

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

(Affiliated to Department of Technical Education, Chennai – 25)

VIRUDHUNAGAR – 626001

## **DIPLOMA IN CIVIL ENGINEERING**

### **M10 - SCHEME**

2017 - 2018 onwards

### **OUTCOME BASED EDUCATION**



**ACADEMIC BOARD**  
**V.S.V.N.POLYTECHNIC COLLEGE (AUTONOMOUS)**  
**VIRUDHUNAGAR - 626 001.**

**Thiru.P.Thilagaraj**  
Technical Assistant,  
(Evaluation –I)  
DOTE

**Tmt.M.Usha**  
Principal  
Tamilnadu Polytechnic College  
Madurai

**Thiru. R.Ravisekar**  
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**Thiru. K.Suresh Kumar**  
(Representative of Alumni)

**Er. S.Raja,**  
(Expert from industry)

**Dr.K.Kartheeban**  
(ISTE Nominee)

**Submitted to the Cell Office,**

The enclosed syllabus has been verified and submitted

**CHAIRMAN**  
**Board of Studies**

**PRINCIPAL & CHAIRMAN**  
**Academic Board**

**CHAIRMAN**  
**Governing Council**

**M10 - SCHEME**

**Regulations (MPEC SYSTEM)**

**Diploma Courses in Engineering / Technology**

**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, TamilNadu.

(Or)

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

(Or)

The Matriculation Examination of Tamil Nadu.

(Or)

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

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

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

A pass in HSC ( Academic ) or ( Vocational ) courses mentioned in the Higher Secondary Schools in TamilNadu affiliated to the TamilNadu Higher Secondary Board with eligibility for university Courses of study or equivalent examination, & should have studied the following subjects.

Sl. No	Courses	H.Sc Academic	H.Sc Vocational	
		Subjects Studied	Subjects Studied	
			Related Subjects	Vocational Subjects
1.	All the Regular Diploma Courses	Physics and Chemistry as compulsory subjects along with one of the 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.
- Branch 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.

**7. Description of the Programme :**

The Programme for the full Time Diploma in Engineering and Technology 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 2017 – 2018 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 atleast 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 programmes 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 practical course, 25 marks are allotted for internal assessment and 75 marks are allotted for End Examination. For each theory course, 25 marks are allotted for internal assessment and 100 marks (which will be converted into 75 marks) are allotted for external examination.

## 11. Continuous Internal Assessment:

### D) THEORY

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

<b>Test</b>	-	<b>10 marks</b>
<b>Assignment</b>	-	<b>10 marks</b>
<b>Course Attendance</b>	-	<b>5 marks</b>
		-----
<b>Total</b>		<b>25 marks</b>
		-----

### (i) Test

**10 Marks**

Two Periodical Tests each of two hours duration for total of 70 marks each and Model Examination for three hours duration for 100 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	PORTION	MARKS	DURATION	WHEN TO CONDUCT
Test – I	I & II Unit	70	2 Hrs.	30 working days from Reopening
Test – II	III & IV Unit	70	2 Hrs.	30 working days from first test
Model	All Units	100	3 Hrs.	After Last Working Day

**Question Paper Pattern for Periodical Test I & II and Model Exam for all papers except for Civil Engineering Drawing I, Civil Engineering Drawing II, Design of Machine Elements in Mechanical Engineering & Electrical Estimation in Electrical and Electronics Engineering**

### a) Question Paper Pattern for Periodical Test: (Test – I & Test – II)

#### With No Choice:

Part – A	10 Questions	10 x 1	-----	10 marks
Part – B	4 Questions	4 x 5	-----	20 marks
Part – C	4 Questions	4 x 10	-----	40 marks
				-----
			Total	70 marks
				-----

### b) Question Paper Pattern for Model Exam:

Part – A	15 Questions (Any 10)	10 x 1	-----	10 marks
Part – B	10 Questions (Any 6)	6 x 5	-----	30 marks
Part – C	10 Questions (Any 6)	6 x 10	-----	60 marks
				-----
			Total	100 marks
				-----

## For Diploma in Modern office practice

### a) Question Paper Pattern for Periodical Test: (Test – I & Test – II)

#### With No Choice:

Part – A	10 Questions	10 x 1	-----	10 marks
Part – B	4 Questions	4 x 5	-----	20 marks
Part – C	4 Questions	4 x 10	-----	40 marks
				-----
			Total	70 marks
				-----

### b) Question Paper Pattern for Model Exam:

As per Syllabus book

### (ii) Assignment

**10 Marks**

For each course, three Assignments are to be given each for 20 marks and the total marks scored should be converted for 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 will be as per the range given below.

