proper methods and materials for a given project	***R/U/A***	1,4,5,7	15
C205.2	Explain various methods of building construction.	***R/U/A***	1,2.4,5	15
C205.3	Achieve mastery of the fundamental knowledge of construction materials	***R/U/A***	1,3,5,7	15
C205.4	To impart knowledge of various types of properties, uses and variety of materials important in construction	***R/U/A***	1,4,5,7	15
C205.5	To provide hand son, research and collaborative activities to vary and deepen the study of construction materials	***R/U/A***	1,3,4, 5,7	15
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	BUILDING MATERIALS	15	30	***4***	***21***	***5***	*22*
II	BUILDING MATERIALS (Cont.)	15	30	***4***	***21***	***5***	*22*
III	FOUNDATIONS AND MASONRIES	15	30	***4***	***21***	***5***	*22*
IV	DOORS, FLOORS, ROOFS, etc.,	15	25	***2***	***18***	***5***	*17*
V	POINTING, PLASTERING , PAINTING, FORMWORK	15	25	***2***	***18***	***5***	*17*
	Total	75	**140**	**16**	**99**	**25**	**100**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
Construction materials and construction Practice	**3**	**2**	**2**	**3**	**3**	**-**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF TOPIC	Time
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. **1.8 CERAMIC PRODUCTS**	**15 Hours**

	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. **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.	**15 Hours**
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	**15 Hours**

	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. **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.	
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 -	**15 Hours**

	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. **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.	
V	**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 – Color 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.	**15 Hours**

Text 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.

Reference Book:

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

MODEL QUESTION PAPER – I

Term : III Time : 3 Hrs
Programme : Diploma in Civil Engineering Max. Marks : 75
Course : **CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE** Course Code: N1CE205

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory (2) Answer division (a) or (b) of each question in PART-C (3) Each question carries 2 Marks in PART –A, 3 marks in PART –B and 10marks in PART- C]

PART-A (5 x 2 = 10)

1. Define specific gravity.
2. What do you mean by HYSD and TMT bars?
3. Define Bond.
4. What is a pitched Roof?
5. What is pointing?
6. What is surki?
7. What is framed structure?
8. Define ventilators.

PART- B (5 x 3 = 15)

9. Mention the requirements of good building stone.
10. Define varnish. What are the ingredients of varnish?
11. Brief about stretcher bond with a sketch.
12. What are the different types of flooring? Briefly explain any one type of floor.
13. What is shoring? State the types of shoring.
14. State the admixtures used in concrete.
15. State the objectives of foundation.
16. What are the objectives pointing?

PART-C (5 x 10 = 50)

17. (A) What are various stages in manufacture of brick and explain them?

OR

(B) What are requirements of good building stone?

18. (A) Explain the types of paint

OR

(B) i) What are the characteristics of plastics?
ii) What are uses of asbestos?

19. (A) i) Explain Defects is brick masonry
ii) Explain Maintenance of brick masonry

OR

(B) Explain the type of partition with neat sketch

20. (A) Explain in detail about the types of flooring

OR

(B) Write in detail about the physical requirement of concrete blocks

21. (A) i) Sketch and explain pit method of underpinning

ii) Describe the various types of pointing with neat sketches

OR

(B) Explain any two different types of scaffoldings with neat sketches

MODEL QUESTION PAPER – II

Term	: III	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: **CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE**	Course Code	: N1CE205

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B
Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B and 10marks in PART- C]

PART-A (5 x 2 = 10)

1. State any two stratified rocks.
2. What is meant by curing of concrete?
3. Define Bearing capacity of a soil
4. What is meant by Ferro cement?
5. What do you understand by the term anti-termites?
6. Where is a pug mill used?
7. What do you mean by OPC?
8. What do you mean by composite floor?

PART- B (5 x 3 = 15)

9. How is surki made?
10. Define paint.
11. Define Foundation.
12. What is hollow Block?
13. List the methods of termite proofing.
14. What is DPC?
15. What is distempering?
16. What are the tests conducted for cement

PART-C (5 x 10 = 50)

17. (A). i) What are the properties of brick?
ii) What are the deleterious materials in water allowed for construction and their limits

OR

(B). Explain the Constituents of glass

18. (A). (i) Explain the method of seasoning of timber?
(ii) Describe the properties of a mortar?

OR

(B). (i) State the types of varnish and explain them.
(ii) Explain in detail the types of metals used in building construction?

19. (A). Describe the points to be considered in the construction of Brick masonry?

OR

(B). Explain in detail about Admixtures and their Functions?

20. (A). (i) Illustrate and explain the component parts of a stair?
(ii) Describe the various types of roof coverings.

OR

(B). Explain with sketches the various types of timber floors?

21. (A). Explain the application of distempering.

OR

(B). Write in detail about the defects in plastering.

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS)

(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE206

Term : III

Course Name : SURVEYING-I

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Term	Marks			Duration
SURVEYING-I	5Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Time
I	INTRODUCTION TO SURVEYING AND CHAIN SURVEYING	13
II	COMPASS SURVEYING	13
III	LEVELLING	23
IV	LEVELLING (Continued)	13
V	CONTOUR SURVEYING AND GLOBAL POSITIONING SYSTEM	13
	Total	75 Hours

Course Outcomes:

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

C206.1	Understand the basics in surveying and chain surveying.
C206.2	Understand the principles of compass surveying and its applications.
C206.3	Understand the basics in levelling, types of levelling instruments and methods of levelling
C206.4	Understand the types of levelling, errors and its applications.
C206.5	Understand the knowledge of basic concepts and principles of GPS, Concept of contour, its uses and methods of contouring.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C206.1	Understand the basics in surveying and chain surveying.	*R/U/A*	1, 2, 3	13
C206.2	Understand the principles of compass surveying and its applications.	*R/U/A*	1, 2, 3	13
C206.3	Understand the basics in levelling, types of levelling instruments and methods of levelling	*R/U/A*	1, 2, 3, 4	23
C206.4	Understand the types of levelling, errors and its applications.	*R/U/A*	1,2,3	13
C206.5	Concept of contour, its uses and methods of contouring. Understand the knowledge of basic concepts and principles of GPS	*R/U/A*	1,2,3,4	13
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for		Marks weightage (%)
				R	U/A	
I	Introduction to surveying and Chain Surveying	13	25	2	23	17.86 %
II	Compass Surveying	13	25	2	23	17.86 %
III	Levelling	23	25	2	23	17.86 %
IV	Levelling (Continued)	13	25	2	23	17.86 %
V	Contour Surveying and Global Positioning System	13	25	2	23	17.86 %
I to V*			15	6	09	10.70%
	Total	75	140	16	124	100 %

*** 3 x 2Marks and 3 x 3Marks from any Unit limited to maximum of 2 Questions in each unit**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
SURVEYING - I	**3**	**3**	**3**	**3**	**-**	**-**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF TOPIC	Time
I	**1. 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, fieldwork and recording field notes – Errors in chaining - Obstacles in chaining – Tape corrections and its necessity	**13 Hours**
II	**2. 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 Hours**
III	**3. 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, Foresight, Intermediate sight, Change point, Height of instrument, Focusing and Parallax - Temporary adjustment of a level-Balancing Back sight and Foresight – Principle of levelling - Simple leveling-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	**23 Hours**

	calculations **:** Problems	
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 Hours**
V	**5.1 CONTOUR SURVEYING** Definition – Contour – Contouring – Characteristics of contours – Methods ofcontouring – Direct and Indirect methods – Tacheometric contouring Interpolation of contours– Different methods - Contour gradient -Uses of contour plan and map – Calculation ofcapacity 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.	**13 Hours**
	Content Beyond Syllabus Distomat - Definition – field procedure for calculating length, area and volume	

TEXT BOOKS:

1. Surveying and Levelling Vol- I & II by B C Punmia
2. Surveying by Duggal

REFERENCE BOOKS

1. Surveying by R Agor
2. Fundamentals of Surveying by S K Roy
3. Surveying and Levelling by N NBasak

MODEL QUESTION I

Term	: III	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: SURVEYING- I	Course Code	: N1CE206

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory (2) Answer division (a) or (b) of each question in PART-C (3) Each question carries 2 Marks in PART –A, 3 marks in PART –B and 10marks in PART- C]

PART-A (5×2=10)

1. What are the main divisions of surveying?
2. What is true bearing?
3. What are the types of level?
4. Define Check leveling.
5. What are the satellites used in GPS.
6. What are the types of chain?
7. Mention any four attractive bodies which cause local attraction.
8. Define contour.

PART-B (5×3=15)

9. Define the following terms: Base line, Check line and Tie line.
10. Define the terms: Dip and Declination
11. Compare Rise and fall method and Height of Collimation method.
12. Name the different sources of errors in leveling
13. Explain any five characteristics of contour line.
14. Differentiate Plane surveying and geodetic surveying
15. Differentiate between Whole circle bearing and reduced bearing.
16. Write short notes on Hand held receiver

PART-C (5×10=50)

17. (A). i) Briefly explain the procedure of ranging by direct method.
ii) Briefly explain how a cross-staff is used to set perpendicular offsets.

OR

(B). i) Explain with a neat sketch the constructional details of 30m chain

18. (A). Draw a neat sketch of a prismatic compass and name the parts.

OR

(B). In running a compass traverse, the following observations were made with a prismatic compass. Calculate the included angles and apply the check

Line	FB	BB
AB	$112^0 30'$	$292^0 30'$
BC	$14^0 15'$	$194^0 15'$
CD	$315^0 00'$	$135^0 00'$
DA	$215^0 15'$	$35^0 15'$

19. (A). Explain the temporary adjustments of a dumpy level.

OR

(B). The following staff readings were observed with a level :

0.795, 1.655, 2.890, 3.015, 0.655, 0.625, 0.955, 0.255, 1.635, 0.860 and 2.375.

The first reading was taken with the staff held upon a B.M. of elevation 550.600m.The instrument have been moved after the fourth and eighth readings. Enter the readings in a field book form and reduce the level by rise and fall. Apply usual check.

20. (A). What is reciprocal leveling? Explain with a neat sketch.

OR

(B). A and B are two points on the opposite banks of a valley. The staff readings on A and B from one bank were 6.940 and 5.270. The level was shifted to other bank and the readings were 8.160 and 5.490. Find the true difference in level and R.L of B if the R.L of A is + 100.380

21. (A). Following are the areas within the contour lines of a proposed reservoir

Contour	130	134	138	142	146	150	154
Area (m^2)	12,600	6,84,000	22,30,200	45,60,500	66,90,600	82,91,000	99,95,000

Calculate the capacity of the reservoir if R.L of bottom of reservoir is 130m. and that of water level is 154m.

OR

(B). What are the uses of contour plan and map?

MODEL QUESTION-II

Term	: III	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: SURVEYING- I	Course Code	: N1CE206

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B
Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B
and 10marks in PART- C]

PART-A (5×2=10)

1.What are the two primary divisions of surveying?
2. Define the term magnetic meridian, true meridian.
3. Mention different types of leveling staff.
4. What is the combined effect due to curvature and refraction?
5. Define the term contour interval.
6. Mention different types of maps.
7. The following is the desired relationship between the fundamental lines in a Dumpy level. "The axis of bubble tube need not be perpendicular to vertical axis" Is it True or False?
8. Define Back sight in levelling

PART-B (5×3=15)

9. Draw a neat sketch of 30m metric chain
10. Define the following: Whole circle bearing, Reduced bearing.
11. Write short note on Line of collimation, Bench mark.
12. What is Longitudinal sectioning?
13. What is contour gradient?
14. State the applications of GPS
15. Convert the following WCB in RB
(i) $82^0$40' (ii) $127^0$12' (iii) $149^0$20'
16. Explain any one method of interpolation of contour.

PART-C (5×10=50)

17. (A). What is meant by tape corrections? What is the necessity of tape corrections?

OR

(B). Define the following terms: Base line, Check line and Tie line.

18. (A). The following bearings were observed in running a compass traverse in a place where Local attraction is suspected. Calculate the interior angles of the traverse. Apply the required check.

LINE	F.B	B.B
AB	92º 30´	272º 30´
BC	10º 15´	190º 00´
CD	211º 00´	34º 00´
DE	112º 30´	288º00´
EA	15º 30´	197º 15´

At what stations do you suspect local attraction? Find the correct bearing.

OR

(B). The following bearings were observed in running a compass traverse. Calculate the interior angles of the traverse. Apply the required check.

LINE	F.B	B.B
AB	45º 15´	225º 15´
BC	123º 15´	303º 15´
CD	181º 00´	01º 00´
DA	289º 30´	109º30´

19. (A). The following staff readings were observed with a level 0.720, 1.580, 1.750, 2.520, 2.760, 2.925, 3.125, 3.820, 1.100, 1.650, 3.960, 0.900, 1.500. The instrument was shifted after fifth, eighth and eleventh reading. Enter the readings in a field book and reduce the levels by HOC method. The first reading was taken on a BM having RL 120.125.

OR

(B). The following consecutive readings were taken with a dumpy level and 4m levelling staff on continuously sloping ground.0.585, 0.935, 1.950, 2.480, 3.645, 3.930, 0.960, 1.035, 1.685, 2.535, 3.845, 0.955, 1.580 and 3.015.
The RL of the first reading was 500.000m. Enter the readings in level field book form in Rise and Fall method. Apply arithmetical check.

20. (A). What do you understand about curvature and refraction?

OR

(B). A level was set up at a station P. The reading on the staff held at Q, 500m away from P was 2.865m and the staff reading at R, 800m away from P was 3.495m. Find the true difference in level between Q and R.

21. (A). The area within the contour lines at the site of a reservoir and along the face of the proposed dam is as follows:

Contour (m)	490	495	500	505	510	515	520
Area (sq.m)	24000	32500	34750	36800	39500	41000	42250

Take 490m as the bottom level of the reservoir and calculate the capacity of reservoir by Trapezoidal rule and Prismoidal formula.

OR

(B). State the applications of GPS in Civil engineering

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VIRUDHUNAGAR – 626 001
N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE209

Term : III Term

Course Name : CIVIL ENGINEERING DRAWING-I

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
CIVIL ENGINEERING DRAWING-I	Hours / Week	Hours / Term	Marks			Duration
	6 Hrs.	90 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Hours
I	INTRODUCTION	5
II	PLANNING OF BUILDING	5
III	BASIC DRAWING	25
IV	BUILDING DRAWINGS	55
	Total	90

Course Outcomes:

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

C209.1	Know concepts of building planning considering climatic parameters, building bye laws, classification of buildings and design buildings
C209.2	Understand and prepare building services drawings
C209.3	Draw the basic drawing of door, roof truss and rainwater harvesting
C209.4	Draw site plan, plans, elevations and sectional views of residential, commercial and public buildings, showing maximum details of various building components using the available construction area effectively according to codal provisions and standard units

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C209.1	Know concepts of building planning considering climatic parameters, building bye laws, classification of buildings and design buildings.	*R/U/A*	1,2,3,5	5
C209.2	Understand and prepare building services drawings	*R/U/A*	1,2,3,5,7	5
C209.3	Draw the basic drawing of door,roof truss and rainwater harvesting	*R/U/A*	1,2,3,5	25
C209.4	Draw site plan, plans, elevations and sectional views of residential, commercial and public buildings, showing maximum details of various building components using the available construction area effectively according to codal provisions and standard units.	*R/U/A*	1,2,3,5,6,7	55
		Total sessions		90

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for		Marks weightage (%)
				R	U/A	
I	INTRODUCTION	5	3	3	-	4
II	PLANNING OF BUILDING	5	3	-	3	4
III	BASIC DRAWING	25	9	-	9	12
IV	BUILDING DRAWINGS	55	60	-	60	80
	Total	90	75	3	72	100

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
CIVIL ENGINEERING DRAWING-I	3	3	3	-	3	2	2

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**INTRODUCTION** **1. CONVENTION, SYMBOLS:** General – Conventions- Title block- Scales- Line work- Lettering- Symbols- Abbreviations **2. BUILDING BYE-LAWS AND SUBMISSION DRAWINGS** Objects of bye-laws- Importance of bye-laws- Function of local authority- Setbacks- 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	**5Hrs**
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 rooms- Ventilation and Lighting - Preparation of line drawing for given requirement with measurements not to scale: **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.	**5Hrs**

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.	**25Hrs**
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	**55 Hrs**

Text Book:

1. B.P. Verma ,"Civil Engineering Drawing and house planning"
2. Dr N. Kumaraswamy and A. KameswaraRao," Building Planning and Drawing",
   G. Vaidhyanathan, I. Kulasekaran, G. sathish Kumar "Building Planning and Construction Companion"

Reference Book:

1. National Building Code (NBC-2012)
2. TamilNadu District Municipal building rules and by-laws
3. S.C.Rangwala ,"Civil Engineering Drawing ",

4. V.R.Thothathri, “A Guide to Civil Engg Drawing.

IS-CODE

1. IS 962: 1989- Code of Practice for Architectural and Building Drawings.
2. National Building Code of India 2005

MODEL QUESTION PAPER – I

Term	: III	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: CIVIL ENGINEERING DRAWING - I	Course Code	: N1CE209

PART A **(15 marks)**

Answer all questions under Part A in the drawing sheet supplied.

I. Answer the following **(2 x 3 = 6)**

1. Define Built up Area and Floor space index
2. What are the general requirements of public buildings.

II. Answer the following **(1 x 9 = 9)**

The sketches under drawn using pencil and drawing instruments, not necessarily to scale.

Sketch the elevation of flush door of size 1100x2100 mm with suitable shutters. Adopt Suitable sizes for the components parts

PART B **(60 marks)**

Answer question under Part B in the drawing sheet supplied.

Any data, not given may be assumed suitably and should be indicated in the drawing.

III. The sketch shows the line plan of a "Two bed room house with RCC Roof. The dimensions noted there in indicate the clear dimensions between the inside walls. The specifications are given below.

Foundation:-

Foundation shall be of C.C. !:4:8 mix, 1000 wide and 300 thick laid at 1100 below G.L. for all main walls and verandah retaining wall. It consists of two footings of size 700 X 400 and 500 X 400 in C.M. 1:6

Basement:-

The basement will be in brick work in C.M. 1:5, 300 mm wide and 600 thick above G.L. A Damp Proof course in C. M. 1:3, 20 thick will be provided for all walls.

Super Structure:-

All main walls will be in brick work in C.M. 1:5, 200 mm thick. The inner partition walls in toilet will be 100 mm thick. The height of all the walls will be 3000 mm above floor level.

Roofing:-

The roofing will be R.C.C. 1:2:4 mix, 120 mm thick flat slab. Verandah slab will be of R.C.C. 1:2:4 mix, 100 thick at a height of 2600 mm from verandah floor level. A weathering course in brick jelly lime concrete plastered with mortar 1:5:9 mix, 75 mm thick will be provided.

Lintels:-

R.C.C. lintel 120 thick over all the openings shall be provided. Suitable sunshades for all external openings shall be provided.

Flooring:-

The flooring will be in C.C. 1:4:8, 120 mm thick plastered smooth with C.M. 1:3, 20 mm thick for all the portions.

Steps:-

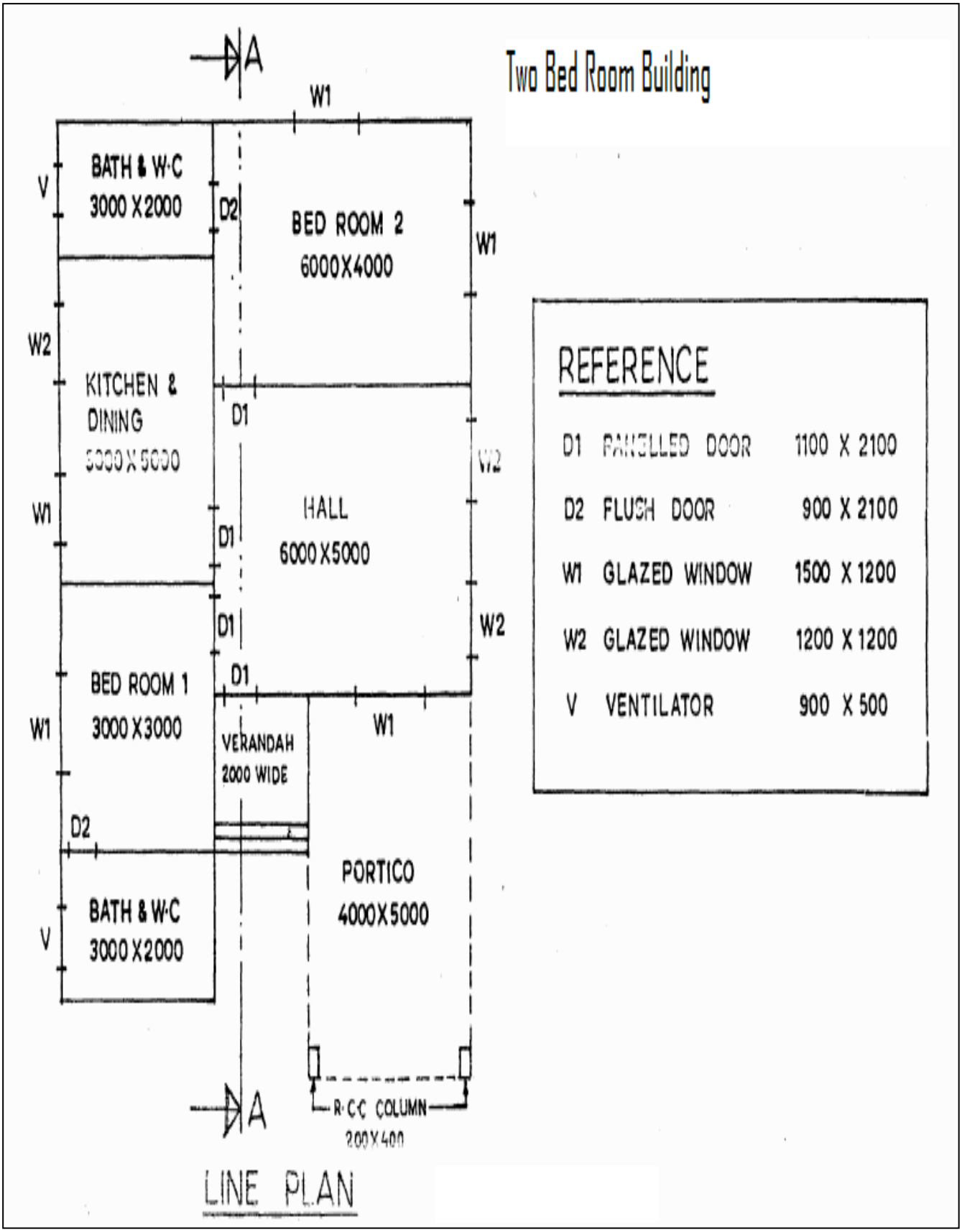
Provide steps of rise 150mm and tread 250 mm

Draw the following views to a suitable scale:-

a) Plan of the building - 20 Marks

b) Section on "AA" - 25 Marks

c) Front Elevation - 15 Marks


Two Bed Room Building
A
W1
BATH & W.C
3000 X 2000
V
D2
BED ROOM 2
6000X4000
W1
W2
KITCHEN &
DINING
5000X5000
D1
W2
W1
HALL
6000X5000
D1
D1
W2
D1
BED ROOM 1
3000X3000
W1
VERANDAH
2000 WIDE
W1
D2
PORTICO
4000X5000
BATH & W.C
3000X2000
V
A
R.C.C COLUMN
200X400
REFERENCE
D1 PANELLED DOOR 1100 X 2100
D2 FLUSH DOOR 900 X 2100
W1 GLAZED WINDOW 1500 X 1200
W2 GLAZED WINDOW 1200 X 1200
V VENTILATOR 900 X 500
LINE PLAN

SKETCH

MODEL QUESTION PAPER - II

Term	: III	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: CIVIL ENGINEERING DRAWING - I	Course Code	: N1CE209

PART A (15 marks)

I. Answer the following **(2 x 3 = 6)**

1. What is the main factor to be considered while planning?
2. Specify the minimum dimension for a living room in residential building as per the NBC standards.

II Sketch the elevation of a steel truss using the following details **(1 x 9 = 9)**

Wall thickness : 300 mm
Bottom tie member : 2 Nos flat 80 X 6 mm
Pitch of roof : 30^0
Strut : Single ISA 70 X45 X 8 mm
Principal rafter : Two ISA 80 X 50 X 8 mm
Cleat angle : 75 X 75 X 8 mm
Purlins : 125 X75 X 8 mm
All other ties : 60 mm X 10 mm flat
Roof covering : G.I. Sheet
Gusset Plate : 10 mm thick

PART B (60 marks)

III The sketch shows the line plan of "A one bed room house with R.C.C. roof". The dimensions noted therein indicate the clear dimensions between the inside walls. The specifications are given below:-

Foundation:-
Foundation shall be of C.C. !:4:8 mix, 1000 wide and 300 thick laid at 1100 below G.L. for all main walls and verandah retaining wall. It consists of two footings of size 700 X 400 and 500 X 400 in C.M. 1:6

Basement:-
The basement will be in brick work in C.M. 1:5, 300 mm wide and 600 thick above G.L. A Damp Proof course in C. M. 1:3, 20 thick will be provided for all walls.

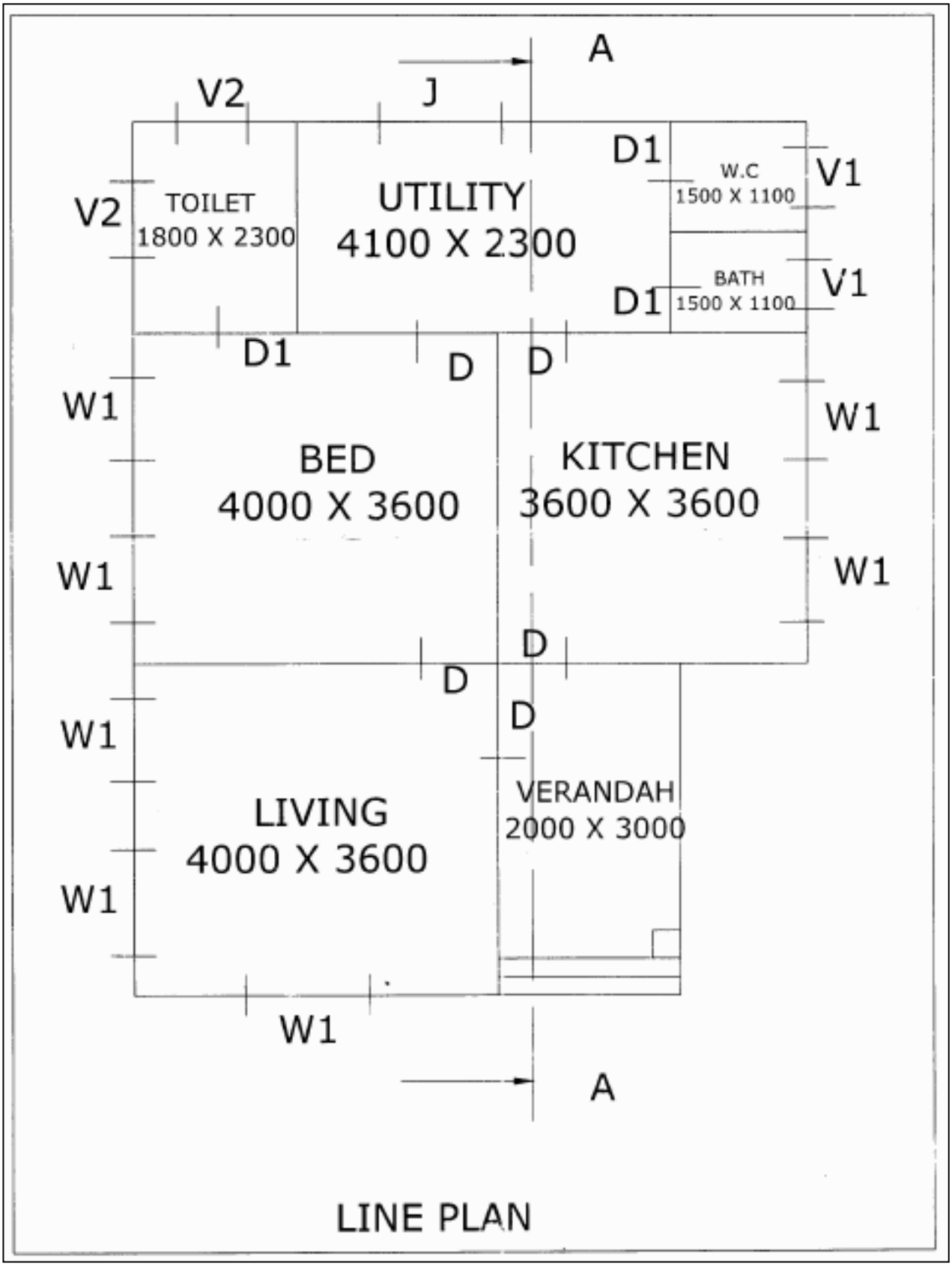
Super Structure:-
All main walls will be in brick work in C.M. 1:5, 200 mm thick. The inner partition walls in toilet will be 100 mm thick. The height of all the walls will be 3000 mm above floor level.

Roofing:-
The roofing will be R.C.C. 1:2:4 mix, 120 mm thick flat slab. Verandah slab will be of R.C.C. 1:2:4 mix, 100 thick at a height of 2600 mm from verandah floor level. A weathering course in brick jelly lime concrete plastered with mortar 1:5:9 mix, 75 mm thick will be provided.

Lintels:-
R.C.C. lintel 120 thick over all the openings shall be provided. Suitable sunshades for all external openings shall be provided.

Flooring:-
The flooring will be in C.C. 1:4:8, 120 mm thick plastered smooth with C.M. 1:3, 20 mm thick for all the portions.

Steps:-
Provide steps of rise 150mm and tread 250 mm
Draw the following views to a suitable scale:-
a) Plan of the building - 20 Marks
b) Section on “AA” - 25 Marks
c) Front Elevation - 15 Marks


A
V2
J
D1
W.C
1500 X 1100
V1
V2
TOILET
1800 X 2300
UTILITY
4100 X 2300
BATH
1500 X 1100
D1
V1
D1
D
D
W1
W1
BED
4000 X 3600
KITCHEN
3600 X 3600
W1
W1
D
D
D
W1
VERANDAH
2000 X 3000
LIVING
4000 X 3600
W1
W1
A
LINE PLAN

SKETCH

PERIODICAL QUESTION MODEL

Programme : Civil Engineering **PERIODICAL TEST**
Term : III Max. Marks : 50
Course : **CIVIL ENGINEERING DRAWING-I** Duration : 2Hrs

NOTE: 1. Answer the question in the drawing sheet supplied.
2. The drawing should be drawn using pencil and drawing Instruments to scale.
3. Any data, not given may be assumed suitably and should be indicated in the drawing.

PART-A (1×50=50MARKS)

I The Sketch show the Line plan of "A One bed room house with R.C.C. roof". The dimensions noted therein indicate the clear dimensions between the inside walls. The specifications are given below:-

Specification:

1. Foundation: The foundation for all main walls will be in cement concrete 1:4:8, 900mm wide & 200 thick laid at 1100mm below ground level. For verandah CC 1:4:8 mix 600mm wide 150mm thick laid 600mm below ground level. The masonry footing for all main walls will be brick masonry in C.M 1:5. The first footing is 750 X 450mm and second footing is 600 X 450mm. The masonry footing for verandah first footing 450mm X 450mm

2. Basement: For all main walls the basement will be in BW in CM 1:5, 400mm wide and 600mm above ground level. For verandah the basement will be 300mm wide and 600mm thick above ground level. A damp proof course in CM 1:3 30 thick will be provided at basement level for all walls. Inside the basement sand filling will be 450mm thick.

3.Super structure: For all main walls the super structure will be in BW with cement mortar 1:5 with 200mm thick. The height of the main walls will be 3000mm above floor level. Floor level, and for verandah 2100mm above floor level. One brick pillar 230 X 230mm thick brick work in CM 1:5. All the walls will be plastered with CM 1:4 externally and CM 1:6 internally with 12.5mm thick. Parapet walls will be 200 mm thick and 600 mm high will be provided all round. Partition wall will be 100 mm thick in brick work in between Bath & WC

4.Roofing: The roofing will be R.C.C. 1:2:4 mix with 120mm thick flat slab over verandah and all other rooms. A weathering course 75mm thick will be laid over the slab.

5.Lintel: All the openings will be provided with R.C.C lintel cum sunshade of 1:2:4, 150mm thick. All the external openings will be provided with R.C.C. lintel cum sunshade of 1:2:4 mix with 600 mm wide. R.C.C lofts will be provided with 450 mm wide kitchen.

6.Flooring: Flooring concrete will be in C.C 1:4:8, 120mm thick over this floor finish with cement mortar 1:3, 30mm thick.