#### Attendance mark reference table

Range of Marks	Marks
80% - 84%	2
85% - 89%	3
90% - 94%	4
95% - 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.

## ID PRACTICAL / DRAWING

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

a) Observation and Exercise	:	10 Marks
b) Model Practical Examination (1&2) (5+5)	:	10 Marks
c) Attendance	:	5 Marks
		-----
Total	:	25 Marks
		-----

- Two model exams should be conducted one in each cycle and each converted to 5 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 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. Communication and Life Skills Practical:**

The Communication and life skills practical with more emphasis is being introduced in IV term for Diploma in Electrical and Electronics Engineering, Electronics and Communication Engineering, Garment Technology, Computer Engineering and Plastic Technology and in V term for Diploma in Civil Engineering, Mechanical Engineering, Modern Office Practice branches. Much stress is given to increase the employability of students.

#### Calculation of Internal Marks:

Record for Communication skills exercises	-	10 Marks
Life skills Assignment	-	10 Marks
Attendance (As per attendance reference table)	-	5 Marks
		-----
Total	-	25 Marks
		-----

### **13. Project Work and Seminar:**

The students of all the Diploma Programmes have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, 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 4<sup>th</sup> and 10<sup>th</sup> week of VI Term.**

#### **a) Internal assessment marks for Project Work:**

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 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.

#### **14. 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.

#### **15. 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/ Drawing course 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 40 marks out of 100 marks in the End Theory and a minimum of 35 marks out of 75 marks** in the End Practical Examinations.

#### **16. Classification of successful candidates:**

Classification of candidates who pass out the final examinations from April 2020 onwards (joined in first year 2017-2018) 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**.

#### **17. 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).

**Question pattern for Civil Engineering Drawing-I in Civil Engineering**

a) **Question Paper Pattern for Periodical Test: (Test – I & Test – II)**

**With No Choice**

<b>Part – A</b>	2 Question x 5 marks	-	10 marks
<b>Part – B</b>	1 Question x 60 marks	-	60 marks
		Total	70 marks

b) **Question Paper Pattern for Model Exam:**

<b>Part – A</b>	2 Question x 5 marks	-	10 marks
	1 Question x 15 marks	-	15 marks
<b>Part – B</b>	1 Question x 75 marks	-	75 marks
		Total	100 marks

**Question pattern for Civil Engineering Drawing-II in Civil Engineering**

a) **Question Paper Pattern for Periodical Test: (Test – I & Test – II)**

**With No Choice**

<b>Part – A</b>	1 Question x 70 marks	-	70marks
		Total	70 marks

b) **Question Paper Pattern for Model Exam:**

<b>Part – A</b>	2 Questions (Any one) 1x 100 marks	-	100marks
		Total	100 marks

**Question pattern for Design of Machine Elements in Mechanical Engineering**

a) **Question Paper Pattern for Periodical Test: (Test – I & Test – II)  
With No Choice**

<b>Part – A</b>	1 Question x 10 marks	-	10 marks
<b>Part – B</b>	3 Questions x 20 marks	-	60 marks
		Total	70 marks

b) **Question Paper Pattern for Model Exam:**

8 Questions ( Any five)	5 x 20 marks	-	100 marks
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**Question pattern for Electrical Estimation in Electrical & Electronics Engineering**

a) **Question Paper Pattern for Periodical Test: (Test – I & Test – II)  
With No Choice**

<b>Part – A</b>	10 Questions	10 x 1	-----	10 marks
<b>Part – B</b>	6 Questions	6 x 5	-----	30 marks
<b>Part – C</b>	3 Questions	3 x 10	-----	30 marks
			Total	70 marks

b) **Question Paper Pattern for Model Exam**

<b>Part – A</b>	15 Questions (Any 10)	10 x 1	-----	10 marks
<b>Part – B</b>	9 Questions (Any 6)	6 x 5	-----	30 marks
<b>Part – C</b>	6 Questions (Any 3)	3 x 10	-----	30 marks
<b>Part – D</b>	1 Question in ‘either’ ‘or’ pattern	1 x 30	-----	30 marks
			Total	100 marks

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### ***INSTITUTE VISION***

To be an institute of excellence in Technical Education and Training individuals focusing on the needs of the Nation and Society in tune with Technological Developments.