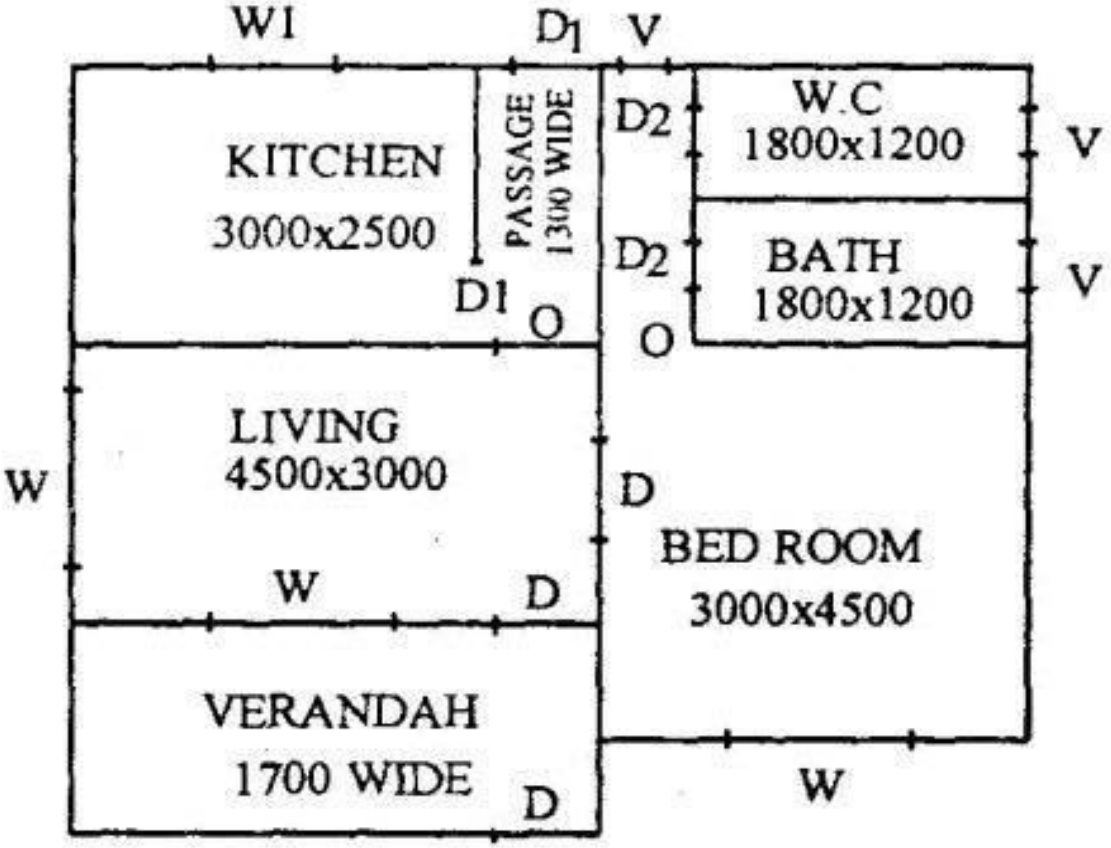
7.Steps: Steps will be in B.W with CM 1:5 laid over 700 X 150 mm CC 1:4:8. Rise 200mm, Tread 300mm. Hand rails are provided in the verandah

8.Doors, Windows, Ventilators

D - Panelled Door	- 1000 X 2100
D1- Panelled Door	- 900 X 2100
D2-Panelled Door	- 750X 2100
W- Glazed window	- 1200 X 1200
W1- Panelled Window	- 900 X 1200
V- Glazed ventilator	- 900 X 600
O- Opening	- 1100 X 2100
Loft	- 450 mm wide

Draw to a suitable scale the following views with require dimensions and details.

1. Plan at window sill level- 15marks
2. Section on AB – 20marks
3. Front Elevation – 15marks



LINE PLAN

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS)

(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE308
Term : III

Course Name : MATERIAL TESTING LAB -I

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Term	Marks			Duration
			Internal Assessment	End Examination	Total	
MATERIAL TESTING LAB -I	3 Hrs.	45 Hrs.	25	75	100	3 Hrs.

Course Outcomes:

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

C308.1	Study of UTM, Torsion testing machine, Hardness tester, Compression testing machine
C308.2	To determine the Material Properties- test conducted on steel, wood, cement, Aluminium, Brass and Brick.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		Linked Expts.	CL	Linked PO	Teaching Hrs
C308.1	Study of UTM, Torsion testing machine, Hardness tester, Compression testing machine	1 to 6	*R/U/A*	1,2,3,6	18
C308.2	To determine the Material Properties- test conducted on steel, wood, cement, Aluminium,	7 to 15	*R/U/A*	1,2,3,4,6	27

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7

MATERIAL TESTING LAB -I	**3**	**3**	**3**	**3**	**1**	**3**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

UNIT	NAME OF TOPIC	Time
I	**PART-A** 1. Tension test on mild steel and 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 of Rigidity. 4. Determination of the fineness of cement by Blains Permeability apparatus or Sieve analysis. 5. Initial and final setting time of cement by Vicat's Apparatus. 6. Determination of normal consistency of cement by Vicat's Apparatus	**18 Hours**
II	**PART-B** 7. Finding Brinnel's and Rockwell's hardness numbers of the following materials.. (a) Mild steel (b) Brass (c) Aluminum. 8. Compression Test on Wooden cube . 9. Double Shear test on M.S.bar. 10. Impact Test on mild steel by performing Izod and Charpy tests 11. Compression test on Bricks/Solid Blocks. 12. Water absorption test on Bricks/pressed tiles. Flexure test on Tiles.	**18 Hours**
III	**Part-C(Not for Examination)** 13. Demonstration of Strain gauges and Strain indicators. 14. Demonstration of Soundness test on cement by Autoclave method.	**3 Hours**
	Revision & Test	**6 Hours**

LIST OF EXERCISES

1. Tension test on mild steel and 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 of Rigidity.
4. Determination of the fineness of cement by Blains Permeability apparatus or Sieve analysis.
5. Initial and final setting time of cement by Vicat's Apparatus.
6. Determination of normal consistency of cement by Vicat's Apparatus.
7. Finding Brinnel's and Rockwell's hardness numbers of the following materials..
   (a) Mild steel (b) Brass (c) Aluminum.
8. Compression Test on Wooden cube
9. Double Shear test on M.S.bar.
10. Impact Test on mild steel by performing Izod and Charpy tests
11. Compression test on Bricks/Solid Blocks.
12. Water absorption test on Bricks/pressed tiles.
13. Flexure test on Tiles

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Content Beyond Syllabus

- Demonstration of Strain gauges and Strain indicators
- Demonstration of Soundness test on cement by Autoclave method

LIST OF EQUIPMENTS

S.NO.	LIST OF THE EQUIPMENTS	QUANTIY
1	UTM	1 no
2	Rock well-cum-Brinell Hardness testing machine	1 no
3	Impact testing machine for Izod and Charpy test	1 no
4	Deflection test verification of Maxwell theorem with magnetic stand, deflection gauge, weights and sets of beam(floor type)	1 no
5	Torsion testing machine	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
12	Weighing balance-digital 10 kg capacity one gram accuracy with battery backup 8 hours/direct electrical connection	1 no
13	Vicat needle apparatus (to conduct cement test)	4 nos

END EXAMINATION

Note: All the exercises have to be completed. Two exercises will be given for examination one from Part-A and one from Part-B.

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination.

Detailed Allocation of Marks for External Assessment

Sl.No	Description	Part-A	Part-B Max Marks (30)
		Max Marks (40)	
1	Procedure	5	5
2	Tabulation & Observation	15	10
3	Calculations	10	5
4	Sketch / Graph	5	5
5	Accuracy of Result	5	5
6	VIVA	**5**	
	TOTAL	**75**	

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE210

Term : III

Course Name : SURVEYING PRACTICE - I

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
SURVEYING PRACTICE - I	Hours / Week	Hours / Term	Marks			Duration
	6 Hours	90 Hours	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Course Outcomes:

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

C210.1	Use of instruments in chain surveying, compass surveying and conducting experiments
C210.2	Use of instruments in levelling and conducting experiments on methods of levelling.
C210.3	Understand the knowledge of basic concepts and principles of GPS

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		Linked Expts.	CL	Linked PO	Teaching Hrs
C210.1	Use of instruments in chain surveying, compass surveying and conducting experiments	1 to 7	*R/U/A*	1,2,3,6	36
C210.2	Use of instruments in levelling and conducting experiments on methods of levelling.	12 to 24	*R/U/A*	1,2,3,4,6	42
C210.3	Understand the knowledge of basic concepts and principles of GPS	8 to 11	*R/U/A*	1,2,3,4,5,6	12

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
SURVEYING PRACTICE - I	**3**	**3**	**3**	**3**	**1**	**3**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

UNIT	NAME OF TOPIC	Time
I	**PART-A** **CHAIN COMPASS AND 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 in accessible–Use Chain /Tape and Compass	**36 Hours**
II	**GLOBAL POSITIONING SYSTEM (GPS)** 2.1. Reading of various Maps like Taluk map and District map andToposheets 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.	**12 Hours**
III	**PART-B** **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 bench marks) with two change points (Minimum Four exercises) 3.3. Fly levelling – Reduction by Rise and Fall method (Minimum 6 bench marks 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 Two exercises)	**42 Hours**

LIST OF EXERCISES

14. Study of chain, tape and accessories used for chain survey
15. Study of Prismatic compass, setting up over a station and observe bearings of lines.
16. Running closed traverse and finding the included angles –Use Chain/Tape and Compass.(Minimum 5 points)**. (Clockwise Direction)**
17. Running closed traverse and finding the included angles –Use Chain/Tape and Compass.(Minimum 5 points)**. (Anti Clockwise Direction)**
18. Determination of distance between two points when their base is accessible –Use Chain /Tape and Compass
19. Determination of distance between two points when their base is in accessible–Use Chain /Tape and Compass **(Towards North)**
20. Determination of distance between two points when their base is in accessible–Use Chain /Tape and Compass **(Towards South)**
21. Reading of various Maps like Taluk map and District map and Topo sheets
22. Study of Hand held GPS.
23. Measurement of Latitude, Longitude and Altitude using hand held GPS.
24. Selection and marking of routings (Way points) using hand held GPS.
25. Study of a Level - Temporary adjustment, taking readings and booking in a field book.
26. Fly levelling – Reduction by Height of Collimation method (Minimum 6 bench marks) with two change points
27. Fly levelling – Reduction by Height of Collimation method (Minimum 6 bench marks) with two change points
28. Fly levelling – Reduction by Height of Collimation method (Minimum 6 bench marks) with two change points
29. Fly levelling – Reduction by Height of Collimation method (Minimum 6 bench marks) with two change points
30. Fly levelling – Reduction by Rise and Fall method (Minimum 6 bench marks with two) change points
31. Fly levelling – Reduction by Rise and Fall method (Minimum 6 bench marks with two) change points
32. Fly levelling – Reduction by Rise and Fall method (Minimum 6 bench marks with two) change points
33. Fly levelling – Reduction by Rise and Fall method (Minimum 6 bench marks with two) change points
34. Fly levelling covering minimum 6 points with 2 inverted readings
35. Fly levelling covering minimum 6 points with 2 inverted readings
36. Check levelling and reduction of levels
37. Check levelling and reduction of levels

Content Beyond Syllabus

- Study of Distomat
- Measurement of Distance, Area and Volume using Distomat.

LIST OF EQUIPMENTS

S.No	Equipment	Quantity
1	Arrows	50
2	Prismatic compass	6
3	Dumpy level	6
4	Levelling staff	6
5	Cross staff	6
6	Ranging rod	12
7	Hand held GPS	4
8	Distomat	1

END EXAMINATION

Note: All the exercises have to be completed. Three exercises will be given for examination one from Chain and Compass surveying, one from Levelling, one from GPS.
All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitted during examination.

Detailed Allocation of Marks for External Assessment

Sl.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**
5	VIVA	**5**		
	TOTAL	**75**		

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE
(AUTONOMOUS)

(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING
Course code : N1CE311
Term : III Term
Course Name : CAD IN CIVIL ENGINEERING DRAWING – I

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Term	Marks			Duration
CAD IN CIVIL ENGNEERING DRAWING-I	4 Hrs.	60 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Course Outcomes:

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

C311.1	Knowing the basic concept and usage of CAD software.
C311.2	Understand CADD workstation and demonstrate basic commands of Computer Aided Design and Drafting Software.
C311.3	Prepare and plot 2D drawings of Building Components, Prepare the Approval drawing
C311.4	Create and plot 2D objects.
C311.5	Create and plot 3D objects.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		Linked Expts.	CL	Linked PO	Teaching Hrs
C311.1	Knowing the basic concept and usage of CAD software.	***1***	***R,U,AP***	1,4,7	03
C311.2	Understand CADD workstation and demonstrate basic commands of Computer Aided Design and Drafting Software.	***2***	***R,U,AP***	2,3,4,5,7	05
C311.3	Prepare and plot 2D drawings of Building Components, Prepare the Approval drawing	***3,4,5,6,7***	***R,U,AP***	1,2,3,4	20
C311.4	Create and plot 2D objects.	***8,9,10, 11,12***	***R,U,AP***	1,3,5,7	24
C311.5	Create and plot 3D objects.	***14***	***R,U,AP***	1,4,7	08

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
Cad In Civil Engineering Drawing - I	**3**	**2**	**2**	**2**	**1**	**-**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

LIST OF EXERCISES
PART-A

I. Introduction of CAD software for Preparation of Drawings **(5 HOURS)**

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

II. 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.

(5 HOURS)

3. Section of semicircular Arch
4. Elevation of door, partly paneled and partly glazed
5. Preparation of Plan showing arrangement of furniture's / fixtures and other features with standard sizes for the followings (Each room to be drawn separately - features and furniture's 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

III. Draw the building drawing using available CAD software (50 HOURS)

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.

*. 3D View of single bed room building using any software (Not for Examination).

LIST OF EQUIPMENTS

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

END EXAMINATION

Note:

- All the exercises have to be completed. Two exercises will be given for examination. One from PART –A and One from PART- B
- All the exercises should be given in the question paper and students are allowed to select by a lot.
- Record note book should be submitted during examination.

Detailed Allocation of Marks for External Assessment

PART - A	By lot one question	30 Marks
PART - B	By lot one question	40 Marks
Viva - Voce		5 Marks
Total		75 Marks

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N1 - SCHEME

Programme : CIVIL ENGINEERING

Course code : N1CE301

Term : IV

Course Name : THEORY OF STRUCTURES

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Term	Marks			Duration
THEORY OF STRUCTURES	6 Hrs.	90 Hrs.	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	SLOPE AND DEFLECTION OF BEAMS PROPPED CANTILEVERS	18
2	FIXED BEAMS CONTINUOUS BEAMS – THEOREM OF THREE MOMENTS METHOD	18
3	CONTINUOUS BEAMS – MOMENT DISTRIBUTION METHOD	18
4	COLUMNS AND STRUTS COMBINED BENDING AND DIRECT STRESSES	18
5	MASONRY DAMS EARTH PRESSURE AND RETAINING WALLS	18
	Total	90

Course Outcomes:

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

C301.1	Determine the Slope and Deflection of Determinate beams by area moment method.
C301.2	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.
C301.3	Analyse Continuous beams, Portal frames and Substitute frames by Moment Distribution Method and draw SFD, BMD.
C301.4	Define different types of Columns and find critical loads of Columns.
C301.5	Analyse Columns and Chimneys subject to eccentric loading / moment / horizontal loads and find maximum and minimum combined stresses in their sections.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C301.1	Determine the Slope and Deflection of Determinate beams by area moment method.	***R/U/A***	1,2	18
C301.2	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.	***R/U/A***	3,4	18
C301.3	Analyse Continuous beams, Portal frames and Substitute frames by Moment Distribution Method and draw SFD, BMD.	***R/U/A***	1,2,6,7	18
C301.4	Define different types of Columns and find critical loads of Columns.	***R/U/A***	1,2,3,4	18
C301.5	Analyse Columns and Chimneys subject to eccentric loading / moment / horizontal loads and find maximum and minimum combined stresses in their sections.	***R/U/A***	1,2,3,4	18
		Total sessions		90

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	SLOPE AND DEFLECTION OF BEAMS PROPPED CANTILEVERS	18	30	*4*	*21*	*5*	*22*
II	FIXED BEAMS CONTINUOUS BEAMS – THEOREM OF THREE MOMENTS METHOD	18	30	*4*	*21*	*5*	*22*
III	CONTINUOUS BEAMS – MOMENT DISTRIBUTION METHOD	18	30	*4*	*21*	*5*	*22*
IV	COLUMNS AND STRUTS COMBINED BENDING AND DIRECT STRESSES	18	25	*2*	*18*	*5*	*17*
V	MASONRY DAMS EARTH PRESSURE AND RETAINING WALLS	18	25	*2*	*18*	*5*	*17*
	Total	**90**	**140**	**16**	**99**	**25**	**100**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
Theory of Structures	**3**	**3**	**3**	**3**	**-**	**1**	**1**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
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- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**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	18
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. **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 simply supported or fixed ends – 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.	18

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 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	18
IV	4.1 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	18
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	18

	earth retaining walls – Problems to check the stability of walls- Minimum base width for no tension.	

TEXT BOOKS:

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

REFERENCE BOOKS:

1. V.N. Vazirani& M.M. Ratwani, "Analysis of structures"
2. R.L. Jindal , "Elementary Theory of Structures"
3. FV. Warnock, "Strength of materials"
4. Madhan Mohan Dass, " Structural Analysis" PHI Learning Pvt. Ltd., New Delhi.

MODEL QUESTION PAPER - I

Term	:	IV	Time	:	3Hrs
Programme	:	Diploma in Civil Engineering	Max.Marks	:	75
Course	:	Theory of Structures	Code	:	N1CE301

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART - A

1. Define slope.
2. Mention any two advantages of fixed beam.
3. What is meant by symmetrical frame?
4. State the effect of eccentric loading on short column.
5. What are the forces acting on a gravity dam?
6. State the clapeyron's theorem of three moments.
7. Define the term prop. What is the use of prop.
8. Define effective length of a column.

PART-B (5×3=15)

9 What is the slope and deflection of a simply supported beam supported to a udl over a full length?

10. Define free BMD and fixed BMD.
11. Define Stiffness and Distribution Factor.
12. Explain with suitable sketches the various types of end conditions of column.
13. What are the conditions to be satisfied for the safety of a masonry dam?
14. Write notes on overturning of a dam.
15. State different methods of analysis of Indeterminate Structures
16. What is propped cantilever beam? Find its degree of indeterminancy

PART-C **(5×10=50)**

17. (A) A cantilever beam of length 4.0 m carries an udl of 12 KN/m for a distance of 2.0 m from support and a point load of 15 KN at its free end. EI=7.2x10^4 kN.m^2. Find the slope and deflection at the free end of the beam by area-moment method. (10)

OR

(B) A Proped cantilever of length 6m carries a point load of 40KN at a distance of 4m from the fixed end. Determine the prop reaction and draw SFD and BMD. (10)

18. (A) A fixed beam of 8 m span carries an udl of 20kN/m on its full length and a point load of 40 kN at 2m from its left support. Draw the SF and BM diagrams. (10)

OR

(B)A two span continuous beam of 4m and 6m spans are fixed at both of its extreme ends. The size of the beam is uniform in both spans. The 4m span carries an udl of 24KN/m throughout its length. The 6m span carries two point loads of 30 KN each at its one third points. Find out the support moments using theorem of three moments (10)

19. (A) A two span continuous beam ABC is fixed at support A and simply supported at support C. AB=8m; BC=4m. Span AB carries an udl of 16KN/m; BC carries a central point load of 80KN. I_{AB}= 1.5 I_{BC}. Analyze the beam by moment distribution method and draw the BMD. (10)

OR

(B) Explain with neat sketches how substitute frames are assumed and analyzed in the case of multi storey buildings. (10)

20. (A) Two channel sections ISLC 300@331N/m of 5m length are placed back to back at a clear distance of 120mm and used as a column. The bottom end of the column is rigidly fixed and the top hinged. The geometrical properties of each channel are: A=4211 mm^2; D=300mm; bf=100mm; t_f=11.6mm; t_w=6.7mm; C_y=25.5mm; I_{zz}=60.48x10^6mm4; I_{yy}=2.46x$10^6$$mm^4$. Find the Euler's crippling load for the column. Assuming a factor of safety 2, find the safe permissible compressive stress in the cross section (10)

OR

(B) A hollow rectangular cross section of a masonry pillar has the overall dimension 1600mmx1000mm. The wall thickness is 200mm. A vertical load of 600kN is resting on the

pillar with eccentricities of 120mm from major axis and 80mm from minor axis. Determine the maximum and minimum stress in the cross section ignoring its self-weight. (10)

21. (A) A gravity dam of trapezoidal cross section of 20m height stores water on its vertical face for 18 m height, with 2 m free board. The top and bottom widths of dam are 4m and 10m respectively. Draw the pressure distribution diagram at base. Specific weights of masonry and water are 20 kN/m^3 and 10 kN/m^3 respectively.

OR

(B) A masonry retaining wall of 7.2 m height retains earth of unit weight 16 kN/m^3 and angle of repose 35° up to its top. The width of wall is 1.2m at top, 1.2m at 1.0m depth and 4.2m at base. Check the wall for its stability and no tension at base. The co efficient of friction between wall and earth is 0.6. Unit weight of wall may be taken as 19 kN/m^3.

20. (A). Design a circular RC column with lateral ties to carry an axial load of 1250 KN. Take *fck* as 20 MPa and *fy* as 500 MPa. The unsupported length of the column is 4 m. The ends of the column are effectively held in position but not restrained against rotation (10)

OR

(B). Design a square footing of uniform thickness for a RC Column carrying an axial load of 1800 KN. Size of column is 400 mm X 400 mm safe being capacity of soil is 150 KN/m^2 Use M20 grade concrete and Fe 415 grade steel. Check for shear not required (10)

21. (A). Select a suitable single angle section to carry an axial tension of 240KN, due to DL and IL. The member has to be connected to gusset plates at its ends by fillet welds through one leg. The yield and ultimate strengths of steel are 250 N/m^2 and 400 N/m^2.Connection need not be designed. (10)

OR

(B). A laterally supported cantilever beam of 3 m effective span carries a load of 12.5 KN/m inclusive of its self weight through out its span. Design the beam by limit state method using double channels of yield stress 350 MPa. Check for stiffness not necessary (10)

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MODEL QUESTION PAPER - II

Term	:	IV	Time	:	3Hrs
Programme	:	Diploma in Civil Engineering	Max.Marks	:	75
Course	:	Theory of Structures	Code	:	N1CE301

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART - A

1. Define Deflection
2. What is fixed beam and how it differ from a simply supported beam
3. Define stiffness factor. What is the stiffness factor of a beam with simply supported end
4. Write any three assumptions in Euler's theory
5. What is the elementary profile of a dam?
6. What are the types of prop and explain?
7. What is meant by slenderness ratio?
8. State the modes of failure of dams

PART-B (5×3=15)

9. State Mohr's theorem I and II
10. What is fixed beam and draw the sketch?
11. State Clapeyron's theorem of three moment with neat sketch
12. Distinguish between axially loaded and eccentrically loaded column
13. Define active earth pressure and passive earth pressure
14. State middle third rule
15. Draw the deflected shape of beams with different support conditions
16. State the assumptions made in Rankine's theory of earth pressure

PART-C **(5×10=50)**

17. (A). A cantilever beam 120mm wide and 200mm deep is 3m long. What udl should the beam can carry to produce a deflection of 8mm at the free end. Take E = 210 GN/mm^2 (10)

OR

(B). A cantilever of span 6m is supported by a rigid prop at the free end. It carries an udl of 20 KN/m throughout the span. Determine the prop reaction and the and the fixing moment. Draw SFD and BMD. (10)

18. (A). A fixed beam of span 6m carries point loads of 20KN and 15KN at 2m and 4m from the left end respectively. Find the support moments. Draw SFD and BMD. (10)

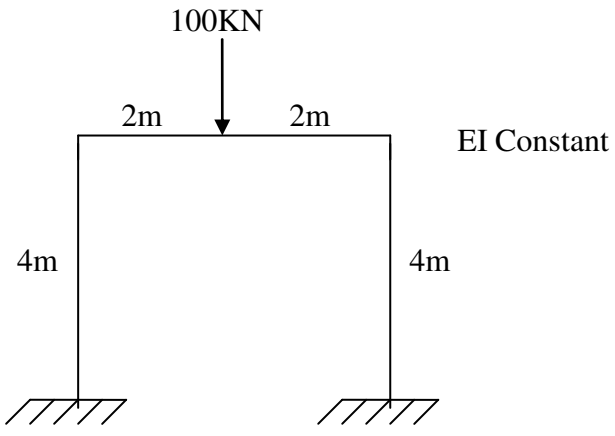
OR

(B). A two span continuous beam ABC of uniform flexural rigidity is subjected to udl of w/unit length. The two spans AB = BC = l . Determine the support moment at B using Clapeyron's theorem of three moments. The supports A and B are simply supported. (10)

19. (A). Analyse the continuous beam shown in fig. by moment distribution method. Find the support moments and draw the BMD. Assume EI as constant. (10)

OR

(B). For the portal frame shown in fig. compute the bending moments by moment distribution and draw BMD (10)



20. (A). A hollow C I column whose outside diameter is 200 mm has a thickness of 25 mm. It is 4.5m long and is fixed at both the ends. Calculate the safe load by Rankine's formula using a factor of safety 3 , if a = 1/7500 , E = 2.1 x 10^5 N/mm^2 and yield stress is 330 N/mm^2 (10)

OR

(B). A rectangular column 300 mm wide and 250 mm thick is carrying a vertical load of 100 KN , acting at an eccentricity of 50 mm in a plane bisecting the thickness. Determine the maximum and minimum stress developed. (10)

21. (A). A trapezoidal masonry dam 3m wide at top, 12m wide at the base is 18 m high. It retains water up to a depth of 17 m on its vertical face. Check the stability of the dam for sliding if, μ = 0.6 and F.O.S = 1.5. Take the weight of masonry as 20KN/m^3 and that of water as 10KN/m^3 (10)

OR

(B). A retaining wall trapezoidal in section is 8 m high, 1 m wide at top and 3 m wide at the bottom with a vertical earth face retaining earth level with the top of the wall. If the weight of the masonry is 24 KN/m^3 and that of the earth is18 KN/m^3 with an angle of repose of 30˚, calculate the maximum and minimum stress at the base. (10)

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VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE
(AUTONOMOUS)

(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING
Course code : N1CE302
Term : IV Term
Course Name : TRANSPORTATION ENGINEERING

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
	Hours/ Week	Hours / Term	Marks			Duration
TRANSPORTATION ENGINEERING	5 Hrs.	75 hrs	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	HIGHWAY ENGINEERING	15
2	HIGHWAY ENGINEERING (Contd.)	15
3	RAILWAY ENGINEERING	15
4	RAILWAY ENGINEERING (Contd.)	15
5	BRIDGE ENGINEERING	15
	Total	75 Hours

Course Outcomes:

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

C302.1	Understand the factors influencing road vehicle performance characteristics and design
C302.2	Apply basic science principles in estimating stopping and passing sight distance requirements
C302.3	Understand basic traffic stream parameters and models, traffic flow methods and queuing theory
C302.4	Design basic traffic signal phasing and timing plan
C302.5	Given basic information, prepare a horizontal and vertical alignment, including super elevation

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		**CL**	**Linked PO**	**Teaching Hrs**
C302.1	Understand the factors influencing road vehicle performance characteristics and design	***R/U/A***	1,3,4,5,7	16
C302.2	Apply basic science principles in estimating stopping and passing sight distance requirements	***R/U/A***	1,2,3,5,7	13
C302.3	Understand basic traffic stream parameters and models, traffic flow methods and queuing theory	***R/U/A***	1,2,3,4,5,6,7	16
C302.4	Design basic traffic signal phasing and timing plan	***R/U/A***	1,2,3,5,7	16
C302.5	Given basic information, prepare a horizontal and vertical alignment, including super elevation	***R/U/A***	1,2,3,4,5,7	14
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	**Unit Name**	**Hour**	**Max. Marks per Unit**	**Questions to be set for**			**Marks weightage (%)**
				R	**U**	**A**	
I	HIGHWAY ENGINEERING	15	30	***4***	***21***	***5***	*22*
II	HIGHWAY ENGINEERING (Contd.)	15	30	***4***	***21***	***5***	*22*
III	RAILWAY ENGINEERING	15	30	***4***	***21***	***5***	*22*
IV	RAILWAY ENGINEERING (Contd.)	15	25	***2***	***18***	***5***	*17*
V	BRIDGE ENGINEERING	15	25	***2***	***18***	***5***	*17*
	Total	75	**140**	**16**	**99**	**25**	**100**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
Transportation engineering	**3**	**3**	**3**	**2**	**3**	**1**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF TOPIC	Time
I	**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**	**(15Hours)**

	Objects of Arboriculture - Selection of trees - Location of trees - Highway lighting - Benefits.	
II	**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-Equipments for Bituminous road(Description not reqd) **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 Bituminousroads - Surface dressing - Types – Bituminous Concrete - Maintenance of Bituminous roads. **2.5 CEMENT CONCRETE ROADS** General - Advantages and disadvantages - Methods of construction of cement concrete roadswith sketches - Construction procedure for concrete roads. **2.6 HILL ROADS** Factors considered in alignment - Formation of hill roads - Hair pin bends - Retaining andBreast walls. **2.7 PLASTIC ROADS** Introduction- Types of plastic wastes used for Road Construction – Process of Laying ofRoads - Advantages	**(15Hours)**
III	**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 ofrails - 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.	**(15Hours)**

IV	**4.1 STATIONS AND YARDS** Definition of station - Purpose of railway station - Types of stations - Wayside, Junction andTerminal stations - Platforms - Passenger and Goods platforms - Definition of Yard - Types ofyard - 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 - Sandhump - Weigh bridges. **4.3 POINTS AND CROSSINGS** Purpose - Some definitions - Turnouts - Right hand and left hand turnouts - Sleepers laid forpoints and crossings - Types of switches - Crossings - Types of crossings. **4.4 SIGNALLING** General - Objects of signalling - Types of signalling - Based on function and location - Specialsignals - Control of movement of trains - Different methods - Following train system -Absolute block system - Automatic signalling - Pilot guard system - Centralized traffic control system. **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	**(15Hours)**
V	**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 groundwater for foundation – Caisson foundation - Coffer dam – Types. **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.	**(15Hours)**

Text Book:

SPCHANDOLA,"A Text Book of Transportation Engineering" S Chand & Company Ltd.,

Reference Book:

1. RANGWALA, "Highway Engineering",Charotor Publishing House Pvt. Ltd., Edition 2010
2. RANGWALA, "Railway Engineering" , Charotor Publishing House Pvt. Ltd., Edition2010
3. RANGWALA, "Bridge Engineering" , Charotor Publishing House Pvt. Ltd., Edition 2009

MODEL QUESTION PAPER - I

Term	: IV	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: TRANSPORTATIONENGINEERING	Course Code	: N1CE302

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B
Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B
and 10marks in PART- C]

PART – A (5×2=10)

1. What is Nagpur plan?
2. Define "Super elevation"
3. What do you mean by Reconnaissance survey?
4. Define "Gauges"
5. State any two functions of sleepers
6. What is the use of turn table?
7. State any two objects of signaling
8. What are the different types of wing walls?

PART – B (5×3=15)

9. Define "Plastic limit"
10. State any two advantages of highway lighting
11. What do you mean by surface dressing bituminous road?
12. What is hair pin bend?
13. What do you meant by creep of rails?
14. Define "Marshalling yard"
15. State the principles of interlocking
16. What is elastomer bearings?

PART – C (5×10=50)

17. (A). (i) What are the requirements of an ideal road? (5)

(ii) What is sight distance? Explain any two types of sight distances with neat sketches (5)

OR

(B). (i) What are the objects of road arboriculture? (5)

(ii) What is optimum moisture content? Explain with neat sketches the Proctor's compaction test to determine the optimum moisture content (5)

18. (A). (i) What are the factors affecting road alignment? (5)

(ii) Explain with neat sketch the construction of water bound macadam road (5)

OR

(B). (i) Write short notes on retaining wall and breast wall (5)

(ii) Explain with neat sketches the different methods of construction of concrete roads (5)

19. (A). (i) what are the advantages of uniformity in gauges? (5)

(ii) What are the functions and requirements of good ballast materials? (5)

OR

(B). (i) Explain the different types of rail joints (5)

(ii) Explain how the maintenance of railway track is carried out (5)

20. (A). (i) State the purposes of railway stations. (5)

(ii) Define switches. Explain the different types of switches with neat sketches (5)

OR

(B). (i) Write short notes on absolute block system of controlling the movement of trains? (5)

(ii) Explain with neat sketches the tappets and locks system of interlocking (5)

21. (A). (i) What are the factors to be considered in the alignment of bridges ? (5)

(ii) What are causeways? Explain with neat sketches any two types of causeways (5)

OR

(B). (i) State the functions of bearings used in bridges? (5)

(ii) Write short notes on balanced cantilever bridges and suspension bridges (5)

MODEL QUESTION PAPER - II

Term	: IV	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: TRANSPORTATIONENGINEERING	Course Code	: N1CE302

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B and 10marks in PART- C]

PART – A (5×2=10)

1. State IRC classifications of road.
2. What is transition curve?
3. What is the purpose of grader?
4. State the materials used for WBM road
5. What are the different classifications of gauges?
6. What are the different types of rail joints?
7. Define : Scour
8. State any two functions of foundations?