### ***INSTITUTE MISSION***

Our Mission is to produce Disciplined and Quality Technocrats through Academic Programme of noted excellence to serve the Society.

### ***DEPARTMENT VISION***

To be a Department of excellence in Civil engineering 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 Technocrats through Civil Engineering Programme of noted excellence to serve the Society.

### **PEO's:**

1. **Adaptability to Technological changes:** Disciplined and quality Civil Engineering Technocrats with academic program of noted excellence will adopt with technological changes.
2. **Employability:** Technocrats with high skill sets in tune with technological developments will get employed in core industries.
3. **Entrepreneur:** Technocrats with excellence in technical education will become an entrepreneur in the field of Civil Engineering to serve the society.

### **PROGRAMME OUTCOMES (Pos)**

1. **Basic knowledge:** An ability to apply the knowledge of mathematics, science, engineering to solve the engineering problems.
2. **Discipline Knowledge:** An ability to apply Civil Discipline knowledge to solve core and applied Engineering Problems.
3. **Experiments and Practice:** An ability to plan and perform experiments and practices and to use the result to solve engineering problems.
4. **Engineering Tools:** Apply appropriate technology and tools with the understanding of limitations.
5. **The engineer and society:** Demonstrate knowledge to access societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
6. **Environment and sustainability:** Understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
7. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
8. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.
9. **Communication:** An ability to communicate effectively.
10. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

**Program Specific Outcomes:**

**PSO1:** Function as Design Consultants in construction industry for the design of Civil Engineering Structures.

**PSO2:** Provide Sustainable Solutions to the Civil Engineering problems.

**MAPPING OF PEO's WITH PO's**

Program Educational Objects(PEO's)	Program Outcomes									
	1	2	3	4	5	6	7	8	9	10
Adaptability to Technological	X	X	X							X
Employability	X	X	X	X				X	X	X
Entrepreneur					X	X	X	X	X	X

**LEGEND X: Linked**

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**(AUTONOMOUS)**  
**VIRUDHUNAGAR**  
**PROGRAMME: CIVIL ENGINEERING**  
**LIST OF COURSES**

**I FOUNDATION COURSES**

Course Code	Name of the course	Credits	Prerequisites
M10BE101	Communication English-I	2	-
M10BE102	Engineering Mathematics	5	-
M10BE103	Engineering Physics – I	3	-
M10BE104	Engineering Chemistry– I	3	-
M10BE105	Engineering Drawing	4	-
M10BE106	Engineering Physics & Solar Physics Practical – I	1	-
M10BE107	Engineering Chemistry & Nano Science Practical-I	1	-
M10BE108	Computer applications Practical	1	-
M10BE109	Communication English – II	2	M10BE101
M10BE110	Applied Mathematics	5	M10BE102
M10BE111	Engineering Physics – II	3	M10BE103
M10BE112	Engineering Chemistry – II	3	M10BE104
M10BE113	Engineering Physics & Solar Physics practical – II	1	M10BE106
M10BE114	Engineering Chemistry & Nano science Practical - II	1	M10BE107
M10BE115	Computer Aided Drafting Practical	2	M10BE105
M10BE116	Workshop Practice	1	-
Total Credits		38(23.00%)	

**II CORE COURSES**

Course Code	Name of the course	Credits	Prerequisites
M10CE201	Basics of Civil Engineering Materials-I	4	-
M10CE202	Construction practical – I	2	-
M10CE203	Basics of Civil Engineering Materials-II	4	M10CE201
M10CE204	Construction practical – II	2	M10CE203
M10CE212	Engineering Mechanics	6	M10BE102
M10CE205	Construction Techniques, Equipment And Practice	5	-
M10CE206	Surveying I	5	-
M10CE207	Estimating and Costing I	5	-
M10CE208	Hydraulics	6	-
M10CE209	Civil Engineering Drawing I	4	M10BE105
M10CE210	Surveying Practice I	4	M10CE 206
M10CE211	Communication and Life Skill Practical	2	-
Total Credits		49(29.70%)	