PART – B (5×3=15)

9. Define : Liquid limit
10. Define : Coal tar
11. Define : Breast wall
12. What do you meant by coning of wheels?

13. What is the use Fouling marks?
14. What do you meant by turnouts?
15. What are causeways?
16. State the importance of bearings in bridges

PART – C **(5×10=50)**

17. (A). (i) What is Ribbon development? State the effects of Ribbon development (5)
(ii) What is gradient? Explain the different types of gradient (5)

OR

(B). (i) Explain how the plastic limit of soil is determined in the laboratory ? (5)
(ii) What is road accident? What are the causes of road accident ? Explain the reventive measures for the road accident (5)

18. (A). (i) Write short notes on preliminary survey in a road project? (5)
(ii) Explain with a neat sketch the different methods of construction of gravel road(5)

OR

(B). (i) What are the factors to be considered in the alignment of hill roads? (5)
(ii) Explain with neat sketches the different types of surface dressing bituminous road (5)

19. (A). (i) Write short notes on loading gauge (5)
(ii) What are the functions and requirements of good sleepers? (5)

OR

(B). (i) State the necessities for the maintenance of railway track (5)
(ii) Explain how the telescopic method of plate laying is carried out (5)

20. (A). (i) Write short notes on examination pits and drop pits (5)
(ii) Draw a neat sketch of left-hand turnout and name the various parts on it (5)

OR

(B). (i) What are the objects of signalling? (5)
(ii) Explain the features of underground railways and tube railways (5)

21. (A). (i) Explain how the ground water is controlled during construction of foundation?(5)
(ii) What is cofferdam ? Explain with neat sketches the different types of cofferdams (5)

OR

(B). (i) Define: Abutment. State the different types of abutment (5)
(ii) Explain with neat sketches the different types of bridges according to its Superstructure (5)

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS)

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE303

Term : IV

Course Name : SURVEYING-II

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
SURVEYING-II	Hours / Week	Hours / Term	Marks			Duration
	5Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Time
I	THEODOLITE SURVEYING	16
II	TACHEOMETRIC SURVEYING	13
III	TRIGONOMETRICAL LEVELLING REMOTE SENSING, PHOTOGRAMMETRIC SURVEYING AND HYDROGRAPHIC SURVEYING	20
IV	CURVES	13
V	TOTAL STATION, GEOGRAPHICAL INFORMATION SYSTEM (GIS)	13
	Total	75 Hours

Course Outcomes:

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

C303.1	Apply the knowledge of basic concepts and principles of Theodolite and Understand the usage of Theodolite in any civil engineering projects before planning and during execution
C303.2	Understand the principles and use of Tacheometric survey in rough terrain.
C303.3	Understand the usage of Theodolite in any civil engineering projects before planning and during execution.
C303.4	To Understand the knowledge of basic concepts and principles of Photogrammetric Surveying, Remote sensing, Hydrographic Surveying.
C303.5	To Understand the usage and apply the knowledge of Total Station in different field activities and to Understand the knowledge of basic concepts and principles of GIS in Surveying

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C303.1	Apply the knowledge of basic concepts and principles of Theodolite and Understand the usage of Theodolite in any civil engineering projects before planning and during execution	*R/U/A*	1, 2, 3	13
C303.2	Understand the principles and use of Tacheometric survey in rough terrain.	*R/U/A*	1, 2, 3	13
C303.3	Understand the usage of Theodolite in any civil engineering projects before planning and during execution.	*R/U/A*	1, 2, 3	23
C303.4	To Understand the knowledge of basic concepts and principles of Photogrammetric Surveying, Remote sensing, Hydrographic Surveying.	*R/U/A*	1,2,3,4	13
C303.5	To Understand the usage and apply the knowledge of Total Station in different field activities and to Understand the knowledge of basic concepts and principles of GIS in Surveying	*R/U/A*	1,2,3,4	13
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for		Marks weightage (%)
				R	U/A	
I	THEODOLITE SURVEYING	16	25	2	23	17.86
II	TACHEOMETRIC SURVEYING	13	25	2	23	17.86
III	TRIGONOMETRICAL LEVELLING REMOTE SENSING, PHOTOGRAMMETRIC SURVEYING AND HYDROGRAPHIC SURVEYING	20	25	2	23	17.86
IV	CURVES	13	25	2	23	17.86
V	TOTAL STATION AND GIS	13	25	2	23	17.86
I to V*			15	6	09	10.70
	Total	75	140	16	124	100

*** 3 x 2Marks and 3 x 3Marks from any Unit limited to maximum of 2 Questions in each unit**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
SURVEYING - II	**3**	**3**	**3**	**2**	**-**	**-**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF TOPIC	Time
I	**1. THEODOLITE SURVEYING** Introduction - Types of Theodolites : Transit and non-transit Theodolite, Vernier and Micrometer Theodolites – Electronic Theodlite (Principles and description only) – Component parts of a transit Theodolite – Fuctions – 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 Hours**

II	**2. TACHEOMETRIC SURVEYING** Introduction – Instruments used in tacheometry – Systems of tacheometry : Stadia and Tangential tacheometry – Principles – Fixed hair method of tacheometry – Distance andElevation 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 Hours**
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 – Definition – Terrestrial and Aerial photographs – Applications -Hydro graphic surveying – Definition-Uses – Sounding: Definition, Purpose, Instruments needed – Steps in hydro graphic surveying	**20 Hours**
IV	**4. 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	**13 Hours**
V	**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)	**13 Hours**

TEXT BOOKS:

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., 16th edition, 2011.
3. Punmia.B.C, Ashok Jain & Arun K. Jain,"Surveying Volume II & III", Laxmi, Publications
Private Limited., 15th edition, 2011.

REFERENCE BOOKS

1. Mimi Das Saikia, Bhargab Mohan Das & Madan Mohan Das, “Surveying”, PHI Learning Private Limited, Edition 2010.
2. S. K. Roy, “Fundamentals of Surveying”, PHI Learning Private Limited, Edition 2010.
3. Sathesh Gopi, R.Sathikumar & N.Madhu, Advanced Surveying, (Total Station, GIS, Remote
Sensing), Pearson Education, Chennai, 2007.
4. M.Anji Reddy, Remote sensing and Geographical information system, B.S Publications, Edition 2006.
5. Burrough P A, Principles of GIS for Land Resources Assessment, Oxford Publication, 2000.
6. Learning Material Development Project – NITTTR, Taramani,Chennai, CD programme on GPS and GIS.

MODEL QUESTION I

Term	: IV	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: SURVEYING-II	Course Code	: N1CE303

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B
Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B
and 10marks in PART- C]

PART – A (5×2=10)

1. Define Latitude and Departure
2. What are Distomats.
3. What are the instrument needed for sounding?
4. How are curve designated.
5. Describe briefly about LIS.
6. Write the types of theodolite.
7. What is an anallactic lens?
8. Mention any two total station characteristics.

PART – B (5×3=15)

9. Mention the fundamental lines of theodolite and state the relation between them
10. Explain the different systems of Tacheometry and discuss their merits
11. State any three application of photogrammetric surveying.
12. State any three elements of simple circular curve.
13. What is the function of prism reflectors in total station?
14. State any three field applications of GIS.
15. What are the various kinds of angles as observed with a theodolite?
16. Explain the method of remote sensing.

PART – C (5×10=50)

17. (A). Draw a neat sketch of a vernier theodolite and explain the functions of any five component parts.

OR

(B)**.** The following lengths and bearings were observed in running a closed traverse ABCD. The length and bearing of line DA have been omitted. Calculate the length and bearing of DA.

Line	**Length (m)**	**Bearing**
AB	485	314º 48´
BC	1725	16º 24´
CD	1050	142º 06´

18. (A)**.** What are the various constants of a tacheometer? Describe the field procedure of determining the constants of a tacheometer.

OR

(B). A tacheometer fitted with an anallactic lens was set up at a station and the following readings were obtained on a vertically held staff

Station	Staff Station	Vertical Angle	Stadia hair readings (m)	Remarks

A	B.M	- 2º 18´	3.225, 3.550, 3.875	R.L of B.M = 743.565
	B	+ 8º 36´	1.650, 2.515, 3.380	

Find the horizontal distance from A to B and RL of B, if the constant of instrument was 100.

19. (A)The theodolite was set up at A, at a distance of 225m from a church and the following observations were recorded. Vertical angle measured to the top of the church is $+9^0$42', Vertical angle measured to the base of the church is $-19^0$54'. RL of A = 2450.750m. Height of instrument =1.630m. Determine the height of the church from its top to its base. Also calculate the RL of top and base of church.

OR

(B). Determine the R.L of top of a transmission tower from the following observations:

Inst. Station	**Vertical angle to top of tower**	**Staff reading on B.M (m)**	**R.L of B.M.**
A	+ 18º 30´	2.815	105.000
B	+ 12º 40´	1.865	

The distance between the station A and B is 60m. Stations A, B and the tower are in the same vertical plane.

20. (A)**.** Describe the procedure for setting out the curve in the field by Rankine's method of deflection angle.

OR

(B). Two tangents intersect at chain age of 200m. The deflection angle being 40º.Calculate all the necessary data for setting out a curve of radius 80m by offsets from long chords produced. Assume peg interval as 20m.

21. (A). State the various applications of Total station.

OR

(B)**.** Briefly write the field procedure to run a traverse survey using Total station.

MODEL QUESTION II

Term	: IV	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: SURVEYING-II	Course Code	: N1CE303

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B
Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B
and 10marks in PART- C]

PART – A (5×2=10)

1. Define the term transiting and swinging
2. What are the two systems of tacheometry?
3. When do you adopt trigonometrical leveling?
4. State any two objectives of transition curve.
5. Name any two accessories used in Total station.
6. Mention any two geographical informations required in GIS.
7. State any one field checks in a closed theodolite traverse.
8. List out the components of GIS

PART – B (5×3=15)

9. Describe the method of measuring horizontal angle by Repetition method.
10. Mention the errors in Tacheometric surveying.
11. Briefly describe the steps in hydrographic surveying.
12. Mention different types of circular curves.
13. State the various applications of Total station.
14. What are the types of traverse?
15. What are the different methods to find out the elevation of objects?
16. Define Land Information System.

PART – C (5×10=50)

17. (A). What are the fundamental lines of a theodolite. State the relationship between them.

OR

(B). The following were the observations made in a closed traverse ABCD. The length and bearing of DA could not be observed. Calculate the omitted measurements

Line	Length (m)	Bearing
AB	500	$98^0$30’
BC	620	$30^0$20’
CD	468	$298^0$30’
DA	?	?

18. (A). Briefly explain different systems of tacheometry.

OR

(B). A tacheometer fitted with an anallatic lens was set up over a B.M 250.000 above datum and the following readings were obtained on a vertically held staff:

Staff station	**Vertical Angle**	**Stadia hair readings(m)**
P	+5º 14´	0.450, 1.035, 1.620
Q	- 7º 33´	0.860, 1.270, 1.680

Calculate the distances of P and Q from the instrument station and their elevation. The height of the instrument is 1.500m.

19. (A). A transit was setup at a distance of 187m from a temple. The angle of depression to the bottom of temple was $3^0$12'and the angle of elevation to its top was $10^0$12'. The elevation of the instrument axis was 176.150m. Find the height of the temple and elevation of its top.

OR

(B). Find the elevation of the top of a tower from the following data:

Instrument Station	Staff reading on BM	Angle of elevation	Remarks
A	0.865m	$18^0$30'	RL of BM = 425.000m
B	1.225m	$10^0$12'	Distance AB = 50.000m

20. (A). Draw a neat sketch of simple circular curve and name the parts

OR

(B). Two straights intersect at an intersection angle of 75º.Calculate the following elements of the curve. Take the degree of curve as 6^0.

(i) Tangent length (ii) Length of curve (iii) Length of the long chord (iv) Apex distance

21. (A)**.** Briefly write the field procedure for co-ordinate measurement, using Total station.

OR

(B)**.** Briefly explain the various steps in GIS mapping.

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS)

(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 – SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE207

Term : IV Term

Course Name : ESTIMATING AND COSTING-I

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
ESTIMATING AND COSTING-I	Hours / Week	Hours / Term	Marks			Duration
	5 Hrs.	75 hours	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
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	18
5	TAKING OFF QUANTITIES BY GROUP SYSTEM	18
	Total	75 Hours

Course Outcomes:

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

C 207.1	Able to Explain types of estimate and duties of an estimator
C 207.2	Able to Determine the irregular area and volume.
C 207.3	Able to Undertake rate analysis of civil engineering works.
C 207.4	Estimate the various types of civil engineering works.
C 207.5	Able to Evaluate the actual value of any property

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C 207.1	Able to Explain types of estimate and duties of an estimator	R/U/A	1,2,3,5,7	12
C 207.2	Able to Determine the irregular area and volume.	R/U/A	1,2,3,4,5	12
C 207.3	Able to Undertake rate analysis of civil engineering works.	R/U/A	2,3,5,7	15
C 207.4	Estimate the various types of civil engineering works.	R/U/A	2,3,4,5,7	18
C 207.5	*Able to Evaluate the actual value of any property*	*R/U/A*	1,2,3,4,5,7	18
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	INTRODUCTION APPROXIMATE ESTIMATES	12	30	***4***	***21***	***5***	*22*
II	AREAS AND VOLUMES EMBANKMENTS AND CUTTINGS	12	30	***4***	***21***	***5***	*22*
III	ANALYSIS OF RATES	15	30	***4***	***21***	***5***	*22*
IV	TAKING OFF QUANTITIES BY TRADE SYSTEM	18	25	***2***	***18***	***5***	*17*
V	TAKING OFF QUANTITIES BY GROUP SYSTEM	18	25	***2***	***18***	***5***	*17*
	Total	**75**	**140**	**16**	**99**	**25**	**100**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
Estimating and costing – I	**2**	**3**	**3**	**2**	**3**	**-**	**2**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF TOPIC	Time
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 Hours**
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 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/	**12 Hours**

	depths or with two level sections of uniform height/ depth.	
III	**3.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/ Levelling 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 Hours**
IV	**4.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 flat roof A Community hall with RCC columns and T-beams A small Industrial building with AC/ GI sheet roof on Steel Trusses	**18 Hours**
V	**5.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)	**18 Hours**

TEXT BOOKS:

1. Rangawala, “Estimating & Costing”, Charotor Publishing;
2. N.A.Shaw, “Quantity Surveying & Valuation”, Khanna Publishers;

REFERENCE BOOKS:

1.L.N.Dutta, "Estimating & Costing", DhanpatRai& Sons
2. Bridie, "Estimating & Costing"
3. Indian Standard Code of Practice, IS:1200

MODEL QUESTION PAPER – I

Term	:	IV	Time	:	3 Hrs
Programme	:	Diploma in Civil Engineering	Max. Marks	:	75
Course	:	Estimating and costing I	Code	:	N1CE207

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory. (2) Answer division (a) or division (b) of each question in PART – C. (3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART – A (Marks: 5 × 2 = 10)

1. Define Group System.
2. What are the rules used to find the Area of Irregular Sections?
3. What is mean by Analysis of Rates?
4. What do you mean by Individual Wall Method of taking of quantities?
5. What is Dimension paper?
6. Define the term "Carpet Area" of the building.
7. Define Standard Data Book.
8. How the Dimensions are Squared?

PART – B (Marks: 5 × 3 = 15)

9. What is painting coefficient? State the painting coefficient for
   i) Panelled door
   ii) Glased window
   iii) Steel door.
10. Differentiate between a level section and two level section.
11. State the difference between sundries & lumpsum portion.
12. What do you mean by "casting and reducing the abstract"?
13. Briefly explain the method of writing the bill.
14. In which practical case you come across a section with partial cutting and partial embankment?
15. How could the rate arrived for items of works not mentioned in the standard data book?
16. What do you mean by "Contingency provision"

PART - C (Marks: 5 ×10 = 50)

17. (A) The particulars of a proposed residential building are given below:

Carpet area = 216 m^2
Circulation area = 12% of Plinth area
Non-livable area = 6% of Plinth area
Wall area = 10% of Plinth area

The total expenditure of a recently constructed similar residential building of plinth area 350m^2 is Rs.49,00,000. Calculate the approximate cost of the proposed building. (10)

OR

(B) (i) List out the duties and requirements of a good quantity surveyor.

. (5)

(ii) A brick masonry wall of 200m^2 area has to be plastered with 12mm thick 1:4 cement mortar. Allowing 15% excess mortar for wastage and undulations in the surface, calculate the quantities of cement (in kg) and sand (in m^3) required for the work. (5)

18. (A) (i) Explain mid ordinate rule and end ordinate rule used for calculating the area of irregular shape. (5)

(ii)The offsets measured to the curved boundary of a land from a straight chain line are given below. Compute the area enclosed by the boundary and the chain line by trapezoidal and Simpson's rules.

Chainage (m)	0	15	30	45	60	75	90	105	120
Offsets (m)	0	2.4	3.7	5.4	8.2	6.9	5.7	3.1	0

(5)

OR

(B) It is proposed to cut a drain of 1 km length with a uniform base width of 5m. The depth of cutting will be 3.0m at the starting point, 4.2m at the mid length and 5.0m at the end point. The sides have slopes of 2:1 on left side and 1½:1 on the right side. Compute the volume of earth work in cutting using Prismoidal formula. (10)

19. (A). Analyze and determine the rates for the following items of work with the given data A)Flooring with 100mm thick base concrete using 40 mm size broken stone in cement mortar 1:4 and finished with 20mm thick ellis pattern cement concrete surface - 1 m^2 (10)

OR

(B) (i) Flush pointing R R masonry with cement mortar 1:4 – 1m^2. (5)

(ii) Supplying and fixing 100mm dia rain water pipes – 1m. (5)

Material and Labour requirement:

Cement concrete base with 40mm broken stone in CM1:4 – 10m^3

40 mm broken stone	9.5	m^3
Cement mortar 1:4	3.8	m^3
Mason Category II	1.8	No.
Mazdoor Category I	17.7	No.
Mazdoor Category II	14.1	No.

Flooring with 100mm thick base concrete using 40mm size broken stone in CM1:4 and

finishing with 20mm thick ellis pattern cement concrete surface- 10m^2

Cement concrete base	1	m^3
Stone chips	0.24	m^3
Cement	117	kg
Mason Category I	0.50	No.
Mazdoor Category I	1.10	No.
Mazdoor Category II	4.30	No.

Labour for tamping base concrete course Rs.400 per 10m^2
Labour for fishing the floor work Rs.450 per 10m^2

Flush pointing R R masonry with cement mortar 1:4 – 10m^2.

Cement mortar 1:4	0.09	m^3
Mason Category II	1.6	No.
Mazdoor Category I	0.5	No
Mazdoor Category II	1.1	No.

Supplying and fixing 100mm dia rain water pipes – 3m

A.C pipe 100 mm dia	3	m
M.S clamp	2	No.
T.W plugs	4	No.
Plumber	1	No
Cement Packing	LS	

Cost of materials and lead particulars:

Material	Unit	Cost (Rs) charges(Rs)	Lead (kM)	Rate for Lead/kM(Rs)	Handling
Cement	50 kg	280.00	4	2.00	5.00
Sand	1m^3	250.00	30	20.00	60.00
Broken stone (40mm)	1m^3	380.00	20	18.00	40.00
Stone chips	1m^3	520.00	20	18.00	40.00
A.C pipe 100mm dia	1m	65.00	4	3.00	5.00
M.S clamp	1No	16.00	--	--	--
T.W plugs	1No	3.00	--	--	--

Cost of Labour:

Mason Category I	Rs.550.00 per day
Mason Category II	Rs.500.00 per day
Plumber	Rs.550.00 per day
Mazdoor Category I	Rs.400.00 per day
Mazdoor Category II	Rs.275.00 per day
Mixing charge for mortar	Rs.200 / m^3

20. (A) Take the quantity of earth work in foundation for the residential building shown in (Sketch 1) by Centre line method using Trade system
(10)

OR

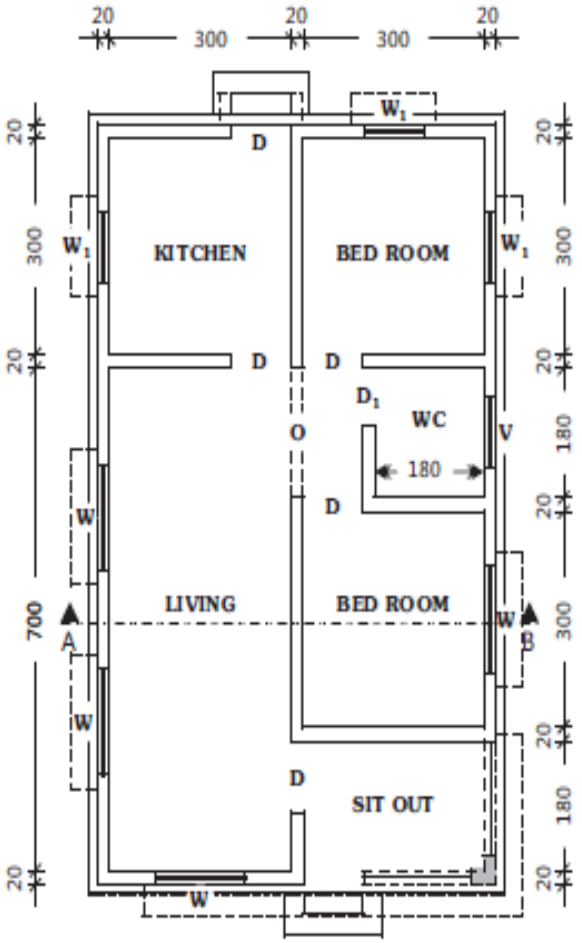
(B) Take the quantity of R.C.C in the sloped roof for the residential building shown in Sketch 1 using Trade system – A plan and section of a small residential building with sloped

RCC roof.
(10)

21. (A) Take the quantity of brick work in foundation and basement for the residential building shown in (Sketch 2) using Group system
(10)

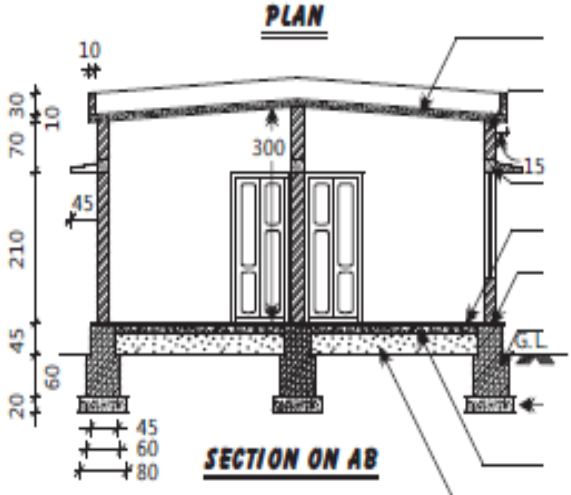
OR

(B) Take the quantities of works in the parapet of the residential building shown in Sketch 2
using Group system. – A plan and section of a small office building with flat RCC roof
(10)



PLAN

REFERENCE	
FOUNDATION	R.R. IN C.M. 1:8
BASEMENT	R.R. IN C.M. 1:8
WALLS	B.W. IN C.M. 1:6, 20 Tk
LINTEL	R.C.C. 1:2:4, 15 Tk
ROOF	R.C.C. 1:2:4, 10 Tk
DOORS	D - 100 x 210, FULLY PANELLED
	D_1 - 80 x 210, FULLY PANELLED
WINDOWS	W - 150 x 150 ,FULLY GLAZED
	W_1 - 100 x 150 ,FULLY GLAZED
VENTILATOR	V - 100 x 50 ,FULLY GLAZED
PLASTERING	INSIDE & OUT SIDE WITH C.M. 1:5, CEILING C.M. 1:3
STEPS	
TREAD	30
RISE	15



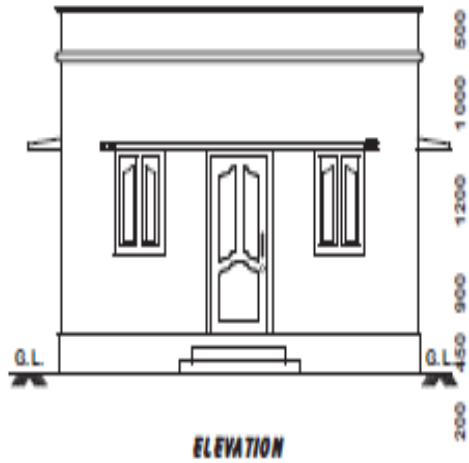
SECTION ON AB

ROOFING WITH C.C.1:2:4, 100 THICK
BRICK WORK IN SUPER STRUCTURE WITH C.M. 1:5, 200 THICK
LINTEL CUM SUNSHADE, 150 THICK
FLOOR FINISH WITH C.M. 1:4, 20 THICK
D.P.C. WITH C.M. 1:3, 20 THICK
R.R.MASONRY IN FOUNDATION AND BASEMENT WITH C.M. 1:5
CEMENT CONCRETE FOR FOUNDATION, 1:4:8, 200 THICK
FLOORING WITH CEMENT CONCRETE, 1:4:8, 130 THICK
SAND FILLING, 300 THICK

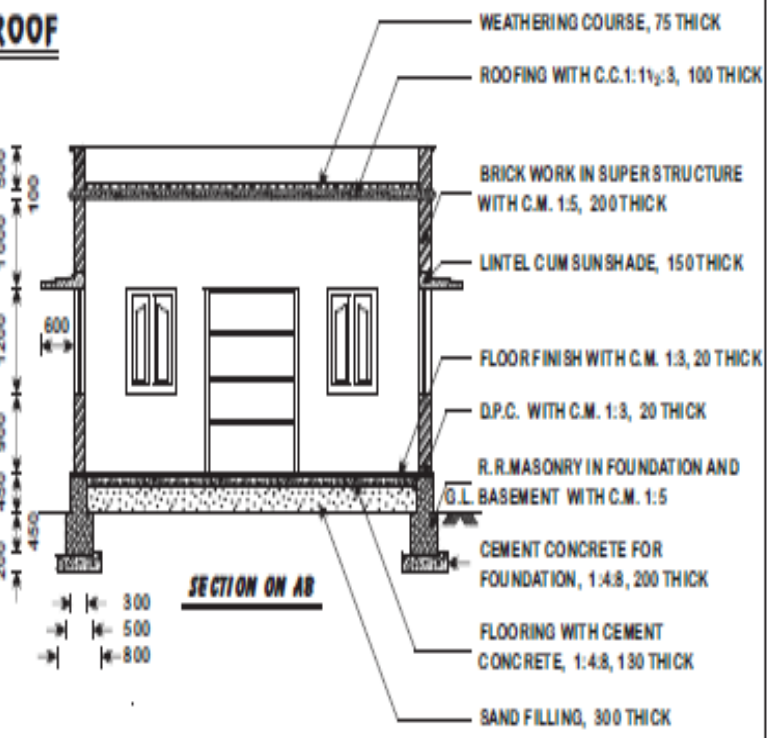
A RESIDENTIAL BUILDING WITH TWO BED ROOM

ALL DIMENSIONS ARE IN CM.

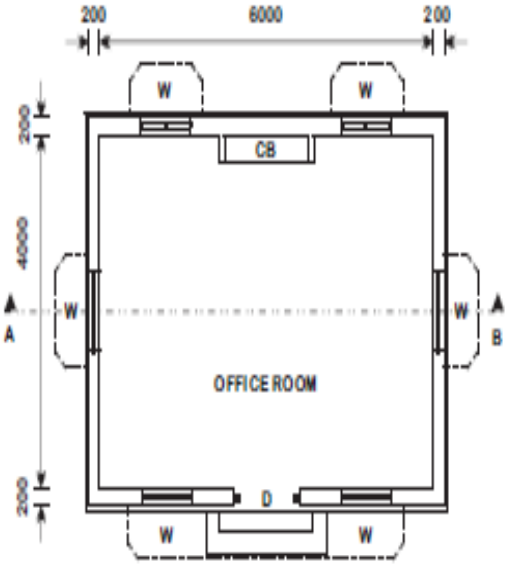
AN OFFICE ROOM WITH R.C.C. FLAT ROOF



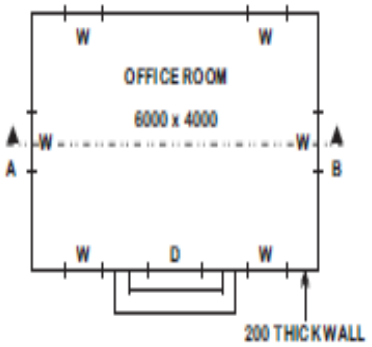
ELEVATION



SECTION ON AB



PLAN



LINE PLAN

REFERENCE		
TYPE	DESCRIPITION	SIZE
D	DOOR - PANELLED	1200 x 2100
W	WINDOW - PANELLED	900 x 1200
CB	CUPBOARD	1500 x 2100 300 DEPTH
STEPS	RISE	150
	TREAD	250

NAME :

PLATE No. : DATE :

ALL DIMENSIONS ARE IN mm, NOT TO SCALE

MODEL QUESTION II

Term	: IV	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course name	: Estimating and costing I	Course code	:N1CE207

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART – A **(Marks: 5 × 2 = 10)**

1. Write any two types of estimates.
2. What is Level Section?
3. What is Lead Statement?
4. State the unit of work for following items:
   a) Plastering
   b) Brickwork in super structure.
5. What is the unit of measurement of R.C.C in Beams?
6. What is group system?
7. What are sundries?
8. Calculate the quantities of materials used for CM 1:5 – $1m^3$

PART – B **(Marks: 5 × 3 = 15)**

9. List out the duties of Good Quantity Surveyor.
10. Calculate the distance of a road between 100m contour and 150m contour with a gradient of 1 in 20 in a hill road section.
11. Write short notes on Schedule of Rates.
12. Explain about Trade system.
13. What are the functions of Abstract sheets?
14. With an example, how the entered dimensions in the dimension paper are cancelled.
15. State the use of standard data book in the Analysis of Rates.
16. Explain in detail about Prismoidal Rule.

PART – C **(Marks: 5 × 10 = 50)**

17. (A) (i). State the duties and requirements of a good quantity surveyor (6)
    (ii) Give a brief note about the standard data book and schedule of rate book (4)

OR

(B). The Expenditure incurred in the construction of a single storey residential building of plinth area $95m^2$ is found to be Rs. 32,85,000. In which 70% is towards the cost of materials and the remaining is towards the cost of labour. It is proposed to construct a similar building of the same specifications with the plinth area of $125m^2$ at a place where the cost of materials 16% more and the cost o9f labour is 12% more. Estimate the approximate cost of the proposed building

18. (A). The cross sectional area of a Embankment are as given below. Calculate the volume of the Embankment by (i) Trapezoidal rule (ii) Prismoidal rule
(10)

Distance (m)	0	50	100	150	200
Area ($m^{2)}$	200	540	810	1420	1520

OR

(B). A chain was run in the middle of a long strip and perpendicular offsets were taken to the boundaries on the left to right side of the chain line. The measured values are given below. Determine the area of the strip of the land by Simpson's rule and Trapoezoidal rule
(10)

Chainage (m)	0	15	30	45	60	75	90	105	120
Offset to right (m)	10.1	9.6	6.2	12.1	13.1	11.2	10.3	11.2	9.8
Offset to left (m)	12.8	9.4	8.8	10.8	9.6	12.2	10.1	10.8	12.1

19. Analyse and determine the rates for the following items of work with the given data:-
(A) Random rubble masonry in CM 1:5 rate for $10m^3$
(10)

OR

(B) R.C.C 1:2:4 for beams 300 X 500mm using 20mm size broken stone including reinforcement centering, shuttering etc. complete – $1m^3$
(10)

Material and Labour requirement:

i) C.C 1:2:4 - 10 m^3

Broken stone 20mm size	: 9 m^3
Sand	: 4.5 m^3
Cement	: 3,230 Kg
Mason I Class	: 3.5 Nos
Mazdoor I Class	: 21 Nos
Mazdoor II Class	: 3.5 Nos

ii) Random Rubble masonry in CM 1:5 – 10 m^3

Rough Stone	: 11 m^3
CM 1:5	: 3.4 m^3
Mason I Class	: 7.1 Nos
Mason II Class	: 10.6 Nos
Mazdoor I Class	: 14.1 Nos
Mazdoor II Class	: 14.1 Nos

iii) R.C.C. 1:2:4 for beams 300 X 500 mm - 1 m^3

C.C. 1:2:4	:1 m^3
Reinforcement	: 150kg/ m^3 of concrete
Binding wire	: 1% reinforcement
Centering	: As required
Bending and fixing grills	: As required

Cost of materials at site:

Cement	: Rs. 10,000 / Tonne
Steel	: Rs. 40,000 / Tonne
Binding wire	: Rs. 60 / Kg
Rough stone	: Rs. 1,200 / m^3
Broken stone 20mm size	: Rs. 1,600 / m^3
Sand	: Rs. 1,500 / m^3

Cost of Labour:

Mason I Class	: Rs. 450 / day
Mason II Class	: Rs. 375 / day
Mazdoor I Class	: Rs. 350 / day
Mazdoor II Class	: Rs. 250 / day

20. Takeout the quantities for the following items of work for the given "Residential building"
(Sketch-A) by Trade system

(A). (i) Earthwork Excavation for foundation (6)

(ii) R.C.C for roof slab and lintel only (4)

OR

(B). R.R Masonry with C.M 1:6 for foundation footings and basement
(10)

21. Takeout the quantities for the following items of work for the given "One roomed building" (Sketch-B) by Group system

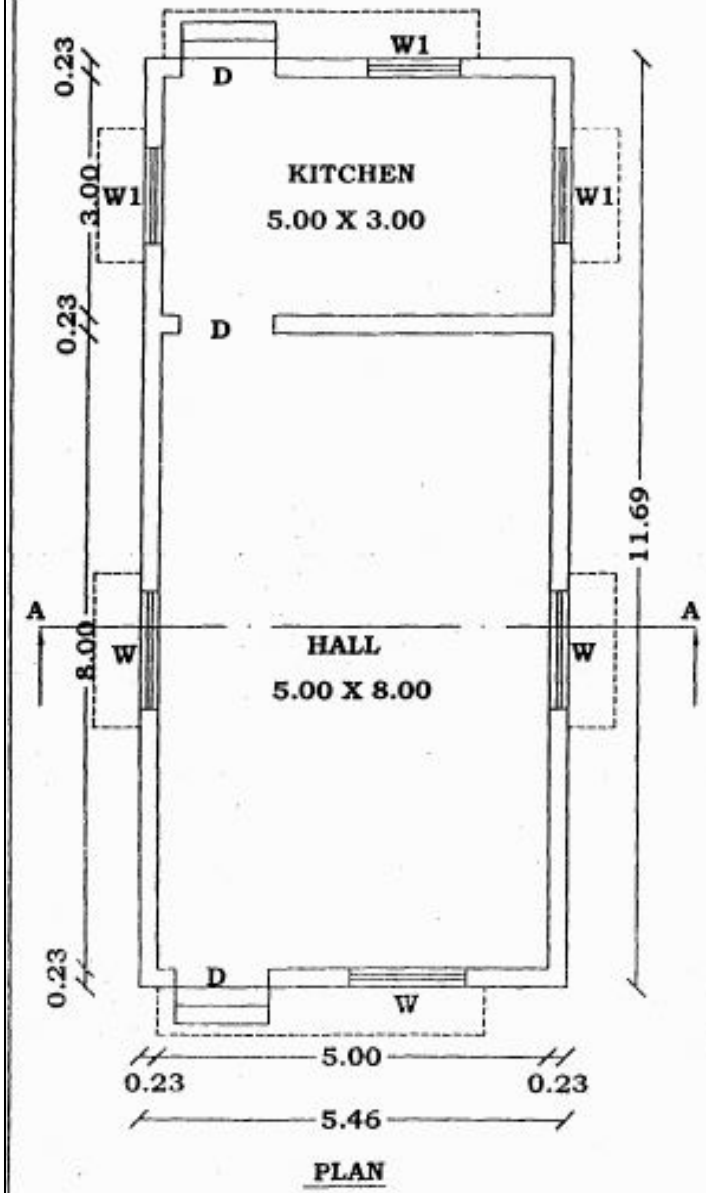
(A). B.W in C.M 1:4 for footing and basement (10)

OR

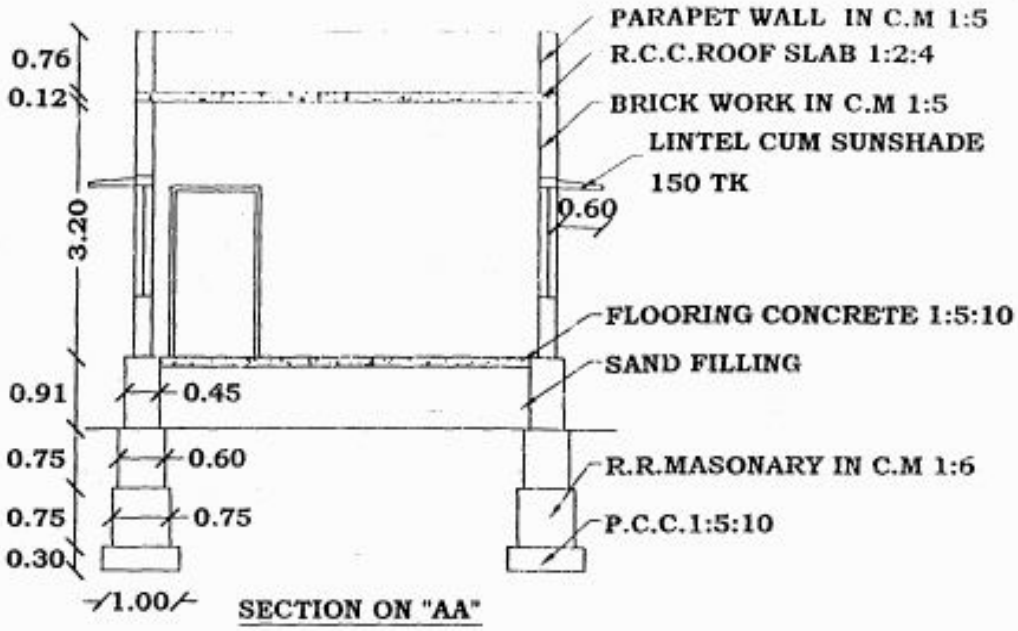
(B). (i) Foundation concrete with C.C 1:4:8 (5)

(ii) R.C.C. for roof slab and lintel only (5)

SKETCH 'A'



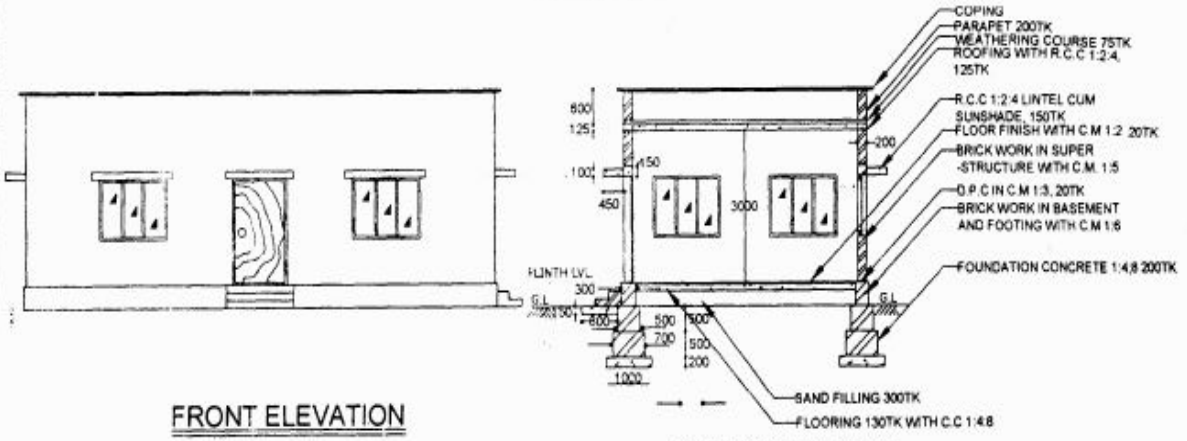
PLAN



SECTION ON "AA"

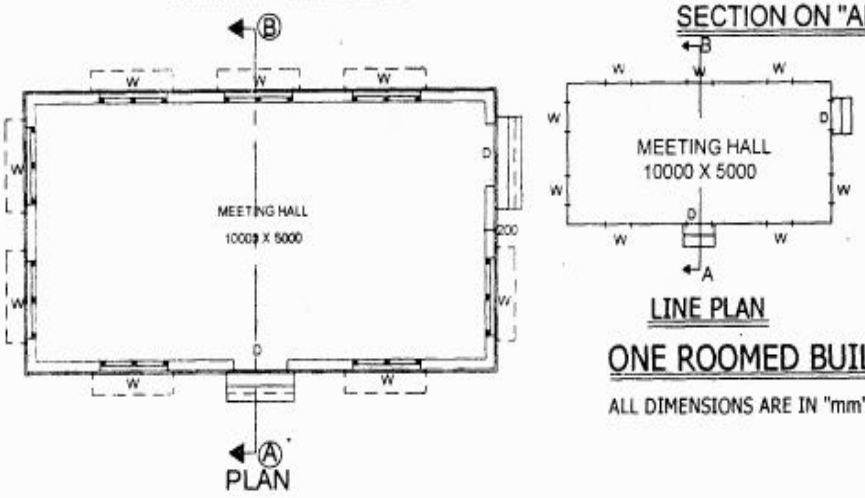
REFERENCE		
D	DOOR	1.20 X 2.10
W	WINDOW	1.50 X 1.40
W1	WINDOW	1.20 X 1.40

Sketch - A



FRONT ELEVATION

SECTION ON "AB"



PLAN

LINE PLAN

REFERENCE

D - FLUSH DOOR 1200 X 2100

W - GLAZED WINDOW 1500 X 1200

STEPS

TREAD	300
RISE	150

ONE ROOMED BUILDING

ALL DIMENSIONS ARE IN "mm"

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE
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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE309
Term : IV

Course Name : MATERIAL TESTING LAB -II

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Term	Marks			Duration
			Internal Assessment	End Examination	Total	
MATERIAL TESTING LAB -II	3 Hrs.	45 Hrs.	25	75	100	3 Hrs.

Course Outcomes:

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

C309.1	Test on properties of fine aggregate and coarse aggregate.
C309.2	Test on properties of soil.
C309.3	Analysis the properties of water/waste water

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		Linked Expts.	CL	Linked PO	Teaching Hrs
C309.1	Test on properties of fine aggregate and coarse aggregate.	1 to 4, 8 to 11,15	*R/U/A*	1,2,3,6	18
C309.2	Test on properties of soil.	5 to 7	*R/U/A*	1,2,3,4,6	15
C309.3	Analysis the properties of water/waste water	12 to 14	*R/U/A*	1,2,3,6	12

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
MATERIAL TESTING LAB -I	**3**	**3**	**3**	**3**	**1**	**3**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

UNIT	NAME OF TOPIC	Time
I	**PART-A** 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	**18 Hours**
II	**PART-B** 8.Attrition test on Aggregate. 9. Abrasion test on Aggregate. 10. Aggregate crushing value test. 11. Aggregate impact value test.	**15 Hours**
III	**PART -C** 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 Course aggregate.Demonstration of	**12 Hours**

LIST OF EXERCISES

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.
8. Attrition test on Aggregate.

9. Abrasion test on Aggregate.
10. Aggregate crushing value test.
11. Aggregate impact value test
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 Course aggregate.

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Content Beyond Syllabus

- Determination of pH of water by Colorimetric method

LIST OF EQUIPMENTS

Sl.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

END EXAMINATION

Note: All the exercises have to be completed. 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.

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination.

Detailed Allocation of Marks for External Assessment

Sl.No	Description	Part-A	Part-B	Part-C
		Max Marks (70)	**Max Marks (40)**	**Max Marks (30)**
1	Procedure	15	10	10
2	Tabulation & Observation	20	10	5
3	Calculations	20	10	5
4	Sketch / Graph	10	5	5
5	Accuracy of Result	5	5	5
6	VIVA	**5**		
	TOTAL	**75**		

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE310

Term : IV

Course Name : SURVEYING PRACTICE - II

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
SURVEYING PRACTICE - II	Hours / Week	Hours / Term	Marks			Duration
	6 Hours	90 Hours	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Course Outcomes:

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

C310.1	Knowing the usage and operation of Theodolite in the field
C310.2	Apply the knowledge of Theodolite in different operations in civil engineering projects.
C310.3	Apply the knowledge of principles and purpose of Tacheometry in finding out the constants.
C310.4	Usage of total station in the field of civil engineering survey.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		Linked Expts.	CL	Linked PO	Teaching Hrs
C310.1	Knowing the usage and operation of Theodolite in the field	1 to 3	*R/U/A*	1,2,6	10
C310.2	Apply the knowledge of Theodolite in different operations in civil engineering projects.	4 to 10	*R/U/A*	1,2,3,4,6	30
C310.3	Apply the knowledge of principles and purpose of Tacheometry in finding out the constants.	11 to 14	*R/U/A*	1,2,3,4,6	28
C310.4	Usage of total station in the field of civil engineering survey.	15 to 19	*R/U/A*	1,2,3,4,5,6	22

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
SURVEYING PRACTICE - II	**3**	**3**	**3**	**3**	**1**	**3**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

UNIT	NAME OF TOPIC	HOURS
I	**PART – A THEODOLITE SURVEYING** 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.	**40Hours**
II	**PART-B TACHEOMETRIC SURVEYING** 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 acheometry. 12. Determination of distance and elevation of points by Tangential tacheometry	**28 Hours**
III	**PART-C TOTAL STATION** 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.	**22 Hours**

LIST OF EXPERIMENTS

PART A - THEODOLITE SURVEYING

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

PART-B TACHEOMETRIC SURVEYING

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

PART-C TOTAL STATION

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

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 END 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.

LIST OF EQUIPMENTS

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

END EXAMINATION

Note: All the exercises have to be completed. One exercise will be given from PART-A or PART-B and one exercise will be given from PART-C for examination.
All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book and Camp Record Note book should be submitted during examination.

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

Sl.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

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N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING
Course code : N1CE409
Term : IV Term
Course Name : 3-D CAD IN CIVIL ENGINEERING DRAWING

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
3-D CAD IN CIVIL ENGINEERING DRAWING	Hours / Week	Hours / Term	Marks			Duration
	5 Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Course Outcomes:

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

C312.1	Develop 3D models of simple geometrical objects and render their surfaces.
C312.2	Apply suitable commands to generate 3D models of furniture and interior artifacts (viz. Lampshade, of buildings.
C312.3	Generate Plan, elevation, sectional views and 3D view of Interior layout of each unit in a Residential Building
C312.4	Develop Exterior 3D view of a residential Building along with landscaping elements

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		Linked Expts.	CL	Linked PO	Teaching Hrs
C312.1	Develop 3D models of simple geometrical objects and render their surfaces.	**2,8,10,12**	***R/U/A***	1,3,7	3
C312.2	Apply suitable commands to generate 3D models of furniture and interior artifacts	**1,3,7,8,9,12**	***R/U/A***	2,3,4,5,7	9
C312.3	Generate Plan, elevation, sectional views and 3D view of Interior layout of each unit in a Residential Building	**7,8,12**	***R/U/A***	1,2,3,4,5,7	23
C312.4	Develop Exterior 3D view of a residential Building along with landscaping elements	**4,5,6,8,10,11, 12**	***R/U/A***	1,3,4,5,7	40

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
3-D CAD in Civil Engineering Drawing	**3**	**2**	**3**	3	**3**	**-**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

LIST OF EXERCISES

1. AutoCAD – 3D commands, 3D's Max – commands
2. Develop 3D view of any five geometrical objects preferably objects comprising Straight, oblique and curved edges
3. Develop Steps and pins
4. Develop Doors and windows
5. Develop Dog – legged staircase
6. Develop Spiral staircase
7. Develop rendered 3D view showing both exterior of a residence with single bed and produce the print.
8. Develop rendered 3D view showing both interior of a residence with single bed and produce the print.
9. Develop rendered 3D view showing both exterior of a residence with two bed room and produce the print out.

10. Develop rendered 3D view showing both interior of a residence with two bed room and produce the print out.
11. Develop rendered 3D view showing both exterior of a residence with three bed room and produce the print out.
12. Develop rendered 3D view showing both interior of a residence with three bed room and produce the print out.

Content beyond the syllabus: (not for examination)

- Develop kitchen cabinet
- Develop bay window

LIST OF EQUIPMENTS

DETAILS OF INSTRUMENTS:-

Computer, table and chair = each per student

SOFTWARE: -

3Ds Max / Revit Architecture

END EXAMINATION

Note:

- All the exercises have to be completed. One exercise will be given for examination.
- All the exercises should be given in the question paper and students are allowed to select by a lot.
- Record note book should be submitted during examination.

Detailed Allocation of Marks for External Assessment

Content	Max. Marks
PLAN	10
3D MODELING	40
RENDERING	20
Viva voce	5
Total	**75 Marks**

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N1 - SCHEME

Programme : CIVIL ENGINEERING

Course code : N1CE304

Term : III

Course Name : STRUCTURAL ENGINEERING

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Term	Marks			Duration
STRUCTURAL ENGINEERING	6 Hrs.	90 Hrs.	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	REINFORCED CEMENT CONCRETE STRUCTURES	18
2	DESING OF T-BEAMS AND LINTELS FOR FLEXURE BY LSM DESIGN OF CONTINUOUS BEAMS FOR FLEXURE ANDSHEAR BY	18
3	DESIGN OF ONE WAY SLABS AND STAIR CASES BY LSM DESIGN OF TWO WAY SLABS BY LSM	18
4	DESIGN OF COLUMNS BY LSM DESIGN OF COLUMN FOOTINGS	18
5	STEEL STRUCTURES	18
	Total	90

Course Outcomes:

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

C304.1	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;
C304.2	Design One way/ Two way slabs and Staircases by limit state method;
C304.3	Design Axially loaded Columns and Footings by limit state method;
C304.4	Design simple Steel members like Laterally supported Beams, Tension members, Compression members and Welded connections by limit state method.
C304.5	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;

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C304.1	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	***R/U/A***	1,2	18
C304.2	Design One way/ Two way slabs and Staircases by limit state method	***R/U/A***	3,4	18
C304.3	Design Axially loaded Columns and Footings by limit state method	***R/U/A***	1,2,6,7	18
C304.4	Design simple Steel members like Laterally supported Beams, Tension members, Compression members and Welded	***R/U/A***	1,2,3,4	18
C304.5	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	***R/U/A***	1,2,3,4	18
		Total sessions		90

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	REINFORCED CEMENT CONCRETE STRUCTURES	18	30	*4*	*21*	*5*	*22 %*
II	DESING OF T-BEAMS AND LINTELS FOR FLEXURE BY LSM	18	30	*4*	*21*	*5*	*22 %*
III	DESIGN OF ONE WAY SLABS AND STAIR CASES BY LSM	18	30	*4*	*21*	*5*	*22 %*
IV	DESIGN OF COLUMNS BY LSM DESIGN OF COLUMN FOOTINGS	18	25	*2*	*18*	*5*	*17 %*
V	STEEL STRUCTURES	18	25	*2*	*18*	*5*	*17 %*
	Total	**90**	**140**	**16**	**99**	**25**	**100 %**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
Structural Engineering	**3**	**3**	**3**	**3**	**-**	**1**	**1**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

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	18

	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 -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	18

	bars for rectangular beams using limit state method –Simple problems- Practice on use of Design Aids (not for examination).	
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 – 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.	18
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.	18
V	**STEEL STRUCTURES** **5.1 DESIGN OF TENSION AND COMPRESSION MEMBERS BY L.S.M** General- Characteristic Actions, Partial Safety Factors for Loads,	18

	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 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 principlesMinimum thickness of Web-Design Strength in Bending/ ShearLimiting 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).	

Text book:

1. B C Punmia, " R C C Designs", Laxmi Publications, 2006
2. S SBhavikatti, " Design of R C C and Structural Elements" (RCC Vol I), New Age International Publications, 2011

Reference Books:

1. S.R.Karve and V.L.Shah," Limit state Theory and Design of Reinforced Concrete",PuneVidyaGrihaPrakashan.
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, " LimitState Design of Reinforced Concrete", Laxmi Publications,2007
7. I S 456-2000; I S 875-1987; I S 800 -2007.
8. Explanatory hand book SP24, Design Aid SP 16, Detailing of Reinforcement,SP 34
9. M.R.Shiyekar "LimitState Design in Structural Steel", PHI Learning Pvt Ltd, 2011

MODEL QUESTION PAPER - I

Term	:	V	Time	:	3Hrs
Programme	:	Diploma in Civil Engineering	Max.Marks	:	75
Course	:	Structural Engineering	Code	:	N1CE304

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART - A

1. How will you find out design load?
2. When a beam is called as continuous beam ?
3. List out the types of slabs according to the direction of spanning?
4. What are the main factors which govern the strength of RCC column?
5. Define tension member
6. List out the different types of shear stirrups
7. What is isolated footing?
8. When a slab is designed as a two way slab?

PART - B

9. Define Characteristics load and design load
10. Specify the codal provisions regarding the minimum shear reinforcement for beams
11. Define one way slab and two way slab
12. What are the types of column footing?
13. Draw the sketch for fillet welds
14. What are the classifications of column depending upon slenderness ratio? Explain
15. What are the assumptions made in the limit state method of design?
16. Distinguish between a long column and short column

PART - C

17. (A). i) Explain critical neutral axis and actual neutral axis in working stress method with a neat sketch. (5)

ii) A RCC beam 300 mm x 420 mm effective size is reinforced with 3 Nos of 16mm diameter bars in its tension zone. Fe415 grade steel and M20 grade concrete are used. Determine the limiting moment of resistance of the section by limit state method (5)

OR

(B). A cantilever beam of rectangular section 250 mm wide and 500 mm overall depth has to carry an udl of 24 KN/m (inclusive of self weight) over an effective span of 3.4 m. M20 grade concrete and Fe415 grade steel are to be used. Design the reinforcement for flexure by limit state method (10)

18. (A). Find the moment of resistance of a T beam having the following data: Effective width of flange = 740mm; Breadth of rib = 250mm; Reinforcement = 5 Nos 25 mm dia bars intension zone; Thickness of slab = 80 mm; Effective depth of beam= 400 mm ; Steel grade Fe 415; Concrete grade M20 (10)

OR

(B). The support section of a continuous rectangular beam is subjected to a shear force of 150 KN. The effective size of the section is 305 mm x 510 mm. The beam had 5 numbers of 20 mm dia Fe 415 grade bars as tension reinforcement at mid span out of which two bars are cranked at 450 mm near the support. The support section already had 2 numbers of 20 mm dia bars in its tension zone. Design the shear reinforcement for the support section using Fe 415 grade steel by LSM. Concrete used is of grade M25. (10)

19. (A). Design a dog legged staircase for a flat using M25 grade concrete and Fe.415 grade steel. The height between the floors is 3.0m. The effective span of a flight is 5.25 m including the two landings. The tread and rise of brick steps are 300mm and 150mm respectively. The unit weight of brick steps is 19KN/m^3.The imposed load is 3KN/m^2. The flight slab is simply supported at their ends and their sides are not embedded in to the wall. Uniform loading may be assumed for the full span. (10)

OR

(B). Design a simply supported roof slab for a library of clear size 4 m x 5 m by LSM. The thickness of walls all-round is 230 mm. Access is not provided to the roof. The corners of the slab are not held down. Weight of weathering course will be 1 KN/m^2. Use M20 grade concrete and Fe 415 grade steel (Check for stiffness not necessary). (10)

20. (A). Design a circular RC column with lateral ties to carry an axial load of 1250 KN. Take *fck* as 20 MPa and *fy* as 500 MPa. The unsupported length of the column is 4 m. The ends of the column are effectively held in position but not restrained against rotation (10)

OR

(B). Design a square footing of uniform thickness for a RC Column carrying an axial load of 1800 KN. Size of column is 400 mm X 400 mm safe being capacity of soil is 150 KN/m^2 Use M20 grade concrete and Fe 415 grade steel. Check for shear not required (10)

21. (A). Select a suitable single angle section to carry an axial tension of 240KN, due to DL and IL. The member has to be connected to gusset plates at its ends by fillet welds through one leg. The yield and ultimate strengths of steel are 250 N/m^2 and 400 N/m^2.Connection need not be designed. (10)

OR

(B). A laterally supported cantilever beam of 3 m effective span carries a load of 12.5 KN/m inclusive of its self weight through out its span. Design the beam by limit state method using double channels of yield stress 350 MPa. Check for stiffness not necessary (10)

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MODEL QUESTION PAPER - II

Term	:	V	Time	:	3Hrs
Programme	:	Diploma in Civil Engineering	Max.Marks	:	75
Course	:	Structural Engineering	Code	:	N1CE304

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART - A

1. What is the modular ratio for M20 grade concrete?
2. Define Tee beam
3. Differentiate one way slab and two way slab
4. Differentiate Long column and short column
5. What is meant by Net sectional area of a tension member?
6. What is laterally restrained beam in steel structure?
7. Define Nominal shear stress
8. Draw stress block in limit state of flexure

PART - B

9. What is meant by doubly reinforced section?
10. Sketch different types of shear reinforcements provided for beams.
11. Why can you curtail the reinforcement in slab?
12. What are the assumptions used in limit state of collapse in compression?
13. Define Gross area , net area of tension member
14. State the code requirements regarding arrangement of loads on continuous beams and their combinations
15. When Torsion reinforcement is provided in a slab?. Specify its requirements
16. What are the basic requirements of R.C Footing?

PART - C

17. (A). (i) Explain how the design stress for compression steel of a beam can be determined from the stress-strain curve. (5)

(ii) A rectangular section of overall size 300 mm x 600 mm is reinforced with 4# 20 mm ϕ bars in the tension zone and 2# 20 mm ϕ bars in the compression zone with a clear cover of 25 mm. M20 grade concrete and Fe415 grade steel are used. Find the limiting moment of resistance of the section. (fsc = 355 N/mm^2 for d'/d = 0.05 and fsc = 352 N/mm^2 for d'/d = 0.10) (5)

OR

(B). A simply supported rectangular beam has to be provided over a clear span of 12 m to carry an UDL of 20 KN/m, excluding its self weight. Design the mid span section of the beam using M20 grade concrete and Fe 415 grade steel in tension for the limit state of collapse in flexure. Assume the width of support as 300 mm. (10)

18. (A). A Tee beam with rib width 230 mm, breadth of flange 1600 mm, and thickness of flange 100 mm has to carry an udl of 36 KN/m over its full span. The clear span of the beam is 6metre. Width of supports is 300 mm. Design the mid span section of the beam for limit state of collapse in flexure using M20 grade concrete and Fe.500 grade steel. (10)

OR

(B) A continuous rectangular beam with 7 m equal spans (effective) carries an imposed load (not fixed) of 12 KN/m and a dead load of 24 KN/m throughout its length. Design the beam for the maximum bending moment using M25 grade concrete and Fe.415 grade steel. (10)

19. (A). (i) List the different types of stairs used in ordinary buildings. Draw a neat sketch of any one type. (5)

(ii) The vertical height between two successive floors of a multi storeyed residential building is 3.2m. The clear size of the staircase room is 2.10 m X 4.25 m. Plan a dog legged stair case for the building. (5)

OR

(B). Design the corner panel of a continuous reinforced concrete slab , which is supported by 230 mm wide RC beams at 3.8 m centres in X-direction and at 4.75 m centres in Y-direction, using M20 concrete and Fe 415 steel by limit state method. Imposed load (not fixed) is 2 KN/m^2 and weight of floor finish is 0.6 KN/m^2. (10)

20. (A). Design a short square column using M15 concrete and mild steel to carry an axial load of 1800KN, by limit state method. Check the slenderness of the column if its effective length is 3.2 m. (10)

OR

(B). The size of the rectangular footing provided for an RC column of 300 mm x 500 mm size is 3.0 m x 3.6 m. The column carries an axial load of 1500 KN. The thickness of footing is 1.0 m along the faces of column and 200 mm along its free edges. 18 numbers of 12 mm dia Fe 415 steel bars are provided in each direction at an average effective cover of 70 mm. check the footing for transverse shear. The concrete used is of M20 grade. (10)

21. (A). Design a tie member using a single channel section to carry an axial load of 850 KN. fy = 450 MPa; fu = 570 MPa. The member will be connected at its ends through its web by side fillet welds of 300 mm length each. (10)

(OR)

(B). Two mild steel flats of 240 mm x 10 mm and 240 mm x 8 mm size are to be connected by a lap joint at the site. Using the maximum permissible size of welds, determine the design tensile strength of the joint. The angle between the fusion faces will be 1050. Ultimate strength of weld is 415 N/mm^2. Determine the maximum permissible design tensile stresses in the two plates (10)

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VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS)

(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE305

Term : V Term

Course Name : ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL	Hours / Week	Hours / Term	Marks			Duration
	5 Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	WATER SUPPLY ENGINEERING	15
2	WATER SUPPLY ENGINEERING (Contd)	15
3	SANITARY ENGINEERING	15
4	SANITARY ENGINEERING (Contd,)	15
5	POLLUTION CONTROL	15
	Total	**75**

Course Outcomes:

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

C305.1	Understand the quality of water, Testing procedure and standards of drinking water.
C305.2	Understand the various treatments and distribution system of water.
C305.3	Understand the concept of waste, types of sewage , sewerage system and various sewer appurtenances.
C305.4	Understand the various treatment methods and disposal of sewage and solid waste management.

C305.5	Understand the sources , effects and control of Water, Soil , Noise and Air pollution

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C305.1	Understand the quality of water, Testing procedure and standards of drinking water.	*R/U/A*	2,3,5,7	15
C305.2	Understand the various treatments and distribution system of water.	*R/U/A*	1,2,4,6	15
C305.3	Understand the concept of waste, types of sewage, sewerage system and various sewer appurtenances.	*R/U/A*	1,2,3,5,7	15
C305.4	Understand the various treatment methods and disposal of sewage and solid waste management.	*R/U/A*	2,3,5	15
C305.5	Understand the sources , effects and control of Water, Soil , Noise and Air pollution	*R/U/A*	1,4,5,7	15
		Total sessions		**75**

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	WATER SUPPLY ENGINEERING	15	30	***4***	***21***	***5***	*22*
II	WATER SUPPLY ENGINEERING (Contd)	15	30	***4***	***21***	***5***	*22*
III	SANITARY ENGINEERING	15	30	***4***	***21***	***5***	*22*
IV	SANITARY ENGINEERING (Contd,)	15	25	***2***	***18***	***5***	*17*
V	POLLUTION CONTROL	15	25	***2***	***18***	***5***	*17*
	Total	**75**	**140**	**16**	**99**	**25**	**100**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
Environmental Engineering & Pollution Control	**2**	**3**	**2**	**1**	**2**	**1**	**2**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*

- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

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	**15 Hours**
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.	**15 Hours**
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 sewers. **3.2 SEWER APPURTENANCES** 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).	**15 Hours**
IV	**4.1 TREATMENT AND DISPOSAL OF SEWAGE** Objects of sewage treatment - flow diagram of sewage treatment	**15 Hours**

	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	
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.	**15 Hours**

Text book:

1. Dr.SURESH K.DHAMEJA- Environmental engineering and management,S.K.Kataria&Sons,New Delhi.
2. S.K.GARG- Water supply and sanitary engineering,Khanna publishers, Delhi.

Reference Book :

1. N.N. BASAK- Environmental Engineering,Tata McGraw hill publishing company Ltd.,NewDelhi, 2010
2. A.KAMALA,D.L.KANTHRAO- Environmental engineering, Tata McGraw hill publishingcompany Ltd.,New Delhi
3. GURCHARAN SINGH- Water supply and sanitary engineering vol.I&II, Standard publishers&distributors,Delhi

MODEL QUESTION PAPER - I

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: ENVIRONMENTAL ENGINEERIING AND POLLUTION CONTROL	Course Code	: N1CE305

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B and 10marks in PART- C]

PART-A **(5×2=10)**

1. List out the different types of water demand.
2. State any two objects of water treatment.
3. Define Sewage and Garbage.
4. What is Soak pit.
5. Explain EIA.
6. List out any four methods of Sludge disposal.
7. Name any four different shapes of Sewer.
8. What is mineral water.

PART-B **(5×3=15)**

9. Give a brief note about Pipe Corrosion.
10. Explain the coagulation process in water treatment.
11. Give a brief note about Catch Basin with neat sketch.
12. Give a brief note about Oxidation Pond.
13. Give a brief note about Acid Rain.
14. What are the precautions to be taken while collecting the water sample.
15. List out the different methods of Disinfection of water.
16. Explain briefly Soil Pollution.
17.

PART-C **(5×10=50)**

17. (A). The censes records of a city show the population as follows (10)

Present	: 50,000
Before one decade	: 47,100
Before two decades	: 43,500
Before three decades	: 41,000

Workout the probable population after one, two, three decades by arithmetical increase and geometrical increase methods

OR

(B). i) Describe canal intake with a neat sketch (5)
ii) What is turbidity? How is it measured? (5)

18. (A). Describe the construction and operation of a rapid sand filter with a neat sketch (10)

OR

(B). i) Explain the systems of supply of water (5)

ii) State and explain the types of service reservoirs (5)

19. (A). Describe the procedure for laying and testing of sewers (10)

OR

(B). What are sanitary fittings? State and explain any four sanitary fittings with sketches (10)

20. (A). Explain the treatment of sewage by activated sludge process with the help of a flow diagram (10)

OR

(B). Write short notes on i) Collection and conveyance of solid waste

ii) Energy from waste (10)

21. (A). i) State the effects of water pollution and explain the measures to be taken to prevent water pollution (5)

ii) Write short notes on ozone layer depletion (5)

OR

(B) i) State the limitations of EIA (5)

ii) How is the environmental impact statement prepared? (5)

MODEL QUESTION PAPER - II

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: ENVIRONMENTAL ENGINEERIING AND POLLUTION CONTROL	Course Code	: N1CE305

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B and 10marks in PART- C]

PART-A (5×2=10)

1. Name any four type of sewer materials.
2. State the purpose of sedimentation process.
3. Define Refuse and Garbage.
4. What is solid waste.
5. What is Noise pollution.
6. What is the use of Grid Chamber in the sewage treatment process.
7. Name any four sewer appurtenances .
8. Name the physical tests to be conducted for water analysis.

PART-B (5×3=15)

9. Name the various chemical tests to be conducted for water analysis.
10. Give a brief note about the Coagulation process in water treatment .
11. State the various purposes of sanitation.
12. Draw a neat sketch of Septic tank and indicate the component parts.
13. Give a brief note about Green House Effect.
14. Explain the limitations of EIA.
15. Explain briefly LAMPHOLE with a neat sketch.
16. Explain briefly the cement concrete joints provided in the water main lines.