### III APPLIED COURSES

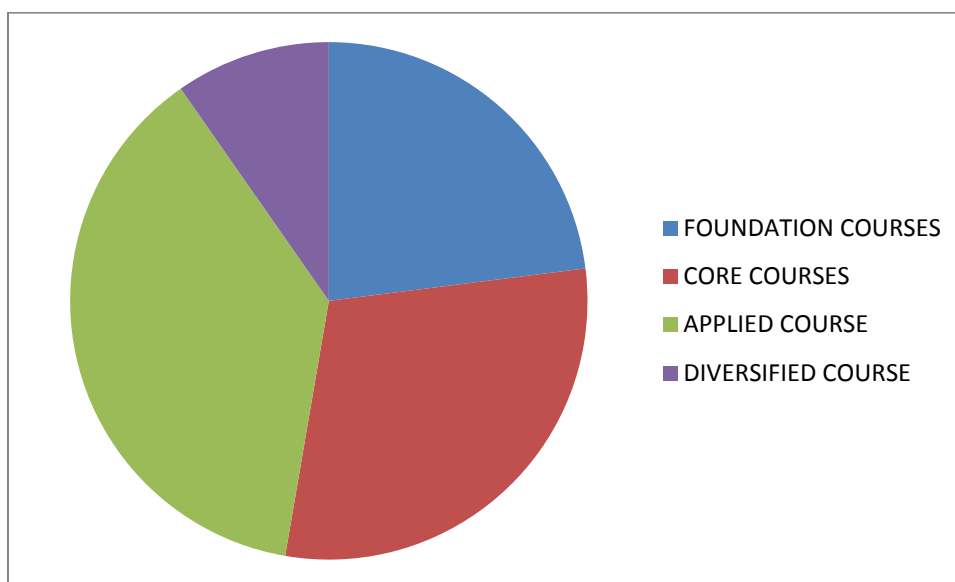
Course Code	Name Of the Course	Credits	Prerequisite
M10CE301	Theory of Structures	6	M10CE 212
M10CE302	Transportation Engineering	5	-
M10CE303	Surveying-II	5	M10CE 206
M10CE304	Structural Engineering	6	M10CE 301
M10CE305	Environmental Engineering & Pollution Control	5	-
M10CE306	Construction Management with MIS	5	-
M10CE307	Estimating and Costing II	5	M10CE 207
M10CE308	Material Testing Lab & Plumbing practices	2	M10CE 212
M10CE309	Material Testing Lab II	2	M10CE 302
M10CE310	Surveying Practice II	4	M10CE 210
M10CE311	CAD in Civil Engineering Drawing I	3	M10CE 209
M10CE312	Civil Engineering Drawing II	4	M10CE 209
M10CE313	Construction Practice Lab	2	M10CE 205
M10CE314	CAD in Civil Engineering Drawing II	3	M10CE 312
M10CE315	Hydraulics Lab	2	M10CE 208
M10CE320	Computer Application in Architecture	3	-
	Total	62 (37.60%)	

### IV DIVERSIFIED COURSES

Course Code	Name Of the Course	Credits	Prerequisite
	<b>Elective Theory – I</b>		
M10CE401	a) Water Resources Management	5	M10CE 208
M10CE402	b) Applications of GIS in Civil Engineering		M10CE 303
M10CE403	c) Building Services and Solar Energy for Buildings		-
M10CE404	d) Soil Mechanics and Foundation Engineering		-
	<b>Elective Theory – II</b>		
M10CE405	a) Advanced Construction Technology and Nano Technology	5	M10CE201, M10CE203, M10CE205
M10CE406	b) Town Planning and High rise Structures		-
M10CE407	c) Steel Structures		M10CE304
M10CE408	d) Earthquake Engineering		-
M10CO400	e) Nano And Solar Engineering		-
M10CE416	<b>Elective practical</b>	2	M10CE 311
M10CO401	a) Computer Applications in Civil Engineering b) Nano And Solar Engineering Practical		-
M10CE410	Project Work and seminar	4	M10CE 304, M10CE 307
	Total	16 (9.7%)	

**MPEC SYSTEM**  
**COURSEWISE CREDITS**

NAME OF COURSE	CREDITS	Percentage (%)
FOUNDATION COURSES	38	23
CORE COURSES	49	29.70
APPLIED COURSES	62	37.60
DIVERSIFIED COURSES	16	9.7
<b>Total Credits</b>	<b>165</b>	<b>100</b>



**TERMWISE CREDITS**

Year/Term	Credits	Percentage (%)
I YEAR	50	30.3
III TERM	29	17.6
IV TERM	30	18.1
V TERM	27	16.4
VI TERM	29	17.6
<b>Total Credits</b>	<b>165</b>	<b>100</b>