PART-C (5×10=50)

17. (A). Explain the various types of surface and sub surface sources of water (10)

OR

(B). i) State and explain different types of pipe joints used in water supply (5)
ii) Write short notes on water borne diseases (5)

18. (A). i) State and explain different methods of disinfection of water (5)
ii) Differentiate between plain sedimentation and sedimentation with coagulation (5)

(OR)

(B). Mention the various layouts of distribution in water supply system and explain them in detail (10)

19. (A). i) Compare conservancy system with water carriage system (5)

ii) Write short notes on ventilation of sewers (5)

OR

(B). i) Write short notes on grease and oil trap (5)

ii) Draw a typical layout of house drainage system and state functions of its components (5)

20. (A). Describe the structural features and functioning of a standard rate trickling filter with neat sketches

(10)

OR

(B). i) How are solid wastes classified? (5)

ii) State and explain the methods of solid waste disposal (5)

21. (A). i) Describe the harmful effects of air pollution on human beings, animals, plants (5)

ii) What is acid rain? State the effects of acid rain (5)

OR

(B). With the help of flow chart, describe the EIA process

(10)

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N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE401

Term : V

Course Name : WATER RESOURCE MANAGEMENT

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
WATER RESOURCE MANAGEMENT	Hours / Week	Hours / Term	Marks			Duration
	5 Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Time
I	INTRODUCTION HYDROLOGY	13 HOURS
II	GROUND WATER MANAGEMENT OF GROUND WATER	13 HOURS
III	RIVERS AND RIVER TRAINING WORKS STORAGE WORKS	23 HOURS
IV	DISTRIBUTION WORKSMANAGEMENT OF CANAL IRRIGATION	13 HOURS
V	WATER SHED MANAGEMENT, WATER HARVESTING AND RECYCLING	13 HOURS
	Total	75 HOURS

Course Outcomes:

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

C.401.1	Understand the hydrological cycle and application of hydrology in engineering
C.401.2	Understand the ground water resources andconcept of basin management
C.401.3	Study the river training works and process of storage works
C.401.4	Understand the concept of distribution works and management of canal Irrigation
C.401.5	Study the water shed management and its uses

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C.401.1	Understand the hydrological cycle and application of hydrology in engineering	*R/U/A*	1,2,3,4,5	13
C.401.2	Understand the ground water resources andconcept of basin management	*R/U/A*	1,2,3,4,5	13
C.401.3	Study the river training works and process of storage works	*R/U/A*	1,2,3,4,5,6	23
C.401.4	Understand the concept of distribution works and management of canal irrigation	*R/U/A*	1,2,3,4,5	13
C.401.5	Study the water shed management and its uses	*R/U/A*	1,2,3,4,6	13
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for		Marks weightage (%)
				R	U/A	
I	INTRODUCTION HYDROLOGY	15	25	2	23	17.86
II	GROUND WATER MANAGEMENT OF GROUND WATER	15	25	2	23	17.86
III	RIVERS AND RIVER TRAINING WORKS STORAGE WORKS	15	25	2	23	17.86
IV	DISTRIBUTION WORKSMANAGEMENT OF CANAL IRRIGATION	15	25	2	23	17.86

V	WATER SHED MANAGEMENT, WATER HARVESTING AND RECYCLING	15	25	2	23	17.86
I to V*			15	6	9	10.70
	Total	75	140	16	124	100

*** 3 x 2Marks and 3 x 3Marks from any Unit limited to maximum of 2 Questions in each unit**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
WATER RESOURCE MANAGEMENT	3	2	3	3	3	-	-

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF TOPIC	Time
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 Hours**
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 Hours**
III	**3.1 RIVERS AND RIVER TRAINING WORKS** Classification of river - Major rivers in India and Tamil Nadu – Inter linking of	**23 Hours**

	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.	
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 Hours**
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	**13 Hours**
	Content Beyond Syllabus	

Text book:

1. Santhosh Kumar Garg, Hydrology and water resources engineering, khanna publishers, Delhi.
2. G.L.Asawa,Irrigation and Water Resources Engineering ,New age international(p) ltd.,publishers, New Delhi.

REFERENCE BOOKS

1.David Keith Todd.,Ground water Hydrology,Johnwiley&sons,Singapore.

2.Dilip Kumar Majumdar, Irrigation water management - Principles and Practice, PHI Pvt.Ltd.NewDelhi-1.

MODEL QUESTION I

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course name	: WATER RESOURCE MANAGEMENT	Course Code	: N1CE401

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B
Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B and 10marks in PART- C]

PART-A (5×2=10)

1. State the factors involved in the water resources management.
2. Define GIS.
3. What are the classifications of river training works?
4. What are the irrigation water losses?
5. Define. Soil erosion.
6. What is hydrological cycle.
7. What is the need for crop rotation?
8. name the types of earth dams.

PART-B (5×3=15)

9. State the importance of water resources.
10. Define artificial recharge and its methods.
11. Distinguish between permeable and impermeable spurs.
12. Write short notes on water users association.
13. Write a short note on water shed management.
14. What are the different types of cross drainage works.
15. Define Aquifer.
16. State the types of pond.

PART-C (5×10=50)

17. (A). i) Write short notes on world water inventory. (5)
ii) State the necessity for conserving water resources. (5)

OR

(B). Explain the different types of rain gauges with neat sketches and also state their merits and demerits. (10)

18. (A). i) How do you measure the yield of a well? (5)
ii) Briefly explain the types of aquifers. (5)

OR

(B). Explain the methods of artificial recharge in detail. (10)

19. (A). i) With neat sketches, explain the various types of spurs.
(5)

ii) State the objectives of river training works.
(5)

OR

(B). With neat sketches, explain the causes of failure of earth dam and suggest suitable remedial measures.
(10)

20. (A). i) Explain different types of cross drainage works with sketches.
(5)

ii) Explain any three types of canal lining.
(5)

OR

(B). Explain the various methods of improving canal irrigation management.
(10)

21. (A). i) Explain contour bunding and bench terracing.
(5)

ii) Explain surface and sub surface drains.
(5)

OR

(B). i) Write short notes on water logging and soil reclamation.
(5)

ii) Explain the types of ponds
(5)

MODEL QUESTION II

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: WATER RESOURCE MANAGEMENT	Course Code	: N1CE401

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B
Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B
and 10marks in PART- C]

PART-A (5×2=10)

1. What are the various forms of precipitation?
2. Name the types of aquifer.
3. What are tank slucies?
4. What is an percolation pond?
5. Define. Water shed.
6. Define. Frequency of irrigation.
7. Define. Field permeability.
8. Define. Duty and Delta.

PART-B (5×3=15)

9. What is the necessity for water conservation?
10. Write a short note on electrical resistivity method.
11. Write a short note on water quality management.
12. Write a short note on cropping pattern.
13. Explain. The control of gullies.
14. What are the classifications of rolled fill earth dams?
15. Name the various types of rain gauges.
16. What are the types of water shed.

PART-C (5×10=50)

17. (A). i) Write short notes on water resources management. (5)
ii) Write about water resource potential in India. (5)

OR

(B). i) Explain the various components of a hydrological cycle with a neat sketch. (5)
ii) Explain any two methods of estimation of runoff. (5)

18. (A).Explain the geophysical methods of ground water exploration in detail. (10)

OR

(B). i) Describe the data to be collected in a ground water basin investigation. (5)
ii) Write short notes on basin management by conjunctive use. (5)

19. (A). Explain the different methods of river training. (10)

OR

(B). i) How will you compute reservoir capacity from mass diagram? (5)

ii) What are the points to be considered in the selection of a dam site? (5)

20. (A). i) Draw the typical cross section of canal and explain its components. (5)

ii) Explain the classification of canals based on their alignment. (5)

(OR)

(B). i) Write short notes on farmer's participation in irrigation management. (5)

ii) Explain irrigation scheduling. (5)

21. (A). i) Describe the role of remote sensing and GIS in water shed management. (5)

ii) Mention the effects of soil erosion. (5)

(OR)

(B). i) Explain the methods of waste water recharge for reuse. (5)

ii) Write short notes on evaporation control. (5)

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N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING
Course code : N1CE402
Term : V Term
Course Name : REMOTE SENSING AND GIS

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
REMOTE SENSING AND GIS	Hours / Week	Hours / Term	Marks			Duration
	5 Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	FUNDAMENTALS OF REMOTE SENSING	15
2	PHOTOGRAMMETRY	15
3	IMAGE INTERPRETATION & PROCESSING	15
4	FUNDAMENTALS OF GIS	15
5	GIS - DATA ENTRY, STORAGE AND ANALYSIS	15
	Total	75

Course Outcomes:

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

C402.1	Understand and analyze the functional basics of Remote sensing.
C402.2	Understand Stereoscopic plotting instruments, Ortho photos, Flight planning
C402.3	Know and use main methods to improve, correct and interpret properly Remote sensing images.
C402.4	Process spatial and attribute data and prepare thematic maps.
C402.5	Compute knowledge of Remote sensing and GIS in different civil engineering applications.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C402.1	Understand and analyze the functional basics of Remote sensing.	**R/U/A**	1,3,5	15
C402.2	Understand Stereoscopic plotting instruments, Ortho photos, Flight planning	**R/U/A**	1,3,5,6	15
C402.3	Know and use main methods to improve, correct and interpret properly Remote sensing images.	**R/U/A**	1,3,5,6	15
C402.4	Process spatial and attribute data and prepare thematic maps.	**R/U/A**	1,3,5,6	15
C402.5	Compute knowledge of Remote sensing and GIS in different civil engineering applications.	**R/U/A**	1,2,3,5,6	15
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for		Marks weightage (%)
				R	U/A	
I	FUNDAMENTALS OF REMOTE SENSING	15	25	2	23	17.86 %
II	PHOTOGRAMMETRY	15	25	2	23	17.86 %
III	IMAGE INTERPRETATION & PROCESSING	15	25	2	23	17.86 %
IV	FUNDAMENTALS OF GIS	15	25	2	23	17.86 %
V	GIS - DATA ENTRY, STORAGE AND ANALYSIS	15	25	2	23	17.86 %
I to V*			15	6	09	10.70%
	Total	75	140	16	124	100 %

*** 3 x 2Marks and 3 x 3Marks from any Unit limited to maximum of 2 Questions in each unit**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
REMOTE SENSING AND GIS	**3**	**1**	**3**	**-**	**2**	**2**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

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	**15Hours**
II	**PHOTOGRAMMETRY** Geometric elements of a vertical photograph – Stereoscopic plotting instruments, Ortho photos, Flight planning	**15 Hours**
III	**IMAGE INTERPRETATION & PROCESSING** Fundamentals of Airphoto interpretation - Elements of image interpretation, concepts of digital image processing image Rectification and Restoration, Image enhancement, Image classification, Application of Remote sensing in Civil Engineering	**15 Hours**
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).	**15 Hours**
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.	**15 Hours**

Text Book:

1. Lo & Yeung (2005), Geographic Information Systems, Prentice of India.
2. Anji Reddy.M. (1998), Remote Sensing and Geographical information systems.
3. Wolf Paul (1998), Elements of Photogrammetry, McGraw Hill, New Delhi.

Reference Book:

1. Lillesand, T.M. & Kiefer R.W. (1998), Remote Sensing and image interpretation, John Wiley& Sons, Newyork.
2. Burrough P.A. (2000), Principle of Geographical Information Systems for land resources assessment, Clarendon Press, Oxford.
3. Clarke Parks & Crane (2005), Geographic Information Systems & Environmental Modelling, Prentice-Hall of India.

MODEL QUESTION PAPER – I

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: REMOTE SENSING AND GIS	Course Code	: N1CE402

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B
Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B and 10marks in PART- C]

PART-A (5×2=10)

1. Why are digital forms used?
2. What is image restoration or preprocessing?
3. What is image enhancement?
4. How are data stored and used by computers?
5. What is geo-processing?
6. What is data-set merging?
7. What is GIS?
8. What is data base organization?

PART-B (5×3=15)

]9. How are remote sensing images obtained are converted into digital form?
10.What is the purpose of filtering?
11.What is projection ?
12. What are the four function to be installed in all GIS?
13. Give distinction between vector and raster GIS?
14. What are the advantages of employing object-oriented GIS data base ?
15. What is image classification?
16. What are the basic concepts of remote sensing?

PART-C (5×10=50)

17. (A). What are the five basic steps for image classification?

OR

(B). Differentiate between unsupervised classification and supervised classification?

18. (A). What are the advantages to be guided by multi sensor image merging?

OR

(B). What are the other image variations which computers can produce from the input data?

19. (A). What are the advantages to be gained by multi sensor image merging?

OR

(B). What is the size in pixels of a MSS landsat image and a TM landsat image?

20. (A). Describe the difference between raster and vector data models used to represent maps in a GIS.

OR

(B). Summarize the various definitions of a GIS.

21. (A).What is the difference between projected coordinated system and geographic Co-ordinate system.

OR

(B). Describe the differences between raster and vector based GIS.

MODEL QUESTION PAPER – II

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: REMOTE SENSING AND GIS	Course Code	: N1CE402

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B
Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B
and 10marks in PART- C]

PART-A (5×2=10)

1. How are digital numbers used in application to remote sensing images?
2. What is the purpose of filtering?
3. What is the numerical range of values most often associated with remote sensing data?
4. Define GIS.
5. What is Geo-coding?
6. What is image enhancement?
7. How are remote sensing images obtained are converted into digital form?
8. Why are digital forms used?

PART-B (5×3=15)

9. What are the energy sources for remote sensing?
10. What is ortho photo?
11. What are the elements of GIS?
12. What are the elements of image interpretation?
13. What is data base management?
14. Describe the X,Y and Z parameters of a digital image.
15. What is the term Geo-coding?
16. What is image classification ?

PART-C (5×10=50)

17. (A). What are the five basic steps for image classification?

OR

(B). Differentiate between unsupervised classification and supervised classification?

18. (A). How many ratio combinations are possible with the four bands of MSS?

OR

(B). Why it is useful to view GIS as a process rather than merely software of hardware?

19. (A). State the concepts of digital image processing.

OR

(B). Describe the characteristics of a digital image.

20. (A). What three issues are most critical to the overall success or failure of a GIS project?

OR

(B). Narrate the history development of GIS.

21. (A). Explain the current issues and trends in GIS application in civil engineering.

OR

(B). Explain the difference between attribute and spatial data , give examples.

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N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING
Course code : N1CE403
Term : V Term
Course Name : BUILDING SERVICES

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
BUILDING SERVICES	Hours / Week	Hours / Term	Marks			Duration
	5 Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	ELECTRICAL SERVICES, ELECTRICAL LAYOUT	15
2	MECHANICAL SERVICES, AIR CONDITIONING	15
3	LIGHTING, VENTILATION	15
4	FIRE PROTECTION, ACOUSTICS AND SOUND INSULATIONS	15
5	MAINTENANCE OF BUILDINGS, DEFECTS AND REPAIR WORKS IN BUILDINGS	15
	Total	75

Course Outcomes:

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

C403.1	Understand the basic concept of electrical components and prepare the electrical layout, applications of solar power
C403.2	Study the application of mechanical services in buildings and types of air conditioning
C403.3	Understand the concepts and functions of lighting and types of mechanical ventilation
C403.4	Study the fire protection devices, applications of acoustics in buildings
C403.5	Understand the concept of maintenance and repairing works in building and design the passive solar building.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C403.1	Understand the basic concept of electrical components and prepare the electrical layout,applications of solar power	*R/U/A*	1,2,3,4,5	13
C403.2	Study the application of mechanical services in buildings and types of air conditioning	*R/U*	1,2,3,4,5	13
C403.3	Understand the concepts and functions of lighting and types of mechanical ventilation	*U/A*	1,2,3,4	13
C403.4	Study the fire protection devices, applications of acoustics in buildings	*U/A*	1,2,3,5,6	23
C403.5	Understand the concept of maintenance and repairing works in building and design the passive solar building.	*U/A*	1,2,3,4	13
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	ELECTRICAL SERVICES, ELECTRICAL LAYOUT	15	30	***4***	***21***	***5***	*22*
II	MECHANICAL SERVICES, AIR CONDITIONING	15	30	***4***	***21***	***5***	*22*
III	LIGHTING, VENTILATION	15	30	***4***	***21***	***5***	*22*
IV	FIRE PROTECTION, ACOUSTICS AND SOUND INSULATIONS	15	25	***2***	***18***	***5***	*17*

V	MAINTENANCE OF BUILDINGS, DEFECTS AND REPAIR WORKS IN BUILDINGS	15	25	***2***	***18***	***5***	*17*
	Total	75	**140**	**16**	**99**	**25**	**100**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
BUILDING SERVICES	**3**	**3**	**3**	**3**	**2**	**2**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

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.	15Hours
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.	15 Hours
III	**3.1 LIGHTING** Natural and Artificial Lighting – Requirements of good lighting – Day	**15 Hours**

	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. **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.	**15 Hours**
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.	**15 Hours**

Text 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

Reference Book:

1. Building construction, Dr.B.C.Punmia, Laxmi Publications (p) Ltd, New Delhi
2. A text book on Building services, R.Udyakumar, Eswar Press, Chennai
3. Building repair and maintenance management, P.S.Gahlot, CBS Publishers & distributors (p) Ltd.
4. Maintenance of Buildings, A C Panchdhari, New Age International Publications, Chennai.

MODEL QUESTION PAPER - I

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: BUILDING SERVICES	Course Code	: N1CE403

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B and 10marks in PART- C]

PART-A **(5×2=10)**

1. Mention any two symbols for electrical installations.
2. Define Earthing.
3. What are the different types of elevators?
4. Write any two requirements of good lighting?
5. Define. Lux.
6. Define. Noise absorption co-efficient
7. Define. Expansion joint.
8. Write any two types of cracks in concrete.

PART-B **(5×3=15)**

9. What are the uses of junction box ?
10. What are the component parts of lights?
11. What are the general rules for natural lighting?
12. What are the causes of fire?
13. Define. Fire alarm system.
14. What are the major causes of defects in buildings.
15 Write the necessity of ventilation.
16. What are the types of air conditioner types ?

PART-C **(5×10=50)**

17. (A). Explain the various wiring systems adopted in building.

OR

(B). Draw a neat sketch of layout of electrical fittings in a residential building.

18. (A). Describe escalator and its uses.

OR

(B). Explain in details about indoor air-conditioner.

19. (A). Describe about necessity of artificial lighting

OR

(B). What are the methods of mechanical ventilation and explain any one detail.

20. (A). Explain the factors to be considered for limiting fire spreading area.

OR

(B). State the different factors to be considered in acoustical design.

21. (A). Describe the maintenance of water supply and drainage system in building.

OR

(B). Explain about thermal insulation combines with water proofing for flat concrete roofs

MODEL QUESTION PAPER - II

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: BUILDING SERVICES	Course Code	: N1CE403

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B
Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B
and 10marks in PART- C]

PART-A **(5×2=10)**

1. What is the use of two-way switches?
2. What is meant by CTS wiring?
3. Define. Humidity.
4. Define. Luminous flux.
5. Define. Fire exit.
6. Write any two maintenance works for windows and doors.
7. Write any two sound insulation materials.
8. Write any two water proofing materials.

PART-B **(5×3=15)**

9. What are the various systems of wiring?
10. What are the function of elevator?
11. Whatis the necessity for lighting?
12. What are the characteristics for fire resisting materials?
13. What are the types of cracks in building?
14. What are themaintenance work to be carried out for defects in buildings.
15. Write any three purposes of air-conditioner.
16. What are the methods of mechanical ventilation?

PART-C **(5×10=50)**

17. (A). Explain the various methods of earthing.

OR

(B). Draw a neat sketch of layout of electrical fittings for a school building.

18. (A). Explain in detail the different types of elevators.

OR

(B). What are the types of air conditioners and explain any one type in detail.

19. (A). What are the requirements of good lighting?

OR

(B). what are the methods of natural ventilation and explain anyone in detail.

20. (A). What are the general requirements for fire resisting buildings?

OR

(B). State the different factors to be considered for noise control in residential buildings.

21. (A). What are the various types of cracks in concrete and explain anyone in detail.

OR

(B). Explain the remedial measures of rain water leakage in buildings.

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS)

(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE404

Term : V

Course Name : SOIL MECHANICS AND FOUNDATION ENGINEERING

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
SOIL MECHANICS AND FOUNDATION ENGINEERING	Hours / Week	Hours / Term	Marks			Duration
	5Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Time
I	SOIL MECHANICS AND INDEX PROPERTIES, HYDRAULIC PROPERTIES OF SOIL	15 HOURS
II	CLASSIFICATION AND STRENGTH OF SOILSTABILIZATION OF SOIL AND SUB-SOIL SAMPLING	15 HOURS
III	SEEPAGE ANALYSIS AND SEEPAGE BELOW HYDRAULIC STRUCTURES BEARING CAPACITY AND SETTLEMENT OF FOUNDATIONS	15 HOURS
IV	FOUNDATIONS FOUNDATIONS IN EXPENSIVE SOIL	15 HOURS
V	MACHINE FOUNDATION	15 HOURS
	Total	75 HOURS

Course Outcomes:

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

C.404.1	Students use simple mathematics to derive relationships among soil properties.
C.404.2	Students have the ability to determine index properties and classify the soil
C.404.3	Determine engineering properties through standard tests and empirical corrections with index properties
C.404.4	Students are able to design foundation for different machines, assess the influence of vibrations and selection of remediation methods based on the nature of vibration, properties and behavior of soil
C.404.5	At the end of this course students will have the capacity to idealize soil response in order to analyze and design the foundation elements subjected to different loadings.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C.404.1	Students use simple mathematics to derive relationships among soil properties.	**R/U/A**	1,2,3	15
C.404.2	Students have the ability to determine index properties and classify the soil	**R/U/A**	1,2,3,4,5,6	15
C.404.3	Determine engineering properties through standard tests and empirical corrections with index properties	**R/U/A**	1,2,3,5,6,7	15
C.404.4	Students are able to design foundation for different machines, assess the influence of vibrations and selection of remediation methods based on the nature of vibration, properties and behavior of soil	**R/U/A**	1,2,3,4,5,6	15
C.404.5	At the end of this course students will have the capacity to idealize soil response in order to analyze and design the foundation elements subjected to different loadings.	**R/U/A**	1,2,3,4,5,6	15
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for		Marks weightage (%)
				R	U/A	

I	SOIL MECHANICS AND INDEX PROPERTIES, HYDRAULIC PROPERTIES OF SOIL	15	15	25	2	23
II	CLASSIFICATION AND STRENGTH OF SOILSTABILIZATION OF SOIL	15	15	25	2	23
III	SEEPAGE ANALYSIS AND SEEPAGE BELOW HYDRAULIC STRUCTURES	15	15	25	2	23
IV	FOUNDATIONS FOUNDATIONS IN EXPENSIVE SOIL	15	15	25	2	23
V	MACHINE FOUNDATION	15	15	25	2	23
I to			15	6	9	10.70
	Total	75	140	16	124	100

*** 3 x 2Marks and 3 x 3Marks from any Unit limited to maximum of 2 Questions in each unit**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
SOIL MECHANICS AND FOUNDATION ENGINEERING	3	3	3	3	3	3	1

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF TOPIC	Time
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 –AtterBerg limits – Simple problems **1.2 HYDRAULIC PROPERTIES OF SOIL** Introduction- Permeability -Co-efficient of permeability - Darcy'slaw - Factors affecting permeability - Permeability tests - Simple problems - Quick sand	**15 Hours**

	conditions	
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	**15 Hours**
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	**15 Hours**
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	**15 Hours**

V	**5.1 MACHINE FOUNDATION** Introduction - Soil dynamics – Free vibration and Forced vibration - Definitions –Natural frequency - Barkan'smethod 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	**15 Hours**
	Content Beyond Syllabus	

Text Book:

1./B C PUNMIA , "Soil Mechanics and Foundation Engineering", Laxmi publications (P) Ltd., 2005

2. SWAMI SARAN , "Analysis and Design of Substructures" (LSD) – Second Edition

Reference Book:

1.V N S MURTHY , "Soil Mechanics & Foundation Engineering"–Sai Kripa echnical Consultants

2.Dr S B SEHGAL,"A Text Book of Soil Mechanics", CBS Publishers & Distributors\

3.WAYNE C.TENG, "Foundation Design", Prentice Hall of India (P) Ltd.,

MODEL QUESTION I

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: Soil Mechanics and Foundation Engineering	Course Code	: N1CE404

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B
Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B and 10marks in PART- C

PART-A (5×2=10)

1. Define soil formation
2. Define plastic limit
3. What is Shear strength ?
4. Write the types of samplers.
5. Define bearing capacity of soil
6. Define negative skin friction
7. Define soil dynamics
8. Write the formula for couzen theory

PART-B (5×3=15)

9. Explain Permeability.
10. Define Darcy'slaw
11. Explain the objects of soil stabilization
12. Write the uses of flownet.
13. Explain shear failure
14. What is "CNS" concept?
15. Write short notes on swell potential.
16. Explain the types of foundation.

PART-C (5×10=50)

17. (A). Write the fields of application of soil mechanics.

OR

(B). Explain any two permeability test in detail

18. (A). Explain the standard proctor compaction test

OR

(B). Explain geophysical method in soil stabilization

19. (A). Give details on

i) Explain Quick sand condition ii) what are the properties of flow net

OR

(B). Explain plate load test with neat sketch

20. (A). Explain the types of foundations with neat sketch

OR

(B). State the **"**CNS**"** concept of replacement of soils

21. (A). What are the conditions of choice and type of foundations in detail

OR

(B). Explain the design of mechanical foundation in detail

MODEL QUESTION II

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: Soil Mechanics and Foundation Engineering	Course Code	: N1CE404

[N.B:- (1) Answer any FIVE Questions in each of PART-A and PART –B Q.No. 8 in PART-A and Q.No. 16 in PART-B are compulsory
(2) Answer division (a) or (b) of each question in PART-C
(3) Each question carries 2 Marks in PART –A, 3 marks in PART –B and 10marks in PART- C]

PART-A (5×2=10)

1. Define 3 Phase System
2. Define plastic limit
3. Compare compaction and consolidation
4. What is meant by chunk sampling?
5. Define bearing capacity of soil
6. Define negative skin friction
7. Define soil dynamics
8. Write the formula for couzen theory

PART-B (5×3=15)

9. Explain Atterberg limit.
10. Explain the methods of compaction
11. Explain the objects of soil stabilization
12. Write the uses of flow net.
13. Explain shear failure
14. Write short notes on negative skin friction.
15. Write short notes on swell potential.
16. Explain the types of foundation.

PART-C (5×10=50)

17. (A). Explain atterberg limits in detail

OR

(B). Explain any two permeability test in detail

18. (A). Explain the standard proctor compaction test

OR

(B). Explain geophysical method in soil stabilization

19. (A). Give details on
    i) Explain Quick sand condition
    ii) what are the properties of flownet

OR

(B). Explain plate load test with neat sketch

20. (A). Explain the types of foundations with neat sketch

OR

(B). State the **"**CNS**"** concept of replacement of soils

21. (A). What are the conditions of choice and type of foundations in detail?

OR

(B). Explain the design of mechanical foundation in detail.

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VIRUDHUNAGAR – 626 001
N1 – SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING
Course code : N1CE312
Term : V Term
Course Name : CIVIL ENGINEERING DRAWING-II

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
CIVIL ENGINEERING DRAWING-II	Hours / Week	Hours / Term	Marks			Duration
	6Hrs.	90 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	PUBLIC HEALTH ENGINEERING DRAWING	24 Hrs
2	BRIDGE DRAWING	18 Hrs
3	STRUCTURAL ENGINEERING DRAWING WITH BAR BENDING SCHEDULE	48 Hrs
	Total	90 Hrs

Course Outcomes:

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

C312.1	Understand the basics of Public health engineering drawing and components.
C312.2	Understand the basics of bridge drawing and components
C312.3	Understand the various type of structural Engineering drawing with bar bending Schedule.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C312.1	Understand the basics of Public health engineering drawing and components.	**R/U/A**	1,2,3,5	24
C312.2	Understand the basics of bridge drawing and components	**R/U/A**	1,2,3,5,6	18
C312.3	Understand the various type of structural Engineering drawing with bar bending Schedule.	**R/U/A**	1,2,3,5,6,7	48
		Total sessions		90

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for		Marks weightage (%)
				R	U/A	
I	PUBLIC HEALTH ENGINEERING DRAWING	24	75	-	75	50
II	BRIDGE DRAWING	18				
III	STRUCTURAL ENGINEERING DRAWING WITH BAR BENDING SCHEDULE	48	75	-	75	50
	Total	90	150		150	100%

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
CIVIL ENGINEERING DRAWING-II	3	3	3	-	3	2	1

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**PUBLIC HEALTH ENGINEERING DRAWING** 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	24 Hrs
II	**BRIDGE DRAWING** 5.Two Span Pipe Culvert 6.Two Span Tee Beam With square Returns	18 Hrs
III	**STRUCTURAL ENGINEERING DRAWING WITH BAR BENDING SCHEDULE** 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	48 Hrs

Text Book:

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

Reference Book:

1. M Chakraborti, “Civil Engineering Drawing”
2.GurucharansinghSubhashChandar Sharma, “Civil Engineering Drawing”

MODEL QUESTION PAPER – I

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: Civil Engineering Drawing - II	Course Code	: N1CE312

N.B. 1. Answer any One Question in the drawing sheet supplied.
2. The Drawing should be drawn using pencil and drawing Instruments to scale.
3. Any data, not given may be assumed suitably and should be indicated in the drawing.

I. The following data refer to a Rapid sand filter unit:

Size of unit	:7500x5000mm
Size of inlet chamber	:1000x5000mm
Thickness of wall at top	:450 mm
Thickness of wall at bottom	:600 mm
Thickness of foundation concrete 1:4:8	:450 mm
Diameter of manifolds	:400 mm
Diameter of laterals	:100 mm
Spacing of laterals	:300 mm c/c
Slope of laterals	:1 in 50
Rakers-50 mm dia. at	:300 mm c/c
Raw water inlet	:300 mm dia
Size of wash water troughs	:300x400 mm
Number of troughs	:2
Bottom of trough above sand bed	:450 mm
Free board	:500 mm
Wash water drain pipe	:800 mm dia.

Draw to a suitable scale the following views:
a. Plan of filter unit showing the drainage system. (30)
b. Cross-section of filter unit showing the filter media and wash water through. (25)
c. Longitudinal section of filter unit showing the under drainage system regulating arrangements and back wash. (15)
d. Neatness, scale, details. (5)

II. The following are the details of a doubly reinforced partially fixed beam:

Clear span	:6m
Width of support	:300mm
Size of beam	:300mmx700mm
Reinforcement details:	
Tension reinforcement	: 5 No. of 20 mm dia. Fe 415 steel bars
Compression reinforcement	: 4 No. of 16 mm dia. Fe 415 steel bars.

Both tension and compression reinforcement are placed at an effective cover of 40 mm.

Shear reinforcement :

Use 8 mm dia. 2 legged stirrups of Fe 415 steel at 150 mm c/c up to a distance of 1000 mm from the edges of the support s on both sides. Beyond this point provide these stirrups at 300 mm c/c.

Use standard curtailment procedures.

Assume any data required suitably.

a. Draw to a suitable scale

i. The longitudinal section of the beam. (20)

ii. The cross section of the beam at mid span. (10)

iii. The cross section of the beam at support. (10)

iv. The top and bottom plan of reinforcement. (15)

b. Prepare a bar bending schedule. (20)

MODEL QUESTION PAPER – II

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: Civil Engineering Drawing - II	Course Code	: N1CE312

N.B. 1. Answer any One Question in the drawing sheet supplied.
2. The Drawing should be drawn using pencil and drawing Instruments to scale.
3. Any data, not given may be assumed suitably and should be indicated in the drawing.

I. The details of a Column with Square footings are given below :

Column details:

Size of column	:300mm x 300mm.
Longitudinal steel	:4 no. 22 Φ RTS & 4 No. 16 Φ RTS
Ties	:8 mm Φ MS @ 200 mm c/c
Clear cover	:40 mm
Height of column above ground level	:4 m

Footing details:

Size of footing	:1.2m x 1.2m
Thickness of footing at the edges	:200 mm
Thickness at the junction with column	:500 mm
Bottom cover	: 50 mm
Cover at the sides	: 75 mm

Steel: 16 mm Φ RTS- 9 No. In each direction.

Draw to a suitable scale the following views:

a. Plan of the footing showing details of reinforcements. (20)
b. Plan of the column with reinforcement details. (15)
c. Sectional view of the column with footing. (20)
d. Bar bending schedule. (20)

II. Draw The following views of an infiltration gallery for a town from a river nearby, from the particulars given below:

a. General layout of the scheme showing galleries, manhole wells, infiltration wells, pump house, etc., (not to scale) (15)
b. Longitudinal section of infiltration well, one straight gallery, one inspection well and one jack well. (25)
c. Plan of the above. (25)
d. Cross sectional details of the gallery. (10)

River bed level	: +100.00m
Maximum flood level (MFL)	: +102.00m
Lowest summer water level (LSWL)	: +98.00m
Bottom of gallery	: +95.30m
Sill level of pipes	: +95.45m
Diameter of S.W. pipe	: 400 mm Φ - 1 No.
Length of gallery (total)	: 300 m
Length of one gallery	: 60.0m
River bank level	: +103.20m

Width of gallery	: 2.4m
Diameter of well	
Inner	: Φ 3.60 m
Outer	: Φ 4.50 m
Pump house-cum-collecting well	
Inner diameter	: 6 m
Outer diameter	: 6.90 m
Bottom of pump house	: +94.70m
Floor level of pump house	: +102.20m
Roof level	: +106.00m.