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**CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS**

**BASIC ENGINEERING – M10 SCHEME**

**I TERM**

Course Code	Course Name	Col No	Hours Per week			Credits	Duration of Exam in hrs	Marks			Min. marks for pass
			Theory	Drawing	Tutorial/ Practical			Int.	Ext	Total	
M10BE101	Communication English-I	1	4	-	-	2	3	25	75	100	40
M10BE102	Engineering Mathematics	2	5	-	-	5	3	25	75	100	40
M10BE103	Engineering Physics – I	3	3	-	-	3	3	25	75	100	40
M10BE104	Engineering Chemistry– I	4	3	-	-	3	3	25	75	100	40
M10BE105	Engineering Drawing	5	-	2	4	4	3	25	75	100	40
M10CE201	Basics of civil Engineering materials -I	6	4			4	3	25	75	100	40
M10BE106	Engineering Physics & Solar Physics Practical - I	7	-	-	2	1	3	25	75	100	50
M10BE107	Engineering Chemistry & Nano Science Practical-I	8	-	-	2	1	3	25	75	100	50
M10BE108	Computer applications Practical	9	-	-	2	1	3	25	75	100	50
M10CE202	Construction practical - I	10	-	-	4	2	3	25	75	100	50
	<b>Total</b>		<b>19</b>	<b>2</b>	<b>14</b>	<b>26</b>		<b>250</b>	<b>750</b>	<b>1000</b>	<b>-</b>

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CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS

**BASIC ENGINEERING – M10 SCHEME**

**II TERM**

Course Code	Course Name	Col No	Hours Per week			Credits	Duration of Exam in hrs	Marks			Min. marks for pass
			Theory	Drawin g	Tutorial Practical			Int	Ext	Total	
M10BE109	Communication English – II	1	4	-	-	2	3	25	75	100	40
M10BE110	Applied Mathematics	2	5	-	-	5	3	25	75	100	40
M10BE111	Engineering Physics – II	3	3	-	-	3	3	25	75	100	40
M10BE112	Engineering Chemistry – II	4	3	-	-	3	3	25	75	100	40
M10CE203	Basics of civil Engineering materials –II	5	4	-	-	4	3	25	75	100	40
M10BE113	Engineering Physics & Solar Physics practical - II	6	-	-	2	1	3	25	75	100	50
M10BE114	Engineering Chemistry & Nano science Practical - II	7	-	-	2	1	3	25	75	100	50
M10BE115	Computer Aided Drafting Practical	8	-	2	3	2	3	25	75	100	50
M10BE116	Workshop Practice	9	-	-	3	1	3	25	75	100	50
M10CE204	Construction Practical –II	10	-	-	4	2	3	25	75	100	50
<b>Total</b>			<b>19</b>	<b>2</b>	<b>14</b>	<b>24</b>	<b>-</b>	<b>250</b>	<b>750</b>	<b>1000</b>	<b>-</b>

## CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS

### DIPLOMA IN CIVIL ENGINEERING

#### III TERM

Column No.	Course Code	Course Name	Hours Per Week			Credits	Duration of Exam (Hrs)	Examination Marks			Minimum Marks for Pass
			Theory	Tutorial Practical	Drawing			Int	Ext	Total	
1	M10CE212	Engineering Mechanics	6	-	-	6	3	25	75	100	40
2	M10CE205	Construction Techniques, Equipment And Practice	5	-	-	5	3	25	75	100	40
3	M10CE206	Surveying I	5	-	-	5	3	25	75	100	40
4	M10CE209	Civil Engineering Drawing I	-	-	5	4	3	25	75	100	40
5	M10CE308	Material Testing Lab & Plumbing practices	-	3		2	3	25	75	100	50
6	M10CE210	Surveying Practice I	-	6	-	4	3	25	75	100	50
7	M10CE311	CAD in Civil Engineering Drawing I	-	5	-	3	3	25	75	100	50
		<b>TOTAL</b>	<b>16</b>	<b>14</b>	<b>5</b>	<b>29</b>		<b>175</b>	<b>525</b>	<b>700</b>	<b>-</b>

**CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS****DIPLOMA IN CIVIL ENGINEERING****IV TERM**

Column No.	Course Code	Course Name	Hours Per Week		Credits	Duration of Exam (Hrs)	Examination Marks			Minimum Marks for Pass
			Theory	Tutorial Practical			Int	Ext	Total	
1	M10CE301	Theory of Structures	6	-	6	3	25	75	100	40
2	M10CE302	Transportation Engineering	5	-	5	3	25	75	100	40
3	M10CE303	Surveying II	5	-	5	3	25	75	100	40
4	M10CE207	Estimating and Costing I	5	-	5	3	25	75	100	40
5	M10CE309	Material Testing Lab II	-	3	2	3	25	75	100	50
6	M10CE310	Surveying Practice II	-	6	4	3	25	75	100	50
7	M10CE320	Computer Application in Architecture	-	5	3	3	25	75	100	50
		<b>TOTAL</b>	<b>21</b>	<b>14</b>	<b>30</b>	<b>-</b>	<b>175</b>	<b>525</b>	<b>700</b>	<b>-</b>

**CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS**

**DIPLOMA IN CIVIL ENGINEERING**

**V TERM**

Column No.	Course Code	Course Name	Hours Per Week				Credits	Duration of Exam (Hrs)	Examination Marks			Minimum Marks for Pass
			Theory	Tutorial Practical	Drawing	Int			Ext	Total		
1	M10CE304	Structural Engineering	6	-	-	6	3	25	75	100	40	
2	M10CE305	Environmental Engineering and Pollution Control	5	-	-	5	3	25	75	100	40	
3	M10CE401	<b><u>Elective Theory –I</u></b> a)Water Resources Management	5	-	-	5	3	25	75	100	40	
	M10CE402	b) Applications of GIS in Civil Engineering		-	-						40	
	M10CE403	c)Building Services and Solar energy for Buildings		-	-						40	
	M10CE404	d) Soil Mechanics and Foundation Engineering		-	-						40	
4	M10CE312	Civil Engineering Drawing II	-	-	6	4	3	25	75	100	40	
5	M10CE313	Construction Practice Lab	-	4	-	2	3	25	75	100	50	
6	M10CE314	CAD in Civil Engineering Drawing II	-	5	-	3	3	25	75	100	50	
7	M10CE211	Communication and Life Skill Practical	-	4	-	2	3	25	75	100	50	
		<b>TOTAL</b>	<b>16</b>	<b>13</b>	<b>6</b>	<b>27</b>		<b>175</b>	<b>525</b>	<b>700</b>	<b>-</b>	

**CURRICULUM OUTLINE AND SCHEME OF EXAMINATIONS**

**DIPLOMA IN CIVIL ENGINEERING**

**VI TERM**

Column No.	Course Code	Course Name	Hours Per Week		Credits	Duration of Exam (Hrs)	Examination Marks			Minimum Marks for Pass
			Theory	Tutorial Practical			Int	Ext	Total	
1	M10CE306	Construction Management with MIS	5	-	5	3	25	75	100	40
2	M10CE208	Hydraulics	6	-	6	3	25	75	100	40
3	M10CE405	<b><u>Elective Theory – II</u></b> a)Advanced Construction Technology and Nano Technology	5	-	5	3	25	75	100	40
	M10CE406	b)Town Planning and High rise Structures		-						40
	M10CE407	c)Steel Structures		-						40
	M10CE408	d) Earthquake Engineering		-						40
	M10CO400	e)Nano And Solar Engineering		-						40
4	M10CE307	Estimating and Costing II	5	-	5	3	25	75	100	40
5	M10CE315	Hydraulics Lab	-	4	2	3	25	75	100	50
6	M10CE416	<b><u>Elective practical</u></b> a)Computer Applications in Civil Engineering	-	5	2	3	25	75	100	50
	M10CO401	b)Nano And Solar Engineering Practical	-							50
7	M10CE410	Project Work and seminar	-	5	4	3	25	75	100	50
	<b>TOTAL</b>		<b>21</b>	<b>14</b>	<b>29</b>	<b>21</b>	<b>175</b>	<b>525</b>	<b>700</b>	<b>-</b>