Model Periodical question

V.S.V.N. Polytechnic College **TERM:V**
Programme: Civil Engineering **Max marks:50**
Course: Civil Engineering Drawing II **Duration: 2 hrs**

Note: 1)Answer the question in the drawing sheet supplied.
2)The drawing should be drawn using pencil and drawing instruments to scale.
3) Any data not given may be assumed suitably and should be indicated in the drawing.

1.The following particulars of a rapid sand filter are given below. (1x50=50marks)

1. Size of filter unit	8000x5000mm
2. Sixe of inlet chamber	1000x5000mm
3. Wall thickness at top	450mm
4. Wall thickness at bottom	600mm
5. Thickness of foundation	450mm
6. Diameter of main drain	380mm
7. Diameter of laterals	80mm @300mmc/c
8. Slope of lateral	1 in 60
9. Diameter of inlet pipe	300mm
10. Diameter of wash water drain pipe	300mm
11. Number of wash water trough	3 Nos
12. Size of wash water trough	300x450
13. Free board	300mm
14. Diameter of wash water inlet	200mm

Draw the following views to a suitable scale

1. Plan of the filter unit - 20 marks
2. Longitudinal section of the filter unit - 20 Marks
3. Cross section of filter unit - 10 marks

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE313

Term : V Term

Course Name : CONSTRUCTION PRACTICE LAB

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
CONSTRUCTION PRACTICE LAB	Hours / Week	Hours / Term	Marks			Duration
	4 Hrs.	60 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Course Outcomes:

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

C313.1	Conduct quality control test on concrete making materials
C313.2	Understand and able to prepare and testing the concrete cubes
C313.3	Understand and able to prepare the center line plan and foundation plan
C313.4	Conduct quality control test on fresh and hardened concrete
C313.5	Understand and able to arrange the bricks using English bond

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		Linked Expts.	CL	Linked PO	Teaching Hrs
C.313.1	Conduct quality control test on concrete making materials	***10,11,14,15***	***R/U***	1,4,5,7	12
C.313.2	Understand and able to prepare and testing the concrete cubes	***9***	***R/U***	1,2,3,4,7	12
C.313.3	Understand and able to prepare the center line plan and foundation plan	***1,2***	***R/U***	1,2,3,4,7	12
C.313.4	Conduct quality control test on fresh and hardened concrete	***7,8,12,***	***R/U***	1,2,4,6,7	12

C.313.5	Understand and able to arrange the bricks using English bond	***3,4,5***	***R/U***	1,2,4,6,7	12

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
CONSTRUCTION PRACTICE LAB	**3**	**3**	**1**	**3**	**1**	**1**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

LIST OF EXERCISES

S.NO	NAME OF THE EXPERIMENTS	HOURS
1.	**PART-A** 1.Prepare a centerline plan and foundation plan for a building and set spread footing in the field for the given line sketch of the building 2.Prepare a centerline plan and foundation plan for a building and set out the layout of columns footing in the field for the given line sketch of the building (framed structure) 3.Arrangement of bricks using English Bond for one brick and one and half brick thick wall for right angled corner junction 4. Arrangement of bricks using English Bond for one brick and one and half brick thick wall for Tee junction 5. Arrangement of bricks using English Bond for one brick and one and half brick thick wall and two brick square pillars 6.Cutting,hooking,cranking and arrangement of reinforcement for A)Beam B) Lintel cum sunshade C) Column and footing	30HOURS
2.	**PART-B** 7.Determination workability of concrete by slump cone test 8. Determination workability of concrete by Compaction factor test 9.Casting and compression test of concrete cubes 10.Determination of fineness modulus of fine aggregate and plot a distribution curve and uniformity co efficient 11. Determination of fineness modulus of coarse aggregate and plot a distribution curve and uniformity co efficient 12. Determination workability of concrete by Vee Bee consistometer test 13.Non Destructive Test on concrete- Rebound Hammer Test 14.Determination of Bulking characteristics of the given sand sample 15.Shape test on coarse aggregate A)Flakiness index test B) Elongation index test C) Angularity number test	30HOURS

Content beyond the syllabus (not for examination)

- COMPRESSIVE STRENGTH OF CEMENT
- SPECIFIC GRAVITY OF CEMENT

LIST OF EQUIPMENTS

Sl. No.	Equipment	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

END EXAMINATION

Note:

- All the exercises have to be completed. Two exercises will be given for examination one from PART- A and One from PART – B.
- All the exercises should be given in the question paper and students are allowed to select by a lot.
- Record note book should be submitted during examination.

Detailed Allocation of Marks for External Assessment

ALLOCATION OF MARKS

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

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE314

Term : V

Course Name : CAD IN CIVIL ENGINEERING DRAWING - II

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
CAD IN CIVIL ENGINEERING DRAWING - II	Hours / Week	Hours / Term	Marks			Duration
	4 Hrs.	60 Hrs.	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Course Outcomes:

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

C314.1	To develop the Public Health Drawings
C314.2	To develop the Bridge Drawings
C314.3	To develop the Structural Drawing in various Sectional views.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		Linked Expts.	CL	Linked PO	Teaching Hrs
C314.1	To develop the Public Health Drawings	***1,2,3***	**R/U/A**	1,2,3,5,6	25
C314.2	To develop the Bridge Drawings	***4,5***	**R/U/A**	1,2,3,5	25
C314.3	To develop the Structural Drawing in various Sectional views.	***6,7,8,9, 10,11,12, 13,14***	**R/U/A**	1,2,3	25

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
CAD IN CIVIL ENGINEERING DRAWING - II	**3**	**1**	**1**	**-**	**2**	**2**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

UNIT	NAME OF TOPIC	Time
I	**PART-A** **I PUBLIC HEALTH ENGINEERING** 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	60HOURS
II	**PART B** **II BRIDGE DRAWING** 4. Steel foot over bridge across a Highway 5. Two span Tee Beam bridge with square return.	
III	**PART C** **III STRUCTURAL ENGINEERING** 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	

LIST OF EXERCISES

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
4. Steel foot over bridge across a Highway
5. Two span Tee Beam bridge with square return.

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

Content Beyond Syllabus

- Browse and importing blocks to drawing.
- Measurement of Area and Layer using autocad.

LIST OF EQUIPMENTS

S.No	Equipment	Quantity
1	Computers	30 Nos.
2	Laser printer	3 Nos.
3	CAD software	30 Users

END EXAMINATION

Note: All the exercises have to be completed.

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination.

Detailed Allocation of Marks for External Assessment

Sl.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
5	VIVA	5		
	TOTAL	75		

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE317

Term : V

Course Name : ENVIRONMENTAL ENGINEERING PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
ENVIRONMENTAL ENGINEERING PRACTICAL	Hours / Week	Hours / Term	Marks			Duration
	4 Hrs.	60 Hrs.	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

RATIONALE:

To make the students good aware about water and its importance to human survival.
2. Understand how to classify and analyse various quality parameters of raw water.
3. To make the students to prepare water quality assessment report.
4. To make the students as to suggest required type of treatment to purify raw water.
5. To make the students as analysts to differ quality requirements for industrial waters and domestic waters.

OBJECTIVES:

1. At the end of the course student will able to discuss about importance of water and its quality analysis.
2. Analyse various physico-chemical and biological parameters of water in case of quality requirements. 3. At the end of the course student will be able to assess complete water quality assessment for EIA and domestic supplies.
4. At the end of the course student will suggest various types of treatment methods required to purify raw water with different contaminants.

Course Outcomes:

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

C317.1	Assess physical and chemical characteristics of water
C317.2	Assess physical and chemical characteristics of waste water
C317.3	Assess the quality of air
C317.4	Assess the level of Noise

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		Linked Expts.	CL	Linked PO	Teaching Hrs
C317.1	Assess physical and chemical characteristics of water	1 to 10	*R/U/A*	1,2,3,4,5,6,7	50
C317.2	Assess physical and chemical characteristics of waste water	11 to 13	*R/U/A*	1,2,3,4,5,6,7	
C317.3	Assess the quality of air	14 to 15	*R/U/A*	1,2,3,4,5,6,7	10
C317.4	Assess the level of Noise	16	*R/U/A*	1,2,3,4,5,6,7	

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
ENVIRONMENTAL ENGINEERING PRACTICAL	**3**	**3**	**3**	**3**	**3**	**3**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

PART A 1. To determine the pH and conductivity of the given water sample. 2. To determine the Turbidity of the given water sample 3. To determine the Acidity of the given water sample. 4. To determine the Alkalinity of the given water sample. 5. To determine the Hardness of the given water sample. 6. To determine the Suspended Solids of a given water sample 7. To determine the Total Dissolved Solids of a given water sample 8. To determine the Settleable solids of a given water sample 10. To determine Chloride Concentration in a given water sample.	**60 Hrs**
PART B 11. To determine the pH and Conductivity of the given sewage sample. 12. To determine the Acidity of a given sewage sample. 13. To determine the Alkalinity of a given sewage sample. .	
PART-C 14. Ambient air quality measurement using High Volume sampler 15. Exhaust gas analysis for Air Pollutants 16. Measurement of Noise at different sources using Sound Meter	

LIST OF EXPERIMENTS

PART - A

1. To determine the pH and conductivity of the given water sample.
2. To determine the Turbidity of the given water sample
3. To determine the Acidity of the given water sample.
4. To determine the Alkalinity of the given water sample.
5. To determine the Hardness of the given water sample.
6. To determine the Suspended Solids of a given water sample
7. To determine the Total Dissolved Solids of a given water sample
8. To determine the Settleable solids of a given water sample
10. To determine Chloride Concentration in a given water sample.

PART-B

11. To determine the pH and Conductivity of the given sewage sample.
12. To determine the Acidity of a given sewage sample.
13. To determine the Alkalinity of a given sewage sample. .

PART-C

14. Ambient air quality measurement using High Volume sampler
15. Exhaust gas analysis for Air Pollutants
16. Measurement of Noise at different sources using Sound Meter

LIST OF EQUIPMENTS

Sl.No	LIST OF EQUIPMENTS REQUIRED	QUANTITY REQUIRED
1	pH Meter	1
2	Digital pH pen	1
3	Digital TDS meter	1
4	Conductivity Meter	1
5	Turbidity Meter	1
6	Dissolved Oxygen Meter	1
7	Spectrophotometer	1
8	Noise Level meter	1
9	Stack Monitoring Kit	1
10	High Volume Sampler (HVS)	1
11	Respirable Dust Sampler (RDS PM2.5)	1
12	PM2.5 & PM10 Combo Air Sampler	1
13	Flue Gas Analyser (Testo-350)	1

END EXAMINATION

Note: All the exercises have to be completed. One exercise will be given for examination.
All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitted during examination.

Detailed Allocation of Marks for External Assessment

S.No	Description	Marks (75)
1	Procedure, Handling Instruments / Tools	30
2	Observation and Tabulation	15

3	Calculations and Check	20
4	Accuracy of result	5
5	Viva	5
	Total	75

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N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING
Course code : N1CE306
Term : VI Term
Course Name : CONSTRUCTION MANAGEMENT WITH MIS

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
CONSTRUCTION MANAGEMENT WITH MIS	Hours / Week	Hours / Term	Marks			Duration
	5 Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	CONSTRUCTION SECTOR IN INDIA FEASIBILITY STUDY PLANNING OF CIVIL ENGINEERING PROJECT CONTRACT MANAGEMENT	15
2	CONSTRUCTION ORGANISATION AND THEIR SUPERINTENDENCE DEPARTMENTAL PROCEDURE AND ACCOUNTING	15
3	SCHEDULING AND TIME MANAGEMENT RESOURCE MANAGEMENT	15
4	QUALITY MANAGEMENT AND SAFETY CONSTRUCTION DISPUTES AND THEIR SETTLEMENT CONSTRUCTION LABOUR AND LEGISLATION ETHICS IN ENGINEERING	15
5	ENTREPRENEURSHIP INFORMATION MANAGEMENT AND COMPUTERS FINANCIAL MANAGEMENT	15
	Total	75

Course Outcomes:

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

C306.1	Identify the roles of individuals, companies, and agencies involved in the construction process
C306.2	Understand the structure of organizations with respect to span of control, power, authority, responsibility and decision making
C306.3	Use the PERT/CPM method to evaluate the core tasks within complicated operations that must be prioritized, and those that may be set as lower priority when time is of the essence
C306.4	Employ appropriate practices to organize and manage personnel, materials, equipment, costs, time, and quality of a construction project. Create a construction project safety plan
C306.5	Analyze, evaluate, and select computer applications for the purpose of efficient and effective project management.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C306.1	Identify the roles of individuals, companies, and agencies involved in the construction process	**R/U/A**	1,3,6	15
C306.2	Understand the structure of organizations with respect to span of control, power, authority, responsibility and decision making	**R/U/A**	1,2,3,6	15
C306.3	Use the PERT/CPM method to evaluate the core tasks within complicated operations that must be prioritized, and those that may be set as lower priority when time is of the essence	**R/U/A**	1,2,3,6	15
C306.4	Employ appropriate practices to organize and manage personnel, materials, equipment, costs, time, and quality of a construction project. Create a construction project safety plan	**R/U/A**	1,2,3,6	15
C306.5	Analyze, evaluate, and select computer applications for the purpose of efficient and effective project management.	**R/U/A**	1,2,3,5,6	15
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for		Marks weightage (%)
				R	U/A	
I	CONSTRUCTION SECTOR IN INDIA FEASIBILITY STUDY PLANNING OF CIVIL ENGINEERING PROJECT CONTRACT MANAGEMENT	15	25	2	23	17.86 %
II	CONSTRUCTION ORGANISATION AND THEIR SUPERINTENDENCE DEPARTMENTAL PROCEDURE AND ACCOUNTING	15	25	2	23	17.86 %
III	SCHEDULING AND TIME MANAGEMENT RESOURCE MANAGEMENT	15	25	2	23	17.86 %
IV	QUALITY MANAGEMENT AND SAFETY CONSTRUCTION DISPUTES AND THEIR SETTLEMENT CONSTRUCTION LABOUR AND LEGISLATION ETHICS IN ENGINEERING	15	25	2	23	17.86 %
V	ENTREPRENEURSHIP INFORMATION MANAGEMENT AND COMPUTERS FINANCIAL MANAGEMENT	15	25	2	23	17.86 %
I to V*			15	6	09	10.70%
	Total	75	140	16	124	100 %

*** 3 x 2Marks and 3 x 3Marks from any Unit limited to maximum of 2 Questions in each unit**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
CONSTRUCTION MANAGEMENT WITH MIS	**3**	**3**	**3**	**-**	**1**	**2**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

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	**15 Hours**
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	**15 Hours**

	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)	
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)	**15 Hours**
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 LEGISLATION** 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.	**15 Hours**
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	**15 Hours**

	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.	

Text Book:

1. Engineering Materials by S.C.Rangawala.
2. Engineering Materials by Sushilkumar.

Reference Book:

1. Engineering Materials by G.J. Kulkarni.
2. Engineering Materials by P.C.Varghese.

MODEL QUESTION PAPER – I

Term : VI Time : 3Hours
Programme : Diploma in Civil Engineering Max. Marks : 75
Course : CONSTRUCTION MANAGEMENT WITH MIS Course Code: N1CE306

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART-A (5x2=10)

1. State the need for construction Management.
2. What is meant by Joint Stock Company?
3. Define PERT.
4. What is the purpose of Provident Fund?
5. What are the elements of cash flow?
6. What is meant by private sector
7. Define Scheduling
8. What is time value of money?

PART-B (5x3=15)

9. Write a note on ecological analysis.
10. State any three advantages of sole proprietorship.
11. What is the need for resources management?
12. Explain the modes of settlement
13. Write a note on treasury management.
14. Define the term crash time and crash cost.
15. What are the duties and responsibilities of a consultant?
16. Discuss the different categories of disputes in construction

PART-C (5x10=50)

17. (A). (i) What are the objectives of construction management? (5)
(ii) What are the factors to be considered in the feasibility study of a project? (5)

OR

(B). Explain the function of construction management in National development (10)

18. (A). Describe in detail the different forms of Business organizations. Also mention the merits and demerits (10)

OR

(B). (i) What do you mean by check measurement? Explain (5)
(ii) Write short notes on (5)
1. Nominal muster roll.

2. Daily labour report.

19. (A). Draw a critical path and determine the project duration time for the following details.

(10)

Activity	0-1	0-2	1-3	2-3	3-4	4-5	4-6	5-6
Duration in days	18	4	5	4	6	6	8	8

OR

(B). Explain the terms “material resource” and “human resources”
(10)

20. (A). Describe in details the different forms of quality assurance Techniques
(10)

OR

(B). (i) What are the causes of accidents in the construction site? (5)
(ii) What is the need of labour legislation ? (5)

21. (A). (i) Write any four requirements of an entrepreneur (5)
(ii) How computers are being used in the field of construction industry? (5)

OR

(B). Calculate the net present value of a machine from the following data and also find the profitability index .
(10)

Initial investment Rs.50, 000/- Expected life 5 years
Salvage value Rs.5000/- PV factor for 5 years 0.621 @10%

Year	Cash inflow	P.V discount factor @10%
1	Rs.20,000	0.909
2	Rs.16,000	0.826
3	Rs.14,000	0.751
4	Rs.12,000	0.688
5	Rs. 8,000	0.621

MODEL QUESTION PAPER – II

Term : VI Time : 3 Hours
Programme : Diploma in Civil Engineering Max. Marks : 75
Course : CONSTRUCTION MANAGEMENT WITH MIS Course Code : N1CE306

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART-A

(5x2=10)

1. Write the objectives of planning
2. What is meant by D.L.R?
3. Define resources management
4. What is arbitration?
5. Name the types of Banks
6. State any two limitations in planning of construction projects
7. Define MIS
8. Define Bar Chart

PART-B (5x3=15)

9. What is sub-contract? Explain
10. Write short notes on : Payment of Bills
11. State the rules for numbering the events
12. Write notes on payment of wages Act
13. State any three elements of cash flow.
14. What is earnest money deposit?. Why it is calculated
15. List any three advantage of CPM
16. Briefly explain the outline of MIS

PART-C (5x10=50)

17. (A). Explain in detail the various stages of a construction project? (10)

OR

(B). Explain objectives of planning and site utilization (10)

18. (A). (i) What do you understand by decentralization? Explain (5)

(ii) Explain the basic difference between construction supervision and (5)
construction superintendence

OR

(B). Explain the duties and responsibilities of chief engineer and superintending engineer of State P.W.D.
(10)

19. (A). The following are the three estimates of activities. In weeks. Compute the average expected time for each activity. Draw the project network. Identify the critical path. What is the duration of the project.: (10)

Activity	1-2	1-3	1-5	2-4	3-4	4-5	4-6	5-6
t_o	2	4	2	1	5	3	2	1
t_m	3	5	2	2	6	4	3	2
t_p	5	5	4	4	8	9	6	5

OR

(B). (i) Write short notes on (5)
1. Work breakdown Chart[WBC]
2. Time Vs Cost optimization curve.

(ii) What are the advantages of network analysis? (5)

20. (A). (i) Explain the importance of safety in construction? (5)
(ii) What are the causes of disputes? (5)

OR

(B). Explain the Engineering Ethics and Integrity
(10)

21. (A). Mention the different types of entrepreneurial development programs existing in India
(10)

OR

(B). (i) Mention the objectives of MIS (5)
(ii) Describe the scheme of financial assistance provided by commercial bank to business enterprises and professionals. (5)

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS)

(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE208

Term : VI Term

Course Name : HYDRAULICS

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
HYDRAULICS	Hours / Week	Hours / Term	Marks			Duration
	6 Hrs.	90 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	INTRODUCTION, MEASUREMENT OF PRESSURE, HYDROSTATIC PRESSURE ON SURFACES.	21
2	FLOW OF FLUIDS, FLOW THROUGH ORIFICES AND MOUTH PIECES, FLOW THROUGH PIPES.	21
3	FLOW THROUGH NOTCHES, FLOW THROUGH WEIRS.	14
4	FLOW THROUGH CHANNELS	16
5	GROUND WATER AND PUMPS.	18
	Total	**90**

Course Outcomes:

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

C 208.1	Understand the fluid properties , pressure and its measurements by using pressure measuring devices and compute forces on immersed plane surfaces.
C 208.2	Understand and able to determine the discharge and co-efficient of discharge for Orifice, Mouthpiece, Orifice meter and Venturimeter.
C 208.3	Understand and able to determine the discharge through Notches and Weirs.
C 208.4	Understand and able to design most economical sections , measurement of velocity and lining of canals.
C 208.5	Understand the principles of Centrifugal pump, Reciprocating pump and other minor pumps.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C 208.1	Understand the fluid properties , pressure and its measurements by using pressure measuring devices and compute forces on immersed plane surfaces.	*R/U/Ap*	1,2,3,5,7	21
C 208.2	Understand and able to determine the discharge and co-efficient of discharge for Orifice, Mouthpiece, Orifice meter and Venturimeter.	*R/U/Ap*	1,2,3,4,5	21
C 208.3	Understand and able to determine the discharge through Notches and Weirs.	*R/U/Ap*	1,2,3,5,7	14
C 208.4	Understand and able to design most economical sections , measurement of velocity and lining of canals.	*U/Ap*	1,2,3,4,6,7	16
C 208.5	Understand the principles of Centrifugal pump, Reciprocating pump and other minor pumps.	*U/Ap*	1,2,4,5,7	18
		Total sessions		90

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	INTRODUCTION, MEASUREMENT OF PRESSURE, HYDROSTATIC PRESSURE ON SURFACES.	21	30	***4***	***21***	***5***	*22*
II	FLOW OF FLUIDS, FLOW THROUGH ORIFICES AND MOUTH PIECES, FLOW THROUGH PIPES.	21	30	***4***	***21***	***5***	*22*
III	FLOW THROUGH NOTCHES, FLOW THROUGH WEIRS.	14	30	***4***	***21***	***5***	*22*
IV	FLOW THROUGH CHANNELS	16	25	***2***	***18***	***5***	*17*
V	GROUND WATER AND PUMPS.	18	25	***2***	***18***	***5***	*17*
	Total	**90**	**140**	**16**	**99**	**25**	**100**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
HYDRAULICS	**3**	**3**	**3**	**2**	**2**	**1**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF TOPIC	Time
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- Totalpressure-Centre of pressure - Depth of centre of pressure – Resultant pressure – Problems on Practical application - Sluice gates, Lock gates and Dams- Descriptions.	**21 Hours**
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. **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.	**21 Hours**
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	**14 Hours**

	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.	
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 – 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	**16 Hours**
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-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 – 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 acentrifugal pump – Discharge, power and efficiency - Problems - Specifications of centrifugal pumps and their sections- Hand pump - Jet pump- Deep well pump - Plunger pumps - Piping system.	**18 Hours**

Text Books:

1. Dr. Jagadish Lal - Hydraulics, Fluid Mechanics and Hydraulic MachinesMetropolitan
2. Book 2. Company- New Delhi
3. 3. P.N. Modi & S.M. Sethi - Fluid Mechanics - Standard Publishers – New Delhi

Reference Books:

1 . S. Ramamirtham-Hydraulics,Fluid Mechanics and Hydraulics MachinesDhanpat Rai & Sons, New Delhi

2. K.L.Kumar - Fluid Mechanics – Eurasa Publshing House – New Delhi

3. R.K. Bansal - Fluid Mechanics - Lakshmi Publications

4. Prof. S. Nagarathinam - Fluid Mechanics - Khanna Publishers – New Delhi

5. K.R. Arora - Hydraulics, Fluid Mechanics and Hydraulics Machines –Standard Publishers & Distributors, New Delhi

6. B C S Rao, "Fluid Mechanics and Machinery" Tata-McGraw-Hill Pvt. Ltd., New Delhi

MODEL QUESTION PAPER - I

Term	:	V	Time	:	3 Hours
Programme	:	Diploma in Civil Engineering	Max. Marks	:	75
Course	:	HYDRAULICS	Course Code	:	N1CE208

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory. (2) Answer division (a) or division (b) of each question in PART – C. (3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART-A (5x2=10)

1. State any four properties of Fluids.
2. List out the different types of Flows.
3. Define Notch and Weir.
4. Explain LDPE lining of canal.
5. Define Aquifer and Water table.
6. What are the uses of Differential Manometer?
7. Define Orifice and Mouthpiece.
8. What is Cippoletti weir.

PART- B (5x3=15)

9. Write the dimension and units of the following.
   a) Volume. b) Density c) Discharge.
10. Give a brief note about Hydraulic Co-efficient.
11. Give a brief note about End contraction of a Weir.
12. State the advantages of lining of Canals.
13. Give a brief note about AIR VESSEL.
14. Express the pressure intensity of 58.15×10^3 N/m^2 in metres of water.
15. Give a brief note about Vena contracta and its significance.
16. Explain Priming of Centrifugal pump.

PART-C (5x10=50)

17. (A). A Differential manometer is attached to two points of a horizontal pipe line carrying oil of relative density 0.8. If the mercury deflection is 0.75 m , Calculate the pressure difference between the two points in Pascal.

OR

(B). A rectangular plate 2m x 3m is immersed vertically such that the top 2m edge is parallel to and at a depth of 1m below the free surface of water. Find the Total pressure and depth of Centre of pressure.

18. (A). A Venturimeter is fitted in a horizontal pipe of 75mm diameter has 25mm as throat diameter. The Venturi head is 412 mm of water. If the co-efficient of the meter is 0.97 determine the rate of flow in lps.

OR

(B). A large rectangular Orifice of 1.0m wide and 0.3m deep. The surface of water is 1.20m above the upper edge of the orifice. Determine the discharge if the co-efficient of discharge is 0.62.

19. (A). A triangular notch is discharging under a head of 0.5m. If the angle of the notch is 120^0 and co-efficient is 0.60. Determine the discharge through the Notch.

OR

(B). Determine the discharge over the weir if the head of water over the weir is 1.2m. A weir is 10m long is divided into 4 bays by vertical posts, each 300 mm wide. Take Cd as 0.62.

20. (A). A rectangular channel 1.2m wide and 1.0m deep has longitudinal slope 1 in 3000 using Bazin's formula determine the discharges through the channel. Take the value of K as

OR

(B). Design a most economical rectangular section to carry 0.30 m^3/sec for a bed slope of 1 in 1000. Take C = 60.

21. (A). Draw the neat sketch of Single Acting Reciprocating pump and briefly explain its working.

OR

(B). A single acting reciprocating has a plunger diameter of 250 mm and stroke of 350 mm. If the speed of the pump is 60 rpm find i) Theoretical Discharge ii) Actual Discharge iii) Percentage of Slip.

MODEL QUESTION –II

Term	: VI	Time	: 3 Hours
Programme	: Diploma in Civil Engineering	Max. Marks	: 75
Course	: HYDRAULICS	Course Code:	**N**1CE208

[<u>N.B:</u> (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART-A **(5x2=10)**

1. Define Specific Gravity and Viscosity.
2. What is Laminar and Turbulent flow?
3. Define Nappe and Crest.
4. What is Hydraulic mean depth.
5. Define Open well and Bore well.
6. Write the statement of Bernoulli's Theorem.
7. What is Broad crested weir?
8. What is Micro meter?

PART-B **(5x3=15)**

9. Convert a pressure head of 500 mm of mercury into metres of Oil of relative density of 0.75.
10. Give a brief note about Venturimeter with a neat sketch.
11. State any six types of Weirs.
12. State the advantages of lining of Canal.
13. Give a brief note about Jet Pump.
14. State any six properties of Fluids.
15. List out the different types of Mouth piece.
16. Give a brief about Taping of Ground water.

PART-C **(5x10=50)**

17. (A). A circular plate 3.0 m diameter is placed vertically in water so that the centre of the plate is 4.0 m below the free surface of water. Find the Total pressure and Depth of centre of pressure on the plate.

OR

(B). A Simple U-Tube manometer was used to find the pressure at a point " A " of Kerosene of relative density 0.80 flowing through a pipe. The deflection of mercury in the U-Tube between the limb was 0.10m and the free surface of mercury in the open limb was

0.05m above "A ". Find the pressure at "A "in terms of Pascal's.

18. (A). An Orifice in the side of the large tank is rectangular in shape 1.5m broad and 0.80m deep If the water level on one side of the Orifice is 2.7m above the top edge and water level on the other side of Orifice is 0.40m below the top surface. Find the discharge. Take C_d = 0.62.

OR

(B). A Venturimeter with a 250mm diameter inlet and 125mm throat is laid with its axis horizontal. It is used for measuring the flow of Oil of relative density 0.85. The oil mercury differential manometer shows a deflection of 0.30m. The C_d of the meter as 0.95. Calculate i) Venturi Head. ii) Discharge in lps.

19. (A). A Trapezoidal notch is 1.20m wide at the top and 0.5m at bottom . The height is 0.4m. Determine the discharge through the notch when the head of water is 0.30m. Take Cd as 0.60

OR

(B). A rectangular weir 6.0m long has a constant head of water 0.36m. Using Francis formulae find out the discharge flowing over the weir. Take Cd as 0.62. Consider the end contractions.

20. (A). The velocity of water in a pipe 200 mm diameter is 5.0 m/sec. The length of pipe is 450 m. Find the loss of head due to friction. Take f = 0.032.

OR

(B). An economical rectangular channel discharges 15 cu.m with a velocity of flow of 1.60m/sec. Take Chezy's constant as 60 find out, i) the depth of flow ii) bed width iii) Bed fall.

21. (A). A Centrifugal pump is required to lift 4.0 m^3 of water per second to a height of 5.0m. If the total loss of head is 0.4m Compute the maximum power of the motor to run the pump. Efficiency of the pump and motor is 75 %.

OR

(B). A double acting reciprocating pump has a piston area of 0.15m^2. Its stroke length is 0.30 m It is discharging 2.40m^3 of water per minute at 45 rpm, through a total height of 10.0m. Find, i) Percentage of Slip ii) Co-efficient of discharge iii) Efficiency of the pump.

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE405

Term : VI Term

Course Name : ADVANCED CONSTRUCTION TECHNOLOGY

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
ADVANCED CONSTRUCTION TECHNOLOGY	Hours / Week	Hours / Term	Marks			Duration
	5 Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	PILE FOUNDATIONS MODIFIED CONCRETE	15
2	PREFABRICATION SYSTEM AND METHODS	15
3	FIRE PROTECTION IN BUILDINGS EARTHQUAKE RESISTING CONSTRUCTION	15
4	MAINTENANCE AND REHABILITATION OF BUILDINGS PRECAUTIONS TO PREVENT CRACKS IN BUILDINGS	15
5	HOUSING MODERNIZATION LIFT MODERNIZATION	15
	Total	75

Course Outcomes:

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

C405.1	Report the important operations of construction activities they visited where new techniques, machines and equipment are used.
C405.2	Describe important aspects , operations and safety points pertaining to: a. 'Deep Excavations'; b. Pile foundations ; c. Coffer Dams; d. Caissons; e. Drilling and Blasting

C405.3	Discuss purpose, types, materials, design issues, and erection of temporary structures for construction activities.
C405.4	Describe equipment and tackles used, problems encountered and their solutions in erection of steel structures.
C405.5	Demonstrate proper techniques associated with residential and commercial construction.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C405.1	Report the important operations of construction activities they visited where new techniques, machines and equipment are used.	***R/U/A***	1,3,4,5,7	15
C405.2	Describe important aspects , operations and safety points pertaining to: a. 'Deep Excavations'; b. Pile foundations ; c. Coffer Dams; d. Caissons; e. Drilling and Blasting	***R/U/A***	2,3,4,7	15
C405.3	Discuss purpose, types, materials, design issues, and erection of temporary structures for construction activities.	***R/U/A***	1,2,3,4,6, 7	15
C405.4	Describe equipment and tackles used, problems encountered and their solutions in erection of steel structures.	***R/U/A***	2,3,4,5,7	15
C405.5	Demonstrate proper techniques associated with residential and commercial construction.	***R/U/A***	1,2,3,4,5	15
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	PILE FOUNDATIONS MODIFIED CONCRETE	15	30	***4***	***21***	***5***	*22*
II	PREFABRICATION SYSTEM AND METHODS	15	30	***4***	***21***	***5***	*22*
III	FIRE PROTECTION IN BUILDINGS EARTHQUAKE RESISTING CONSTRUCTION	15	30	***4***	***21***	***5***	*22*
IV	MAINTENANCE AND REHABILITATION OF BUILDINGS PRECAUTIONS TO PREVENT	15	25	***2***	***18***	***5***	*17*
V	HOUSING MODERNIZATION LIFT MODERNIZATION	15	25	***2***	***18***	***5***	*17*
	Total	75	**140**	**16**	**99**	**25**	**100**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
ADVANCED CONSTRUCTION TECHNOLOGY	**2**	**3**	**3**	**3**	**2**	**1**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF TOPIC	Time
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 cementproduction 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 – MagnelBlaton system - Lee-mc-call system - Causes for losses in prestress – remedial measures – Composite member	**15 Hours**
II	**2.1 PRE FABRICATION SYSTEM:** Advantages and Disadvantages of Prefabrication system - Terms defined : prefabricated building, module, composite members, modular coordination, 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	**15 Hours**

	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 precast concrete elements – place - process - main, auxiliary and subsidiary process; Stages of precasting –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.	**15 Hours**
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 **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	**15 Hours**

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 – Rating **5.2 LIFT MODERNISATION** Independent Lifting Services - Mechanical Modernisation - escalators or pathways - Aesthetic Modernisation -Lift Car Interior-Eco-friendly Modernisation – lift construction - Installation and modernization and maintenance.	**15 Hours**

Text Book:

1. Concrete Technology – M.S. Shetty
2. Fire Resistant Construction – Building Construction by S.P.Arora and S.P.Bindra

Reference Book:

1. Earth quake Proof - Building Construction by Dr.Janardhanjha and Prof.Suresh Kumar
2. SinhaIS Code of Practice for Earth quake , IS Code of Practice for Fire resistance, IS Code of Practice for pre stressing (2005)
3. Pile foundation – RD Chellis, MIS
4. Construction and foundation Engg – Sinha &JanathaShau.
5. Principle Fine safty standards for building Construction – M.YaRoytman
6. Report on Nano technology and Construction – Surinder Mann
7. Krishna Raju. N. Prestressed Concrete, Tata McGraw Hill Company, New Delhi 1998

MODEL QUESTION PAPER – I

Term	:	VI	Time	: 3 Hours
Programme	:	Diploma in Civil Engineering	Max. Marks	: 75
Course	:	Advanced Construction Technology	Course Code:	N1CE405

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART-A **(5x2=10)**

1. Define Friction pile.
2. What are the types of pre-fabricated building?
3. Define Epi-centre.
4. What are the types of cracks in buildings?
5. What is lift car?
6. Define. Admixture
7. Define Earthquake.
8. Define Renovation.

PART-B **(5x3=15)**

9. What is sheet pile? Write any one use of sheet pile?
10. What is the modules for beam and column?
11. Differentiate Pre-tensioning and post-tensioning.
12. What are the causes of fire?
13. What is catch plat form?
14. What do you mean by the term “Green house”?
15. Write any three advantages of pre-fabrication?
16. What are the methods used for filling cracks?

PART-C **(5x10=50)**

17. (A). Describe the process of casting a precast concrete pile and draw a neat sketch of a typical concrete pile. (10)

OR

(B). (i) What are the composition of cement. ? (5)

(ii) Write the procedure of Mix design by I.S.Code method. (5)

18. (A). (i) Draw neat sketches of prestressing floor slab, grid floor , circular pipes. (5)

(ii) What are the methods available for post tensioning and explain any one of them.(5)

OR

(B). (i) Draw the different applications of precast elements
(5)

(ii) State the advantages and disadvantages of Pre fabrication system.
(5)

19. (A). (i) Write short notes on Fire-resistance of concrete.
(5)

(ii) What are the general guidelines for planning an earthquake resistant buildings?
(5)

OR

(B). (i) What are the Exit requirement as per NBC of India. ?
(5)

(ii) What are the precautions to be taken during Earth quake?
(5)

20. (A). (i) Explain the methods of repairing cracks in concrete.
(5)

(ii) What are the major causes for defects in building?
(5)

OR

(B). (i) What are the materials used for repairs in buildings. ?
(5)

(ii) Define structural cracking in concrete and what the factors to be considered during

are Demolition.
(5)

21. (A). (i) Explain briefly about Housing modernization and management.
(5)

(ii) What are the features of Lift Car?
(5)

OR

(B). (i) Explain about Passive house construction.
(5) (ii) Explain where escalators are provided.
(5)

MODEL QUESTION PAPER - II

Term : VI Time : 3Hours
Programme : Diploma in Civil Engineering Max. Marks: 75
Course : Advanced Construction Technology Course Code: N1CE405

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART-A **(5x2=10)**

1. List any four types of pile.
2. What is FRC?
3. What is module co-ordination?
4. What is limiting fire spread in buildings?
5. What is rehabilitation in buildings?
6. What are the methods used to filling cracks?
7. What are lift cars?
8. Define focus.

PART-B **(5x3=15)**

9. Differentiate Bearing pile and non-bearing pile.
10. What are the materials used for light weight aggregates?
11. Define Module.
12. What are the causes of earthquake?
13. What are the causes for defects in buildings?
14. Mention the fire precautionary measures.
15. How to repair the plastering cracks in buildings?
16. What is Eco-friendly modernization?

PART-C **(5x10=50)**

17. (A). (i) Describe a process of casting a precast concrete pile (5)
(ii) Draw a neat sketch of a typical concrete pile (5)

OR

(B). (i) What are the advantages of pre stressed concrete? (5)
(ii) Explain with a neat sketch Freyssinet system of prestressing (5)

18. (A). (i) Write a short notes on modular co-ordination. (5)
(ii) Explain about the different tolerances in Pre fabrication system. (5)

OR

(B). (i) What are the Characteristics to be considered in devising a system ? (5)
(ii) What are the stages of pre casting? (5)

19. (A). (i) Write short notes on fire resisting building materials (5)
(ii) Write short notes on Fire-resistance of concrete (5)

OR

(B). (i) Explain the I.S.code provision for Earthquake in Buildings (5)
(ii) What are the causes of Earthquake?
(5)

20. (A). (i) Write short notes on “Patch repairs for plastering” (5)
(ii) What are the factors which influences the cracks? (5)

OR

(B). (i). What are the precautions to be taken during demolitions? (5)
(ii) What are the materials used for repairs in buildings? (5)

21. (A). (i) Explain Property Refurbishment (5)
(ii) Write briefly about Building Energy rating (5)

OR

(B). (i) Explain standards Passive house (5)
(ii) What is quality-tested commercial passive house construction? (5)

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(AUTONOMOUS)
(Affiliated to Directorate of Technical Education, Chennai-25)
VIRUDHUNAGAR – 626 001
N1 - SCHEME

Programme : CIVIL ENGINEERING
Course code : N1CE406
Term : VI Term
Course Name : TOWN PLANNING

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
TOWN PLANNING	Hours / Week	Hours / Term	Marks			Duration
	5 Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	TOWN PLANNING PRINCIPLES	15
2	HOUSING,SLUMBS,TALL BUILDINGS,LOADING	15
3	PUBLIC BUILDINGS	15
4	URBAN ROADS AND TRAFFIC MANAGEMENT	15
5	BUILDING BY LAWS AND MISCELLANEOUS TOPICS	15
	Total	75

Course Outcomes:

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

C406.1	Demonstrate a technical and theoretical body of knowledge in urban and regional planning, including deep understanding in some areas of the discipline.
C406.2	Demonstrate cognitive and technical skills to analyse and evaluate approaches to land-use and built-environment problems in a range of changing social, economic and environmental contexts.
C406.3	Demonstrate knowledge and skills to identify, synthesise and act on the diverse sources of information used by professional planners in the governance of different urban and regional contexts.
C406.4	Demonstrate initiative and judgement in addressing particular planning problems, capacity to work independently and collaboratively, and ability to communicate specialised information via written, oral and graphical forms.
C406.5	Graduates will demonstrate knowledge and appreciation of socially responsible planning practices, particularly in the area of sustainable development.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C406.1	Demonstrate a technical and theoretical body of knowledge in urban and regional planning, including deep understanding in some areas of the discipline.	**R/U/A**	1,2,3	15
C406.2	Demonstrate cognitive and technical skills to analyse and evaluate approaches to land-use and built-environment problems in a range of changing social, economic and environmental contexts.	**R/U/A**	1,2,3,5	15
C406.3	Demonstrate knowledge and skills to identify, synthesise and act on the diverse sources of information used by professional planners in the governance of different urban and regional contexts.	**R/U/A**	1,3,5	15
C406.4	Demonstrate initiative and judgement in addressing particular planning problems, capacity to work independently and collaboratively, and ability to communicate specialised information via written, oral and graphical forms.	**R/U/A**	1,2,3,5,6	15
C406.5	Graduates will demonstrate knowledge and appreciation of socially responsible planning practices, particularly in the area of sustainable development.	**R/U/A**	1,2,3,5,6	15
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for		Marks weightage (%)
				R	U/A	
I	TOWN PLANNING PRINCIPLES	15	25	2	23	17.86 %
II	HOUSING,SLUMBS,TALL BUILDINGS,LOADING	15	25	2	23	17.86 %
III	PUBLIC BUILDINGS	15	25	2	23	17.86 %
IV	URBAN ROADS AND TRAFFIC MANAGEMENT	15	25	2	23	17.86 %
V	BUILDING BY LAWS AND MISCELLANEOUS TOPICS	15	25	2	23	17.86 %
I to V*			15	6	09	10.70%
	Total	75	140	16	124	100 %

*** 3 x 2Marks and 3 x 3Marks from any Unit limited to maximum of 2 Questions in each unit**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
TOWN PLANNING	3	3	3	-	2	2	-

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

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**.**	**15 Hours**

	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**.**	
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. **2.3 TALL BUILDINGS** Development of High rise Structures – General Planning Considerations – Design philosophies – Materials used for Construction – High Strength concrete – High Performance Concrete – Self Compacting Concrete – Glass – High Strength Steel **2.4LOADING** Gravity Loading – Dead Load – Live Load – Live load reduction technique – Impact Load – Construction Load – Sequential Loading. Lateral Loading – Wind load – Earthquake Load. Combination of Loads **2.5 BEHAVIOUR OF VARIOUS STRUCTURAL SYSTEMS** Factors affecting growth, Height and Structural form. High rise behaviour of Various structural systems – Rigid frames, braced frames, Infilled frames, shear walls, coupled shear walls.	**15 Hours**
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. **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.	**15 Hours**

	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 futures- 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.	**15 Hours**
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 otherterms - 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 metropolitan Area - CMDA rules.	**15 Hours**

	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,ExhibitionCentres etc., – Location for water/sewage treatment plants, location for waste disposal etc.,– Transportation planning.	

Text 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.

Reference Book:

1.NationalBuilding Code of India- Part-III.(2005).
2. Municipal and Panchayat bye-laws, CMDA Rules and Corporation bye-laws.
3. KA. Ramegowda, Urban and regional planning , University of Mysore
4. Principles and practice of town and country planning Lewis B. Keeble, Estates Gazette, University of Michigan,2010
5. TaranathB.S.,"Structural Analysis and Design of Tall Buildings", McGraw Hill, 2011.

MODEL QUESTION PAPER – I

Term : VI Time : 3Hours
Programme : Diploma in Civil Engineering Max. Marks : 75
Course : TOWN PLANNING Course Code: N1CE406

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART-A (5x2=10)

1. Mention the necessity of town planning.
2. State any two advantages of zoning.
3. Mention any two causes of slum.
4. Define. Parkways.
5. Mention anyone object of Re-planning.
6. What are the types of street systems.
7. Define.Set-back.
8. What is green belt?

PART-B (5x3=15)

9. Mention the factors to be considered in the evolution of planning.
10. What are the factors to be considered while selecting the building site?
11. Mention any three usual defects of existing town.
12. Write short notes on sub-arterial roads.
13. Mention any three items which are not considered while computing floor-space index.
14. Write short notes on civil survey.
15. What are the classification of public buildings?
16. What are the lighting lay-out?

PART-C
(5x10=50)

17. a) Define Zoning. Explain the various aspects of zoning.

OR

b) Explain the various principles of town planning.

18. a) Describe the various housing programme by HUDCO.

OR

b) Explain critical notes on slum clearance.

19. a) Explain the salient features of landscape architecture.

OR

b) Explain the data required for the preparation of a master plan of a town.

20. a) State the factors to be considered while design a road.

OR

b) Mention the general principles to be observed in the design of road junction.

21. a) Describe the various important points in building bye-laws.

OR

b) Mention the important applications of remote sensing.

MODEL QUESTION PAPER – II

Term : VI Time : 3Hours
Programme : Diploma in Civil Engineering Max. Marks : 75
Course : TOWN PLANNING Course Code: N1CE406

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART-A (5x2=10)

1. Define Town planning.
2. Define. Sky scrapers.
3. What are the types of recreation?
4. Write any two objects of traffic management.
5. Define Building bye-law.
6. Define Zoning.
7. Abbreviate the term CMA.
8. What are the arrangements made at a road inter-section.

PART-B (5x3=15)

9. Why town planning is necessary?
10. Enumerate the effects of slum.
11. Give sketch of a typical ground of a fully developed school.
12. Enumerate the various traffic control method.
13. Differentiate between city block and conurbation.
14. Give sketch of (i) By-pass road (ii) outer ring road.
15. How suitability of the site is finalized?
16. What are the requirements of ideal town?

PART-C (5x10=50)

17. a) Explain about satellite town.

OR

b).Explain the types of surveys in TP.

18. a) Write short notes on
    (i) Slum clearance project.
    (ii) National housing policy.
    (ii)Rent restriction Act.

OR

b) What are the important aspects of rural housing?

19. a) List the drawings to be prepared for the master plan.

OR

b) Explain the various objects of re-planning.

20. a) Enumerate the advantages of grade separators.

OR

b) Explain the various types of street light with neat sketch.

21.a) Mention the application of remote sensing in urban planning.

OR

b) Write notes on CUL-DE-SAC.

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(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE407

Term : VI

Course Name : STEEL STRUCTURES

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Term	Marks			Duration
STEEL STRUCTURES	5Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT	Topic	Time
I	INTRODUCTION TO PLASTIC ANALYSIS AND LSD	15 Hours
II	DESIGN OF TENSION AND COMPRESSION MEMBERS BY LSM	15 Hours
III	DESIGN OF FLEXURAL MEMBERS FOR BM AND SF BY LSM	15 Hours
IV	DESIGN OF SECTIONS FOR COMBINED ACTIONS	15 Hours
V	DESIGN OF CONNECTIONS AND DETAILING	15 Hours
	Total	75 Hours

Course Outcomes:

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

C.407.1	To learn the behavior and design of structural steel components, for example, members and connections in two - dimensional (2D) truss and frame structures.
C.407.2	To gain an educational and comprehensive experience in the design of simple steel structures.
C.407.3	Ability to analyze and design of beam-columns
C.407.4	Ability to analyze and design of simple bolted and welded connections
C.407.5	Ability to design steel framing system and connections of a building in a team setting

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		**CL**	**Linked PO**	**Teaching Hrs**
C.407.1	To learn the behavior and design of structural steel components, for example, members and connections in two - dimensional (2D) truss and frame structures	**R/U/A**	1,3,6	15
C.407.2	To gain an educational and comprehensive experience in the design of simple steel structures.	**R/U/A**	1,4,6	15
C.407.3	Ability to analyze and design of beam-columns	**R/U**	1,5,7	15
C.407.4	Ability to analyze and design of simple bolted and welded connections	**R/U/A**	1,2,5	15
C.407.5	Ability to design steel framing system and connections of a building in a team setting	**R/U/A**	1,3,6,7	15
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for		Marks weightage (%)
				R	U/A	
I	INTRODUCTION TO PLASTIC ANALYSIS AND LSD	15	25	2	23	17.86
II	DESIGN OF TENSION AND COMPRESSION MEMBERS BY LSM	15	25	2	23	17.86
III	DESIGN OF FLEXURAL MEMBERS FOR BM AND SF BY LSM	15	25	2	23	17.86
IV	DESIGN OF SECTIONS FOR COMBINED ACTIONS	15	25	2	23	17.86

V	DESIGN OF CONNECTIONS AND DETAILING	15	25	2	23	17.86
I to V*			15	6	9	10.70
	Total	75	140	16	124	100

*** 3 x 2Marks and 3 x 3Marks from any Unit limited to maximum of 2 Questions in each unit**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
STEEL STRUCTRUCERS	**3**	**1**	**3**	**1**	**2**	**3**	**2**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF TOPIC	Time
I	**INTRODUCTION TO PLASTIC ANALYSIS AND LIMIT STATE DESIGN** 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	**15 Hours**
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	**15 Hours**

	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.	
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 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	**15 Hours**
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	**15 Hours**

	compression and uni-axial BM only). **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 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).	**15 Hours**
	Content Beyond Syllabus	

Text Books:

1. M.R.Shiyekar “LimitState Design in Structural Steel”, PHI Learning Pvt Ltd, 2011

Reference Books:

1. K.S.Sai Ram “Design of Steel Structures” Pearson-Porling Kindersley Pvt Ltd
2. Dr.Subramaniam “Steel Structures.

MODEL QUESTION -I

Term	:	VI	Time	: 3 Hours
Programme	:	Diploma in Civil Engineering	Max. Marks	: 75
Course	:	STEEL STRUCTURES	Course Code	: N1CE407

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART-A (5x2=10)

1. Define the term shape of factor.
2. Why expansion joints are to be provided in steel structures.
3. Why steel beam are provided with lateral supports?
4. Which member of a steel roof system is subjected bi-axial bending?
5. When a column is called as" beam-column"?
6. List the different types of butt weld.
7. Define "Effective length of butt weld".
8. When a flexural member is said to be under high shear?

PART-B (5x3=15)

9. What do you mean by collapse load?
10. List the three different design strength of a tie member.
11. How a slender compression member generally fails.
12. What will be the reduced effective moment of a beam section when it is under tension?
13. Which member of a steel roof system is subjected to vi-axial bending?
14. What is meant by taking fastness?
15. What are the advantages of bolted connections?
16. What are the design requirements of connection?

PART-C (5x10=50)

17. (A). (i) What are the assumptions made in the plastic method of analysis?. (5)
(ii) Explain briefly the serviceability requirements of structural elements to be considered in the limit state design. (5)

OR

(B). A simply supported steel beam of effective span 6 metres is subjected to a point load at 2 metres from the left support. The plastic moment of resistance of the section is 200KN.m. Find the collapse load by kinematical method. (10)

18. (A)**.** Design the tie member of a roof truss to carry an axial force of 200 KN, due to live and dead loads, using double angles, which are to be connected back to back on either side of 8mm thick gusset plates by 4 numbers 16mm dia bolts at each end. (10)

OR

(B). Design the slab base and concrete pedestal for a steel column ISMB350@52.4kg/m carrying an axial design load of 1000 KN. The pedestal is of M20 grade concrete and the SBC of soil is 300KN/m^2. Yield strength of steel is 250 N/mm^2. Suggest suitable size of weld if fu=460 N/mm^2. (10)

19. (A). (i) Differentiate the behaviours of laterally supported and laterally un-supported beams

(5)

(ii) When a beam section has to be designed for the combined effects of bending and Shear?

(5)

(OR)

(B). Design a simply supported steel beam using suitable I-Section to carry an udl of 50 N/m on an effective span of 5 m. The beam is not supported laterally. Yield strength of steel used is 300 MPa. Assume both flanges to be fully restrained against torsional rotation and warping at both ends.
(10)

20. (A). A steel column of effective length 4.0 metre is subjected to an axial compression of 600KN and a bending moment of 25kN.m about its major axis. Select suitable rolled steel I section for the column by limit state method, taking *fy* of steel as 340 MPa. Check for overall member strength is not necessary. (10)

(OR)

(B). An ISLB400@569N/m is used as a laterally supported cantilever beam. The support section of the beam is subjected to a design shear force of 360kN. Determine the design bending strength of the section if *fy* of steel is 300 MPa.
(10)

21. (A). (i) Explain different types of bolts.

(5)

(ii) Draw a neat sketch of beam to column seat angle connection using fillet welds.

(5)

(OR)

(B). A single angle tension member ISA 100x100x8 mm carries an axial force of 150KN. Find out the minimum overlapping length required, on a 10mm thick gusset plate, at its end if

(i) 5mm size fillet welds of permissible design shear strength 150 N/mm^2 are used and

(ii) 16mm dia bolts of design bolt value 50KN are used.

(10)

MODEL QUESTION -II

Term	:	VI	Time	: 3 Hours
Programme	:	Diploma in Civil Engineering	Max. Marks	: 75
Course	:	STEEL STRUCTURES	Course Code:	N1CE407

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART-A (5x2=10)

1. State the methods of Limit state design.
2. What is the necessity of bracings in steel structures?
3. Define. Design strength
4. Which member of a steel roof system is subjected to bi-axial bending?
5. When a column is called as "Beam-column"?
6. What is the type of connection?
7. What are the requirements of laterally unsupported beams?
8. Define "Effective length of butt weld"?

PART-B (5x3=15)

9. What are the assumptions of plastic method of analysis?
10. What are the advantages of Limit State Design of steel structures?
11. Define. Effective length of compression members.
12. Write the classification of steel beams?
13. Which member of steel roof system is subjected to vi-axial bending?
14. What is meant by taking fastness?
15. What are the advantages of bolted connections?
16. What are the design requirements of connection?

PART-C (5x10=50)

17. (A). Explain briefly the assumptions made in the limit state design method.

OR

(B). What are the classifications of Cross sections steel structures as per IS: 800-2007?

18. (A). Design the member of a roof truss to carry an axial force 150 KN due to live load and dead loads , using double angles, which are to be connected back to back on either side of 9 mm thick gusset plate by 4 numbers of 40 mm diameter bolts at each end.

OR

(B). Two ISMC 400 channels have been used with backs towards each other. The clear distance between backs is 30 cm. 50 cm wide and 1.4 cm thick flange plates

have been attached at the flanges with one plate on each side. If the length of this built-up section is 6cm and both it ends are hinged , compute the load carrying capacity of this section by Rankine's formula.

19. (A).When a beam section has to be designed for the effects of bending and shear?

OR

(B). Differentiate the behaviors of laterally supported and laterally un-supported beams.

20. (A). Design an I beam to carry a uniformly distributed load of 5.5 KN/m on a span of
(i) 5m (ii)3m. The beam is laterally supported at the ends only.

OR

(B). Write the interaction equations of sections subjected to bending moment and axial tension.

21. (A). Write the reduction factors for over sized and slotted holes.

OR

(B). Write the basic requirements of connections.

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE
(AUTONOMOUS)
(Affiliated to Directorate of Technical Education, Chennai-25)
VIRUDHUNAGAR – 626 001
N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING
Course code : N1CE408
Term : VI Term
Course Name : Earthquake Engineering

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Term	Marks			Duration
Earthquake Engineering	5 Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Hours
1	INTRODUCTION TO EARTHQUAKE	15
2	SEISMIC EFFECTS ON STRUCTURES	15
3	BEHAVIOUR OF STRUCTURES DURING EARTHQUAKES	15
4	CONCEPTS OF DESIGN OF EARTHQUAKE RESISTING BUILDINGS	15
5	RETROFITTING OF BUILDINGS	15
	Total	75

Course Outcomes:

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

C408.1	Understand the fundamental concepts, principles and application of earthquake engineering in seismic analysis and design of structures.
C408.2	Understand the Seismic effects on structures
C408.3	Understand the Behaviour of structures during earthquakes
C408.4	Understand the Concepts of Design of earthquake resisting buildings
C408.5	Understand the Retrofitting techniques of buildings

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C408.1	Understand the fundamental concepts, principles and application of earthquake engineering in seismic analysis and design of structures.	**R/U/A**	1,2,3,6	15
C408.2	Understand the Seismic effects on structures	**R/U/A**	1,2,3,6	15
C408.3	Understand the Behaviour of structures during earthquakes	**R/U/A**	1,2,3	15
C408.4	Understand the Concepts of Design of earthquake resisting buildings	**R/U/A**	1,2,3	15
C408.5	Understand the Retrofitting techniques of buildings	**R/U/A**	1,2,3,6	15
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for		Marks weightage (%)
				R	U/A	
I	Introduction to earthquake	15	25	2	23	17.86 %
II	Seismic Effects on Structures	15	25	2	23	17.86 %
III	Behaviour of structures during earthquakes	15	25	2	23	17.86 %
IV	Concepts of Design of earthquake resisting buildings	15	25	2	23	17.86 %
V	Retrofitting of buildings	15	25	2	23	17.86 %
I to V*			15	6	09	10.70%
	Total	75	140	16	124	100 %

*** 3 x 2Marks and 3 x 3Marks from any Unit limited to maximum of 2 Questions in each unit**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
Earthquake Engineering	**3**	**3**	**3**	**-**	**-**	**2**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**INTRODUCTION TO EARTHQUAKE** Objective of earthquake engineering - Engineering Seismology - Structure of the earth – Temperatures and Pressures with respect to depth - Plate Tectonics - Evolution of Indian Sub Continent – Seismo tectonics of India - Severe earthquakes in Indian sub continent - Causes of earthquake - Definition of terms : Fault line, Active Fault, Focus or Hypo centre, Epicenter, Epicenter distance ,Focal depth, Peak ground acceleration, Foreshocks, Aftershocks, Aseismic - Isoseismic, 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	**15 Hours**

	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 .	
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	**15 Hours**
III	**BEHAVIOUR OF STRUCTURES DURING EARTHQUAKES** Characteristics of buildings affecting their behavior - Symmetry, regularity, stiffness, flexibility, strength time 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, Freestanding 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 Earthquake Twisting of buildings	**15 Hours**
IV	**CONCEPTS OF DESIGN OF EARTHQUAKE RESISTING BUILDINGS** EarthQuake proof building - EarthQuake resisting building -	**15 Hours**

	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 wall – 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 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	**15 Hours**

Text 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

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

David Key “Earthquake Design Practice of Buildings”, Thomas Telford, London,1998

MODEL QUESTION PAPER – I

Term	:	VI	Time	: 3 Hours
Programme	:	Diploma in Civil Engineering	Max. Marks	: 75
Course	:	Earth quake Engineering	Course Code	: N1CE408

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART-A **(5x2=10)**

1. Define engineering seismology.
2. State hypo centre.
3. Explain pounding of adjacent buildings.
4. State floating columns.
5. Write anyone type of joint.
6. Give anyone advantages of shear wall.
7. Define shotcrete.
8. Explain bracing of roof truss frames

PART -B **(5×3=15)**

9. Explain the types of waves.
10. Discuss about the plate Tectonics.
11. Discuss about the effects of amplitude, duration and distance of earthquake.
12. Discuss the ductility and flexibility of buildings.
13. Explain the types of joints.
14. Explain the behavior of RCC structures.
15. Explain the types of dampers.
16. Explain seismic strengthening techniques.

PART C **(5×10=50)**

17. (A). Discuss about plate tectonics and evolution of Indian sub continent in detail.

OR

(B). Explain about the instrument used for measuring earthquake and seismic zoning map of India.

18. (A). Explain about the causes for seismic damages in buildings.

OR

(B). Give detail about short column effect, size and shape effect of buildings and its pounding effect.

19. (A). Explain about the behaviour of structures on sloped ground and with load bearing walls.

OR

(B). Discuss the Soil characteristics and its impact on various types of structures during

Earthquake Twisting of buildings.

20. (A). Explain the concepts of ductility, deformability and damageability of buildings during earthquake.

OR

(B). Say about the reduction of earthquake effects and features for masonry buildings to resist earthquake.

21. (A). Give detail on the retrofitting method and repairing techniques used for buildings.

OR

(B). Discuss about the strengthening of foundations.

MODEL QUESTION PAPER - II

Term	:	VI	Time	: 3 Hours
Programme	:	Diploma in Civil Engineering	Max. Marks	: 75
Course	:	Earth quake Engineering	Course Code	: N1CE408

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART-A

(5×2=10)

1. Define Richter's Magnitude scale.
2. State Fault line
3. Explain corrosion of reinforcement.
4. State short column effect.
5. Give anyone type of damage in beams.
6. Give anyone type of joint.
7. Write anyone type of seismic dampers.
8. Say anyone repairing technique used for buildings.

PART B (5×3=15)

9. Discuss about the plate Tectonics.
10. Discuss about the effects of Inertia forces, Seismic load and deformation during Earthquake.
11. Discuss the Horizontal and vertical layout of buildings during earthquake.
12. Explain the types of joints.
13. Explain the behavior of brittle elements under cyclic loading.
14. Discuss about the acceptable damages to buildings during earthquakes.
15. Explain the types of dampers.
16. Explain seismic strengthening techniques.

PART C

(5×10=50)

17. (A). Discuss about plate tectonics and severe earthquake in Indian sub continent in detail.

OR

(B). Explain about the instrument used for measuring earthquake and seismic zoning map of India.

18. (A). Explain about the causes for seismic damages in buildings.

OR

(B). Give detail about short column effect, size and shape effect of buildings and its pounding effect.

19. (A). Explain about the behaviour of structures on sloped ground and with load bearing walls.

OR

(B). Discuss the shear failure of columns and functions of stirrups in seismic beams.

20. (A). Explain the concepts of ductility, deformability of buildings during earthquake.

OR

(B). Say about the boundary elements of shear wall and masonry buildings to resist earthquake.

21. (A). Give detail on the retrofitting method and repairing techniques used for buildings.

OR

(B). Discuss about the Codal provisions for seismic isolations and its practical applications.

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS)

(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE307

Term : VI

Course Name : ESTIMATING AND COSTING-II

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
ESTIMATING AND COSTING - II	Hours / Week	Hours / Term	Marks			Duration
	5Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Topics and Allocation of Hours:

UNIT	Topic	Time
I	SPECIFICATION WRITING, REPORT WRITING	10
II	VALUATION RENT CALCULATION	16
III	ANALYSIS OF RATES FOR SANITARY AND WATER SUPPLY WORKS ANALYSIS OF RATES FOR BRIDGE / ROAD WORKS AND MISCELLANEOUS ITEMS	13
IV	TAKING OFF QUANTITIES OF P.H ENGINEERING STRUCTURES USING TRADE SYSTEM	18
V	TAKING OFF QUANTITIES OF ROAD / BRIDGE STRUCTURES USING TRADE SYSTEM	18
	TOTAL	75

Course Outcomes:

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

C307.1	Know about specification writing.
C307.2	Understand the valuation of buildings.
C307.3	Know about the rate analysis and bill preparation
C307.4	Prepare a detailed estimate for Public health, road and bridge structures.
C307.5	Prepare valuation reports and cost quality control.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
C206.1	Know about specification writing.	*R/U/A*	1, 2, 3	10
C206.2	Understand the valuation of buildings.	*R/U/A*	1, 2, 3	16
C206.3	Know about the rate analysis and bill preparation	*R/U/A*	1, 2, 3	13
C206.4	Prepare a detailed estimate for Public health, road and bridge structures.	*R/U/A*	1, 2, 3	18
C206.5	Prepare valuation reports and cost quality control.	*R/U/A*	1, 2, 3	18
		Total sessions		75

Course Content and Blue Print of Marks for End Examination:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for		Marks weightage (%)
				R	U/A	
I	SPECIFICATION WRITING REPORT WRITING	10	25	2	23	17.86 %
II	VALUATION	16	25	2	23	17.86 %
III	ANALYSIS OF RATES FOR SANITARY AND WATER SUPPLY WORKS	13	25	2	23	17.86 %
IV	TAKING OFF QUANTITIES OF P.H ENGINEERING STRUCTURES USING TRADE SYSTEM	18	25	2	23	17.86 %
V	TAKING OFF QUANTITIES OF ROAD / BRIDGE STRUCTURES USING TRADE SYSTEM	18	25	2	23	17.86 %
I to V*			15	6	09	10.70%
	Total	75	140	16	124	100 %

*** 3 x 2Marks and 3 x 3Marks from any Unit limited to maximum of 2 Questions in each unit**

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
ESTIMATING AND COSTING-II	**3**	**3**	**3**	**-**	**-**	**-**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF TOPIC	Time
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 Hours**
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,	**16 Hours**

	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	
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 doors - Glazed windows - Steel Grill gates – Steel grills for windows - Supplying and fixing Aluminium partitions - Providing wooden shutters to lofts - Expansion joint in R.C roof (Exposure to use of software in Analysis of rates - not for examination)	**13 Hours**
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	**18 Hours**
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	**18 Hours**

TEXT BOOKS:

1. Rangawala, “Estimating & Costing” ,Charotor Publishing
2. N.A.Shaw, “Quantity Surveying & Valuation”, Khanna Publishers

Reference Books:

1. L.N.Dutta, “Estimating & Costing”, DhanpatRai& Sons
2. Bridie, “Estimating & Costing”
3. Indian Standard Code of Practice, IS:1200.
4. Civil Estimating, Casting and Valuation – Kalson Publication Ludhiuyana.
5. Vazirani&Chandolu,” Estimating and Costing” 2001.

MODEL QUESTION -I

Term	:	VI	Time	: 3Hours
Programme	:	Diploma in Civil Engineering	Max. Marks	: 75
Course	:	ESTIMATING AND COSTING-II	Course Code:	N1CE307

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART–A (5x2=10)

1. What particulars are to be incorporated in a detailed specification of materials?
2. Define the term "salvage value"
3. Write any two materials for which the lead cost is more than their actual cost.
4. Write any two items of works for which lump sum provisions are being made in the estimate of an over head tank.
5. What will be the unit of measurement for the wearing coat of a bridge?
6. Write any two points to be considered while writing a technical report for a project.
7. Write the formula used to calculate the annual installment of sinking fund
8. What do you mean by "observed data"?

PART-B (5x3=15)

9. Differentiate general specification and detailed specification.
10. Write any three factors which govern the rent of a building.
11. Why rates are to be analysed separately for each project site?
12. How you estimate the quantity of steel reinforcement for various RCC elements?.
13. What are the works involved in the construction of side drains for a road?.
14. What are the details required for writing a general report on a project?.
15. Write any three items of works involved in the construction of a man hole.
16. Write any three items of works involved in the laying of a water bound macadam road.