## COURSE PREREQUISITIES FOR THE CURRICULUM OF DEPARTMENT OF CIVIL ENGINEERING

I Term	II Term	III Term	IV Term	V Term	VI Term
Communication English-I	Communication English – II	Engineering Mechanics	Theory of Structures	Structural Engineering	Construction Management with MIS
Engineering Mathematics	Applied Mathematics	Construction Techniques, Equipment And Practice	Transportation Engineering	Environmental Engineering and Pollution Control	Hydraulics
Engineering Physics – I	Engineering Physics – II	Surveying I	Surveying II	<b>Elective Theory – I</b> a) Water Resources Management	<b>Elective Theory – II</b> a) Advanced Construction Technology and Nano Technology
Engineering Chemistry– I	Engineering Chemistry – II	Civil Engineering Drawing I	Estimating and Costing I	b) Applications of GIS in Civil Engineering	b) Town Planning and High rise Structures
Engineering Drawing	Basics of civil Engineering materials –II	Material Testing Lab & Plumbing practices	Material Testing Lab II	c) Building Services and Solar energy for Buildings	c) Steel Structures
Basics of civil Engineering materials - I	Engineering Physics & Solar Physics practical - II	Surveying Practice I	Surveying Practice II	d) Soil Mechanics and Foundation Engineering	d) Earthquake Engineering
Engineering Physics & Solar Physics Practical - I	Engineering Chemistry & Nano science Practical - II	CAD in Civil Engineering Drawing I	Computer Application in Architecture	Civil Engineering Drawing II	e) Nano And Solar Engineering
Engineering Chemistry & Nano Science Practical-I	Computer Aided Drafting Practical			Construction Practice Lab	Estimating and Costing II
Computer applications Practical	Workshop Practice			CAD in Civil Engineering Drawing II	Hydraulics Lab
Construction practical - I	Construction Practical –II			Communication and Life Skill Practical	<b>Elective practical</b> a) Computer Applications in Civil Engineering
					b) Nano And Solar Engineering Practical
					Project Work and seminar



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**III TERM**

**2017 –2018 onwards**

**M10CE212 – ENGINEERING MECHANICS**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering**

To be implemented for the student admitted on the year 2017-2018

Programme	: Civil Engineering	Type of course	: Theory
Course Title	: <b>Engineering Mechanics</b>	Course Code	: M10CE212
Term	: <b>III</b>	Course Group	: <b>Core</b>
Teaching Scheme (L:T:P)	: <b>6:0:0</b> (in Hours)	Credits	: <b>6 Credits</b>
No of weeks per term	: 15	Total Contact Hours	: <b>90</b>
CIE	: <b>25Marks</b>	TEE	: <b>100 Marks</b>

**Pre-requisites** : Knowledge of basic Mathematics and Science

**Course Topics:**

Unit No	Unit Name	Hours
I	SIMPLE STRESSES AND STRAINS	20
II	SHEAR FORCE AND BENDING MOMENT	18
III	GEOMETRICAL PROPERTIES OF SECTIONS	16
IV	STRESSES IN BEAMS AND SHAFTS	18
V	PIN JOINTED FRAMES	18
	<b>Total</b>	<b>90</b>

**Course Outcomes:**

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

C.212.1 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.

C.212.2 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,.

C.212.3 Compute geometrical properties of the sections knowing the importance of geometry in structural engineering.

C.212.4 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.

C.212.5 Analysis of perfect frames for vertical loads by analytical as well as graphical methods.

**Course Outcome linkage to Cognitive Level**

**COGNITIVE LEVEL LEGEND- R; REMEMBER U: UNDERSTAND, AP: APPLICATION AY: ANALYSIS C: CREATION,**

Course Outcome		CL	Linked PO	Teaching Hrs
C. 212.1	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
C. 212.2	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
C. 212.3	Compute geometrical properties of the sections knowing the importance of geometry in structural engineering.	R/U/A	1,2,6,7	16
C. 212.4	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
C. 212.5	Analysis of perfect frames for vertical loads by analytical methods	R/U/A	1,2,3,4	18
<b>Total sessions</b>				<b>90</b>

**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	33	3	10	20	20
II	SHEAR FORCE AND BENDING MOMENT	18	33	3	10	20	20
III	GEOMETRICAL PROPERTIES OF SECTIONS	16	33	3	10	20	20
IV	STRESSES IN BEAMS AND SHAFTS	18	33	3	10	20	20
V	PIN JOINTED FRAMES	18	33	3	10	20	20
	<b>Total</b>	<b>90</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
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.*