PART-C (5x10=50)

17. (A). (i) Write a detailed specification for the coarse aggregate to be used in reinforced cement concrete. (5)

(ii) Write general specification for any six items of works involved in the construction of a slab culvert. (5)

OR

(B). (i) Write a detailed report about the proposed new bus terminus for a developing town. (5)

(ii) List out the documents and sketches to be enclosed with the above report. (5)

18. (A). (i) Write a small note on valuation. (5)

(ii) A building was constructed in the year 2011 for a total cost of Rs.40 lakhs. Its salvage value in year 2030 is expected to be Rs.15 lakhs. Find the book value of the building

in the year 2020 by sinking fund method, and also determine the annual installment of sinking fund, assuming the rate of interest as 8%. (5)

OR

(B). (i) How the nominal lease rents are fixed for Government buildings when they are rented to service associations of the department employees? (5)

(ii) A person is having a house building worth Rs.12,00,000 at present market value, constructed 10 years back in a plot area of 240 m^2. The present market value of land in the locality is Rs.3000 per m^2. The cost of amenities provided to the building is Rs.1,20,000. Allowing a rate of depreciation of 2% and taking the nominal interest on investments as 9%, fix a fair monthly rent to the building. (5)

19. (A). (Analyze and determine the rates for the following items of work with the given data.
A) i) Supplying and laying of stone ware glazed pipes and specials for sewers 100 mm dia, lowering in trenches upto a depth of 1.5m, jointing with cement mortar 1:1 including testing but excluding earth work excavation – 1 m (5)
(ii) Casting and supplying 1200mm dia, 300mm high, 25mm thick ferro cement ring for well sinking -1No (5)

OR

(B). (i) 20 mm thick Premix Chipping carpet – 1m^2. (5)

(ii) Rough stone dry packing for aprons and revetments – 1 m^3. (5)

Material and Labour requirements:

1.Supplying and laying of stone ware glazed pipes – 30m

600mm length 100mm dia pipes	50	No.
Cement	18	kg
Sand (medium)	0.11	m^3
Spun yarn	2.0	kg
Bitumen, Tools&Plants, Testing etc	Rs.400.00	(LS)
Mason Category I	1.0	No.
Mason Category II	4.0	No.
Mazdoor Category I	5.0	No.
Mazdoor Category II	3.0	No..

2. Casting and supplying 25mm thick ferro cement ring for well sinking -10 Nos

Stone chips	0.30	m^3
Sand (medium)	0.15	m^3
Cement	107	kg
3mm gauge wire mesh	12	m^2
Chicken mesh	24	m^2
Mason Category I	2.4	No.
Mazdoor Category I	4.0	No.
Mazdoor Category II	4.0	No.
Labour for shifting and curing	Rs.200 per 10 Nos	
Cement mortar 1:4	0.09	m^3
Mason Category II	1.6	No.
Mazdoor Category I	0.5	No.
Mazdoor Category II	1.1	No.

3. 20 mm thick Premix Chipping carpet – 100m^2.

Binder Asphalt	255	kg
Stone chips	2.7	m^3
Sand	0.3	m^3

Hire charges for Boiler, Roller, Mixer and cost of fire wood, brushes etc LS :Rs.950.00

4.Rough stone dry packing for aprons and revetments – 10 m3

Rough stones	11	m^3
Wooders	3.5	No.
Mazdoor Category I	10.6	No.
Mazdoor Category II	7.1	No.

Cost of materials and lead particulars:

Material	Unit (Rs)	Cost (kM)	Lead	Rate for Lead/kM) (Rs)	Handling charges (Rs)
Cement	50kg	280.00	4	2.00	5.00
Sand	m^3	250.00	30	20.00	60.00
Rough Stone	m^3	800.00	20	20.00	80.00
Stone chips	m^3	520.00	20	18.00	40.00
SW pipe 100mm dia 0.6m		60.00	4	0.50	0.50
Spun yarn	1kg	16.00	--	--	--
Binder Asphalt	1kg	21.00	--	--	--
3mm gauge wire mesh	$1m^2$	150.00	--	--	--
Chicken mesh	$1m^2$	40.00	--	--	--

Cost of Labour:

Mason Category I Rs.550.00 per day
Mason Category II Rs.500.00 per day
Wooder Rs.450.00 per day
Mazdoor Category I Rs.400.00 per day
Mazdoor Category II Rs.275.00 per day

20. (A). Take the quantity of R.C.C in column footings for the over head tank shown in Sketch using Trade system (10)

OR

(B). Take the area of plastering of the side walls (inner and outer) of the over head tank shown Sketch 1 using Trade system (10)

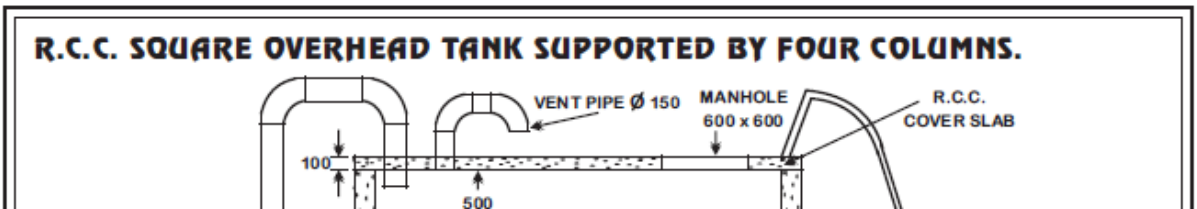
(Sketch 1 – A plan and sectional elevation of a RCC over head tank with flat RCC roof.)

21. (A). Take the quantity of brick work in abutment and wing walls of the Tee-beam bridge shown in Sketch 2, using Trade system (10)

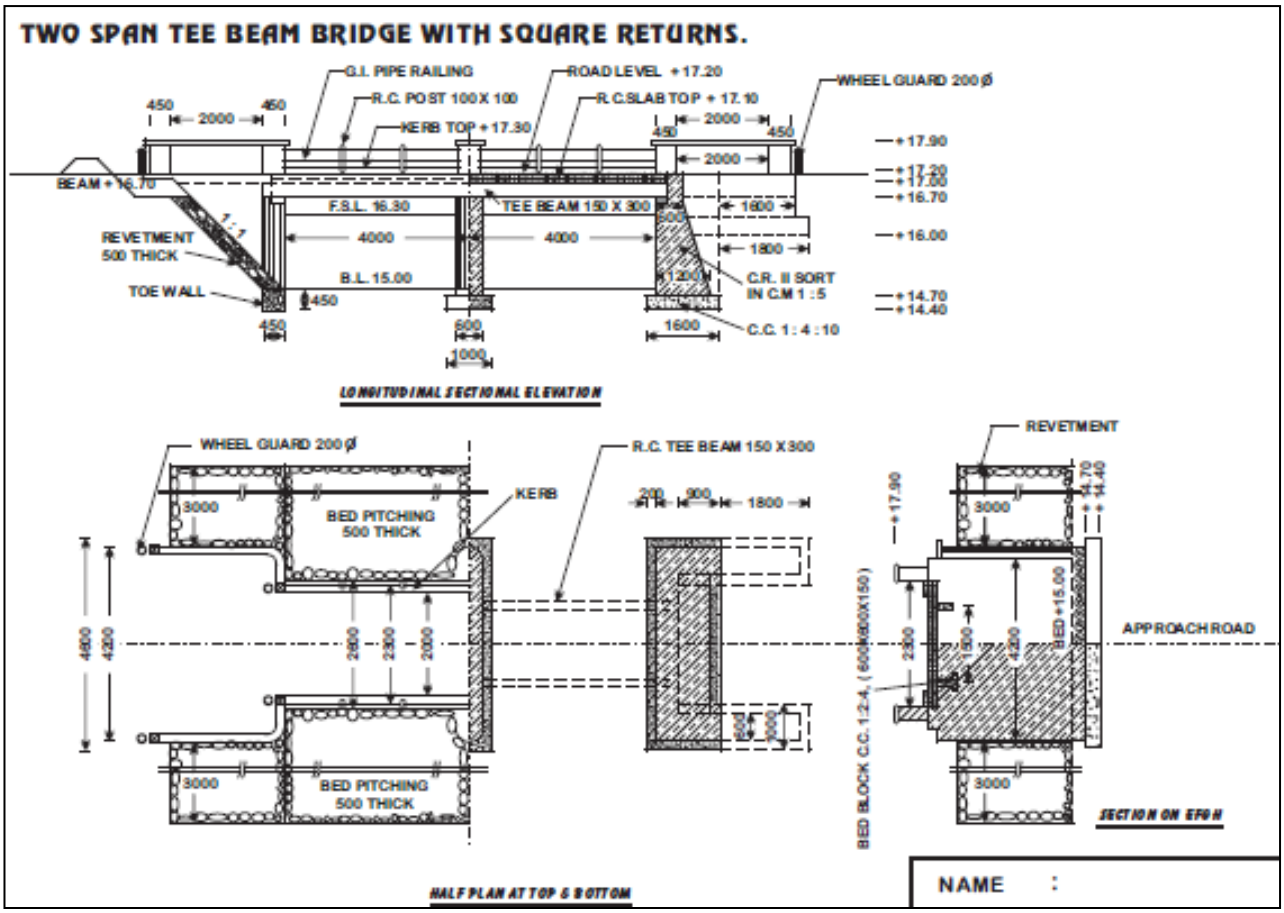
(OR)

(B). Take the quantities of RCC in Beams and Slabs of the Tee beam bridge shown in Sketch 2 using Trade system.

(Sketch 2 – A sectional plan and sectional elevation of a single span Tee beam bridge). (10)



SKETCH - 1



SKETCH - 2

MODEL QUESTION -II

Term	:	VI	Time	: 3 Hours
Programme	:	Diploma in Civil Engineering	Max. Marks : 75	
Course	:	ESTIMATING AND COSTING-II	Course Code:	N1CE307

[N.B: (1) Answer any FIVE Questions in each PART – A and PART – B. Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 Marks in PART – A, 3 Marks in PART – B and 10 Marks in PART – C.]

PART–A (5x2=10)

1. List out the types of specification.
2. What is sinking fund
3. Write any two materials for which the lead cost is more than their actual cost
4. What is dispersion trench?
5. Where steining walls are provided?
6. Define a report.
7. List out the different types of rent
8. What is Rainwater Harvesting?

PART-B (5x3=15)

9. State any three importance of specification.
10. Define Gross income and net income
11. Calculate the quantity of material required for C.M 1:3 per 1 m^3
12. Write any three items of works involved in the construction of a Septic Tank.
13. What is the use of Bed pitching provided in between the abutments in T beam bridge?
14. Prepare detailed estimate for 200mm thick RCC Deck slab of size 3m X 5m of culvert
15. Why rates are to be analysed separately for each project
16. Name the types of report.

PART-C (5x10=50)

17. (A). (i) Write a detailed specification for the material Bitumen to be used for laying of road. (5)

(ii) State the essential requirements of a good specification (5)

OR

(B). (i) Write a detailed report about the proposed construction of new School building in your town. (5)

(ii) Explain the necessity of Report writing (5)

18. (A). A building constructed 20 years back yields a rent of Rs. 6000 per year. The full life of the structure is estimated as 100 years. It is freehold property. The property tax is 7% of rental income. Insurance charges are Rs.850 per annum. Water supply charges are Rs.300 per annum and sanitary charges are Rs. 450 per annum. Repair charges are 4% of the cost of the structure. The rate of interest for sinking fund is 8% and that for capital value is 7%. The structure is estimated to cost Rs.13,75,850/= for replacement at the end of its useful life.

During dismantling and disposing of useful components, an amount of Rs.15,000 is expected to yield. The present cost of the land is Rs.4,25,000 /=. Find the value of the property. (10)

OR

(B). (i). What are the factors influencing the rent of the building. ? (5)

(ii). A person has invested Rs.2,50,000- on a plot and Rs.17,75,000 on construction of a building over it expecting 9% return. Assuming the cost of annual repairs to be Rs.33,000- and other outgoings to be 25% of gross rent, Calculate the reasonable rent, if the annual sinking fund Co-efficient is 0.02 (5)

19. (A). Prepare the data and furnish the rates for the following items of works

(i) Cutting, threading, joining of 20mm dia GI pipes with necessary accessories .. rate for 1.0m (5)

(ii) Supplying and laying of stone ware glazed pipes and specials for sewers 100mm dia, lowering in trenches up to a depth of 1.5m, joining with C.M 1:1 including testing - 1m (5)

(OR)

(B). (i) Laying of WBM over the existing soling spreading metal (IRC 50mm and IRC 40mm in equal proportion) – rate for $10m^2$ (5)

(ii) Spraying bitumen at 12 kg per m^2 and blinding with 12mm size IRC stone chippings at the rate of $0.14m^3$ per $10m^3$ including rolling – rate for $10m^2$ (5)

Materials and labours required:

i) Cutting, threading, joining of 20mm dia GI pipes – Rate for 30m

20 mm dia GI pipe	: 30 m
Tees 20 mm	: 4 Nos
Elbows 20 mm	: 4 Nos
Cutting & Threading Charges	: 8 Nos
Stone Cutter II Class	: 2 Nos
Plumber	: 1 No
Mazdoor I Class	: 2 Nos
Mazdoor II Class	: 1 No

ii) Supplying and laying of stone ware glazed pipes .. .. 30 m

100 mm dia pipes (600 mm length)	: 50 Nos
Cement	: 18 Kg
Sand	: 0.11 m^3
Spun yarn	: 2.0 Kg
Bitumen, Tools & Plants	: Rs.500 (LS)
Mason I Class	: 1 No
Mason II Class	: 4.0 No
Mazdoor I Class	: 5.0 No
Mazdoor II Class	: 3.0 No

iii) Laying of WBM over the existing soling by spreading metal (IRC 50 mm & IRC 40 mm in equal proportions) .. .. Rate for 10 m^2

Broken stone IRC 50 mm	: as required
Broken stone IRC 40 mm	: as required
Gravel	: as required
Labour	: Rs 550 (LS)
Roller	: 1/50 day
Water	: Rs 250 (LS)

iv) Spraying bitumen @ 12 Kg per m^2 and blinding with 12 mm size IRC stone chippings at the rate $0.14m^3$ per $10m^3$ including rolling .. .. $10m^2$

Bitumen 80/100 grade	: as required
Fuel for heating bitumen	: Rs.250 (LS)
IRC 12 mm size stone chippings	: as required
Mazdoor I Class	: 0.7 No.
Mazdoor II Class	: 0.7 No.
Roller	: 1/80 day

Material and Labour required:

20mm dia GI pipes	: Rs.550/1.0m
20mm Elbow	: Rs.85.00 / each
20mm Tee	: Rs.95.00 / each
Cutting and threading charges	: Rs.450 / each / day
Stone cutter II Class	: Rs. 300 each / day
Plumber	: Rs. 350 / each / day
Mazdoor I Class	: Rs.350 / each / day
Mazdoor II Class	: Rs.275 / each / day
Cement	: Rs.14,000 / Tonne
100mm dia pipe (600mm length)	: Rs.225 / No.
Sand	: Rs.3000 / m^3
Spun Yarn	: Rs.200 / Kg
Mason I Class	: Rs.450 / each /day
Mason II Class	: Rs.400 / each /day
Broken Stone IRC 50mm size	: Rs.3000 / m^3
Broken Stone IRC 40mm size	: Rs.4000 / m^3
Garvel	: Rs.2000 / m^3
Bitumen 80/100 grade	: Rs.40,000 / Tonne
Hiring Charges for Roller	: Rs.4000 / day

20. (A). Take out the quantities for the following items of "Septic Tank" given in the sketch by

Trade system

(i) B.W with C.M 1:5 for septic tank and Soak pit (5)

(ii) R.C.C 1:2:4 (5)

OR

(B). (i) Plastering with C.M 1:4 (5)

(ii) Brick jelly concrete 1:3:6 for Soak Pit (5)

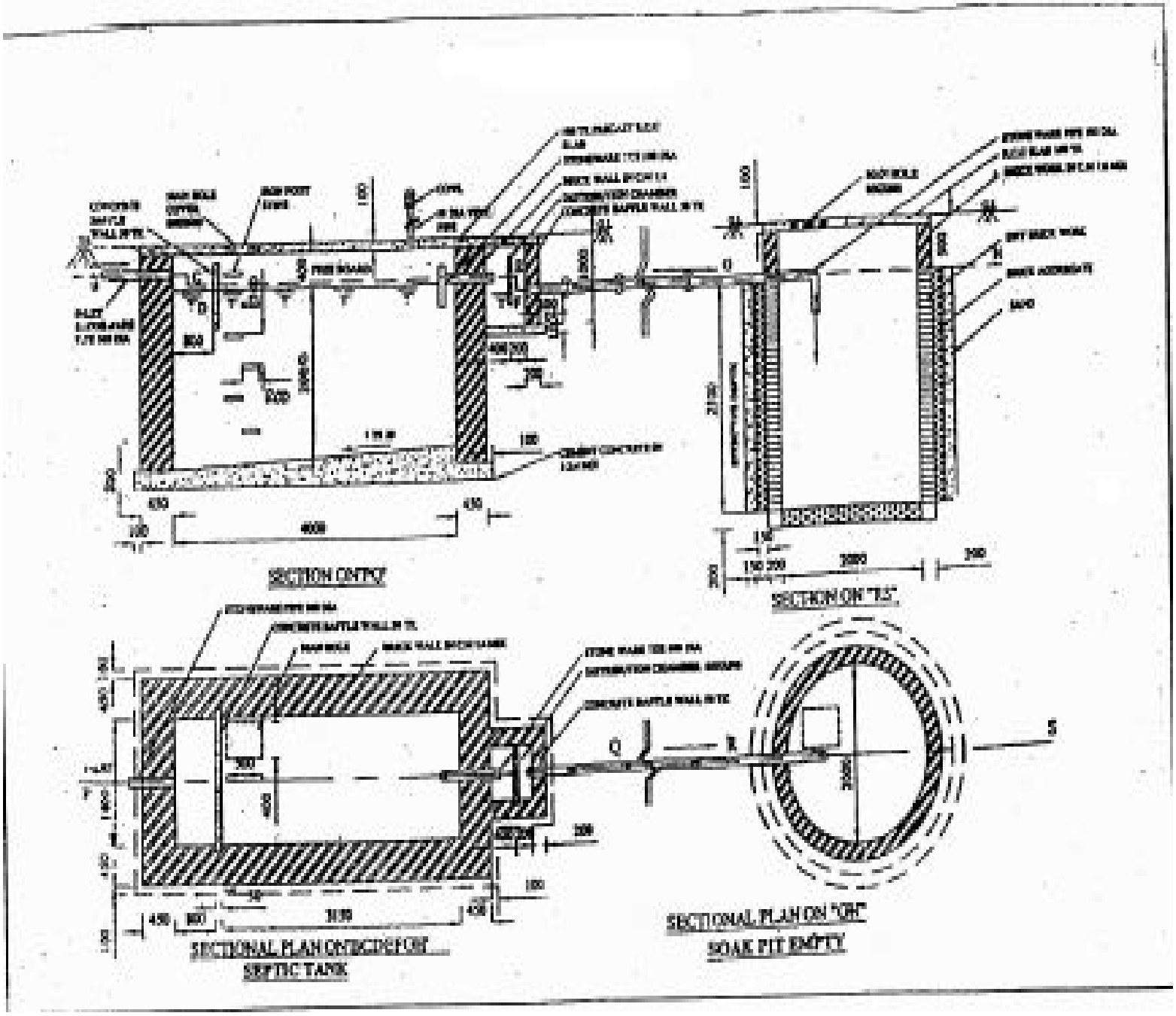
21. (A).Take out the quantities for the following items of "Simple Span Salb culvert by using Trade system.

A) Brick work in C.M 1:4 for abutments, wing walls, parapet walls & Kerb (10)

(OR)

(B). (i) Earthwork excavation for foundation (5)

(ii) R.C.C. 1:2:4 for slab (5)


SECTION ON "PQ"
SECTION ON "RS"
SECTIONAL PLAN ON "OR"
SOAK PIT EMPTY
SECTIONAL PLAN ON "OQ" OF
SEPTIC TANK

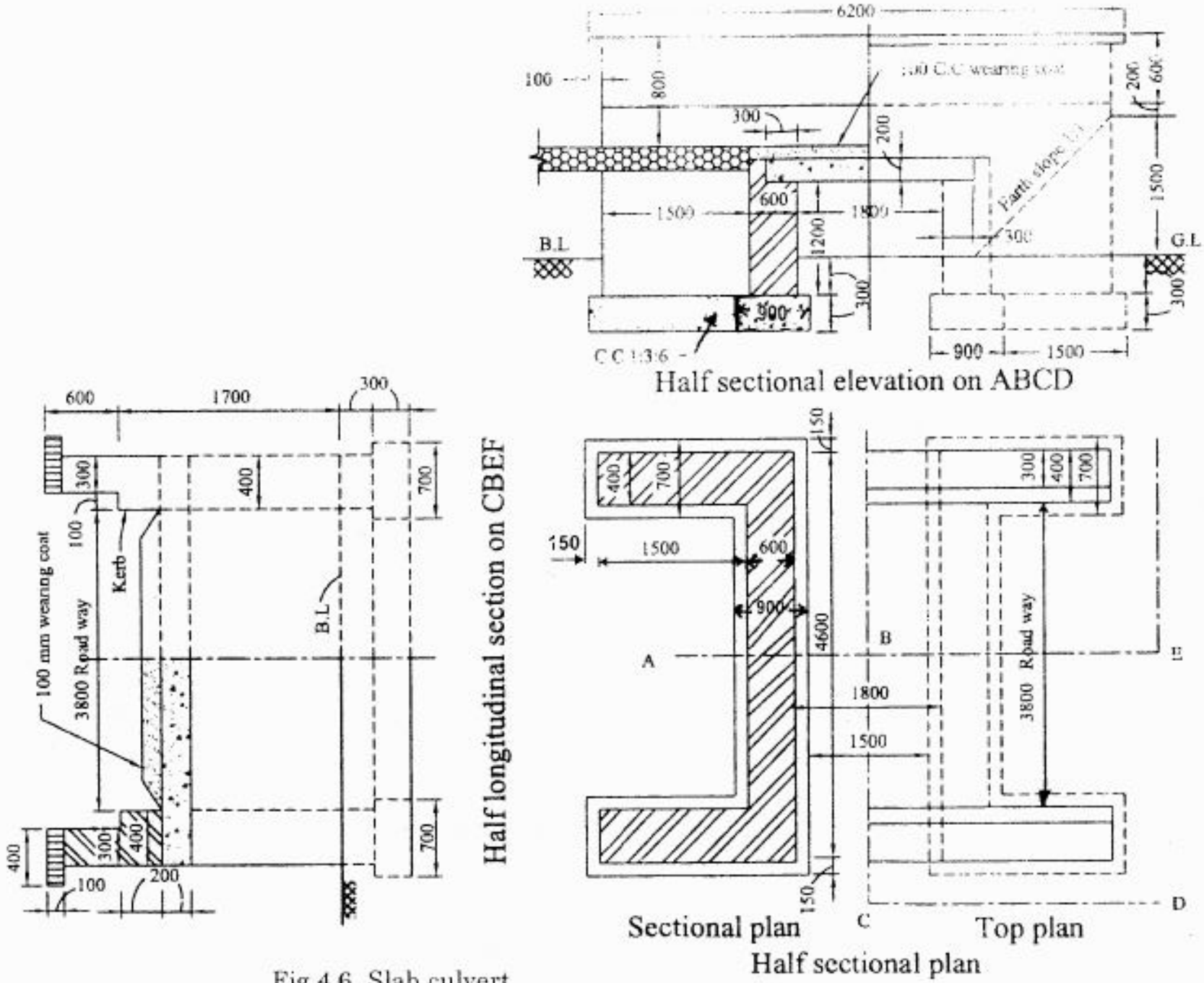


Fig.4.6 Slab culvert

VIRUDHUNAGAR S.VELLAICHAMY NADAR POLYTECHNIC COLLEGE
(AUTONOMOUS)

(Affiliated to Directorate of Technical Education, Chennai-25)

VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE210

Term : VI

Course Name : HYDRAULICS LAB

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
	Hours / Week	Hours / Term	Marks			Duration
			Internal Assessment	End Examination	Total	
HYDRAULICS LAB	3 Hrs.	45 Hrs.	25	75	100	3 Hrs.

Course Outcomes:

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

C210.1	Understand to apply Bernoulli's equation and to determine the co-efficient of discharge of Venturimeter and Orifice meter.
C210.2	Understand and able to determine the co-efficient of discharge of Orifice
C210.3	Understand and able to determine the co-efficient of discharge of Mouthpiece.
C210.4	Understand and able to determine the friction factor and determine the co-efficient of discharge of Notches.
C210.5	Understand and able to determine the characteristic curves of pumps.

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		Linked Expts.	CL	Linked PO	Teaching Hrs
C210.1	Understand to apply Bernoulli's equation and to determine the co-efficient of discharge of Venturimeter and Orifice meter.	***1,2,3***	**R/U**	1,2,4,5,7	12
C210.2	Understand and able to determine the co-efficient of discharge of Orifice	***4,5***	***R/U***	1,2,4,7,	12
C210.3	Understand and able to determine the co-efficient of discharge of Mouthpiece.	***6,7***	***R/U***	1,2,3,4,7	12

C210.4	Understand and able to determine the friction factor and determine the co-efficient of	***8,9***	***R/U***	1,2,4,6,7	12
C210.5	Understand and able to determine the characteristic curves of pumps.	***10,11***	***R/U***	1,2,4,6,7	12

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
HYDRAULICS LAB	**3**	**3**	**1**	**3**	**1**	**2**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

UNIT	NAME OF TOPIC	Time
I	**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.	**60 HOURS**
II	**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	
III	**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	

IV	**Flow through pipes :** 8. Determination of friction factor for the given GI pipe / PVC pipe.	
V	**Flow through notch :** 9.Determination of Co-efficient of Discharge for Rectangular Notch / V-Notch	
VI	**Pumps :** 10. Reciprocating pump – To draw characteristic curves. 11. Centrifugal pump – To draw characteristic curves	

LIST OF EXERCISES

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.
4. Determination of Co-efficient of Discharge by Time fall - Head method Using Orifice
5. Determination of Co-efficient of Discharge by Constant head method Using Orifice
6. Determination of Co-efficient of Discharge by Timing fall in head method Using Mouth Piece
7. Determination of Co-efficient of Discharge by Constant head method Using Mouth Piece
8. Determination of friction factor for the given GI pipe / PVC pipe.
9. Determination of Co-efficient of Discharge for Rectangular Notch / V-Notch
10. Reciprocating pump – To draw characteristic curves.
11. Centrifugal pump – To draw characteristic curves

Content Beyond Syllabus

- **Study of Water meter**

LIST OF EQUIPMENTS

S.No	Equipment	Quantity
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 with accessories	1 No

END EXAMINATION

Note: All the exercises have to be completed. All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitted during examination.

Detailed Allocation of Marks for External Assessment

Sl.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**
5	VIVA	**5**		
	TOTAL	**75**		

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VIRUDHUNAGAR – 626 001

N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE316
Term : VI

Course Name : COMPUTER APPLICATIONS IN CIVIL ENGINEERING

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
COMPUTER APPLICATIONS IN CIVIL ENGINEERING	Hours / Week	Hours / Term	Marks			Duration
	5 Hrs.	75 Hrs.	Internal Assessment	End Examination	Total	3 Hrs.
			25	75	100	

Course Outcomes:

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

C316.1	Use the spreadsheet for solving the analysis of Civil Engineering Problems
C316.2	Use RCC Detailing Software
C316.3	Develop CPM/PERT using software

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		Linked Expts.	CL	Linked PO	Teaching Hrs
C316.1	Use the spreadsheet for solving the analysis of Civil Engineering Problems	1 to 5	*R/U/A*	1,2,3,6	18
C316.2	Use RCC Detailing Software, Analysis Software	6 to 13	*R/U/A*	1,2,3,4,6	30
C316.3	Develop CPM/PERT using software, Aerial map using GIS	14,15	*R/U/A*	1,2,3,6	27

Course-PO Attainment Matrix:

Course Name	Programme Outcomes						
	1	2	3	4	5	6	7
COMPUTER APPLICATIONS IN CIVIL ENGINEERING	**3**	**3**	**3**	**3**	**1**	**3**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- *If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3*
- *If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2*
- *If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1*
- *If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.*

DETAILED SYLLABUS

UNIT	NAME OF TOPIC	Time
I	**PART-A** **ELECTRONIC SPREAD SHEET USING SOFTWARE** Using any one of the available packages mentioned below or any other Suitable package 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	**18 Hours**
II	**PART-B** **RCC DETAILING USING SOFTWARE** Generation of detailed drawings for given specification and Preparation of Bar Bending schedule using one of the packages mentioned below or any other suitable package for the following packages. 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	**30 Hours**

	12. R.C.C Column with square Isolated footing	
III	**RCC STRUCTURES ANALYSIS USING SOFTWARE** 13. Carry out the analysis and design of RCC structures using any one of the available packages mentioned below or any other suitable packages	**15 Hours**
IV	**CONSTRUCTION PROJECT MANAGEMENT USING SOFTWARE** 14. Develop the CPM / PERT Network for the proposed simple building project using one of the available packages mentioned below or any other suitable packages	**7 Hours**
V	**DRAWING MAPS USING GIS SOFTWARE** **(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	**5 Hours**

LIST OF 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

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

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
13. Carry out the analysis and design of RCC structures using any one of the available packages mentioned below or any other suitable packages
14. Develop the CPM / PERT Network for the proposed simple building project using one of the available packages mentioned below or any other suitable packages
15. Develop Aerial map of given area using **any one** of the available packages mentioned below or any other suitable packages

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LIST OF EQUIPMENTS

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

END EXAMINATION

Note: All the exercises have to be completed. 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.

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination.

Detailed Allocation of Marks for External Assessment

Sl.No	Description	Part-A	Part-B
		Max Marks (30)	Max Marks (40)
1	Procedure	5	10
2	Execution	20	20
3	Accuracy of result / Print out	5	10
4	VIVA	**5**	
	TOTAL	**75**	

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N1 - SCHEME

Programme : DIPLOMA IN CIVIL ENGINEERING

Course code : N1CE410

Term : VI Term

Course Name : PROJECT WORK AND SEMINAR

TEACHING AND SCHEME OF EXAMINATION

Number of weeks per Term: 15 weeks

Course	Instructions		Examination			
PROJECT WORK AND SEMINAR	Hours / Week	Hours / Term	Marks			Duration
	4 Hrs.	60 Hrs.	Internal Assessment	End Examination	Total	
			25	75	100	3 Hrs.

Course Outcomes:

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

Seminar:

C410.1	To have an exposure to an innovative area of technology/Information.
C410.2	To develop presentation skills.
C410.3	To develop creative interaction among listeners.

Project work:

C410.1	To develop prototype/model of a product
C410.2	To enhance team spirit and creative talents for achieving a goal.
C410.3	Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment perfectly in an industrial environment
C410.4	Communicate with experts and the community and use their knowledge in developing the project.
C410.5	Analyze the design of the project to ensure it meets the specifications (validate its operational viability)

SEMINAR TOPICS:-

- Human values
- Integrity
- Changing attitude
- Self-Confidence
- Spirituality
- Safety and risk
- Responsibility of engineers
- Types of responsibility
- Environmental Ethics
- Plastic waste disposal
- E-waste disposal
- Semi conductor waste disposal
- Industrial waste disposal
- Human rights
- Human rights of woman
- Status of woman in India
- National Human Right commission constitution
- Intellectual property Right

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 fly ash in concrete

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, fly ash, thermo cool etc) as substitute for Building
- materials
- Low cost Housing
- Rehabilitation of structures

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 Seminar	3rd week	05
First Review	4th week	05
Second seminar	9th week	05
Second review	10th week	05
Attendance		05

Project Review I & II (VI Terms) (5 + 5)	:10 Marks
Seminar I & II (5 + 5) = 10 / 2	: 5 Marks
Project Report	: 5 Marks
Attendance	: 5 Marks
Total	: 25 Marks

Composition of Educational Components:

Minimum marks for pass is 50 out of which minimum 35 marks should be obtained out of 75 marks in the board examinations alone.

END EXAMINATION

External mark for Project work:-

S.No	Criteria Component	MARKS
1	Relevance of topic	10
2	Knowledge of methodology	20
3	Role of individual in the team	10
4	Finding of the study	10
5	Viva-voce	25
TOTAL		75

Rubrics/Criteria for Assessing Student Activities

Dimension	Scale					Student Score (ex)
	Unsatisfactory (1)	Developing (2)	Satisfactory (3)	Good (4)	Exemplary (5)	
Knowledge of Project	not capable	Capable	ok	exactly	well done	3
Basic concept	Poor	Less effective	Partially effective	Exactly	Most Effective	4
Team Work	Poor	Less effective	Partially effective	exactly	Most Effective	3
Workmanship	Poor	Less effective	Partially effective	exactly	Most Effective	3
Presentation	Poor	Less effective	Partially effective	exactly	Most Effective	4
TOTAL MARKS					17/5=3.4	**4**