**Course Content:**

**ENGINEERING MECHANICS**

**DETAILED SYLLABUS**

**UNIT-I SIMPLE STRESSES AND STRAINS**

**20 Hours**

**1.1 INTRODUCTION TO STRESSES AND STRAINS**

Definitions of Force, Moment of force, Actions and reactions, Statics, Static equilibrium of bodies, Mechanics, Engineering Mechanics - Conditions of static equilibrium - Types of forces on structural members - Study of strength of material - Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability - Definitions of stress and strain - Types of stresses - Tensile, Compressive and Shear stresses - Types of strains - Tensile, Compressive and Shear strains - Elongation and Contraction - Longitudinal and Lateral strains - Poisson’s Ratio - Volumetric strain - Simple problems in computation of stress, strain, Poisson’s ratio, change in dimensions and volume etc-Hooke’s law - Elastic Constants - Definitions of: Young’s Modulus of Elasticity – Shear modulus (or) Modulus of Rigidity – Bulk Modulus - Relationship between elastic constants (Derivations not necessary) - Simple problems - Young’s modulus values of few important engineering materials.

**1.2 APPLICATION OF STRESS AND STRAIN IN ENGINEERING FIELD**

Behaviour of ductile and brittle materials under direct loads – Load Extension curve (or) Stress Strain curve of a ductile material - Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress, Actual / Nominal stresses - Working stress - Factor of safety – Percentage elongation - Percentage reduction in area - Significance of percentage elongation and reduction in area of cross section - Deformation of prismatic and stepped bars due to uniaxial load - Deformation of prismatic bars due to its self weight - Numerical problems. Composite Sections – Examples of composite sections in Engineering field- Advantages - Assumptions made – Principles of analysis of Composite sections - Modular ratio – Equivalent area (No Problems)

**UNIT-II SHEAR FORCE AND BENDING MOMENT****18 Hours****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 )

**UNIT-III GEOMETRICAL PROPERTIES OF SECTIONS****16 Hours****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.

**UNIT-IV STRESSES IN BEAMS AND SHAFTS****18 Hours****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

**UNIT-V PIN JOINTED FRAMES**

**18 Hours**

**5.1 ANALYSIS BY ANALYTICAL METHOD ( METHOD OF JOINTS )**

Definitions of: Frame / Truss, Pin Joint, Nodes, Rafters, Ties, Struts, Slings - Determinate and indeterminate frames - Classification of frames – Perfect and imperfect frames – Deficient / Instable and redundant frames -Formulation of a perfect frame - Common types of trusses – Support conditions – Resolution of a force - Designation of a force - Nature of forces in the frame members - Analysis of Frames – Assumptions - Methods of analysis - Analytical methods - Method of Joints and Method of Sections - Problems on Analysis of cantilever and simply supported perfect frames ( with not more than ten members ) with vertical nodal loads by method of joints only. Identification of members with nil force in a determinate truss.

**5.2 ANALYSIS BY TENSION COEFFICIENT METHODS**

Space frame-tension coefficient- tension coefficient method applied to space frames.

**Text Books:**

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.,

**E-Resources**

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	<b>What</b>		<b>To Whom</b>	<b>Frequency</b>	<b>Max Marks</b>	<b>Evidence Collected</b>	<b>Course Outcomes</b>
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE</b> (Term End Examination)	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires	1 to5 Effectiveness of Delivery of instructions & Assessment Methods	

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	30	50
3	Application	61	100
<b>Total</b>		<b>100</b>	<b>165</b>

VSVNPC

**MODEL QUESTION**

Term	: <b>III</b>	Time	: <b>3 Hrs</b>
Programme	: <b>Diploma in Civil Engineering</b>	Max. Marks	: <b>100</b>
Course	: <b>Engineering Mechanics</b>	Course Code	: <b>M10CE212</b>

**PART – A**

**(10 x 1 = 10)**

**Answer any TEN questions .Each carries one marks.**

1. Define the term “Ductility”
2. Name the three types of basic stresses.
3. State Hooke’s law.
4. Write examples of an uniformly distributed load and a point load with respect to beams.
5. When a support is called “fixed”?
6. How we call the point of zero bending moment in a beam?
7. What principle is applied in the determination of position of centroid of a section?
8. What is meant by centroidal axis?
9. State perpendicular axes theorem.
10. What will be the magnitude of bending stress at the centroidal axis of section due to flexure?
11. Write the relationship between E, R, I and M with respect to a beam.
12. Where the stress due to torque will be maximum in the cross section of a shaft?
13. Write the condition for perfect frame.
14. When the joint of a frame is called a “pin joint”?
15. When you draw a “polar diagram”?

**PART-B**

**(6 x 5=30)**

**Answer any SIX questions. Each carries five marks.**

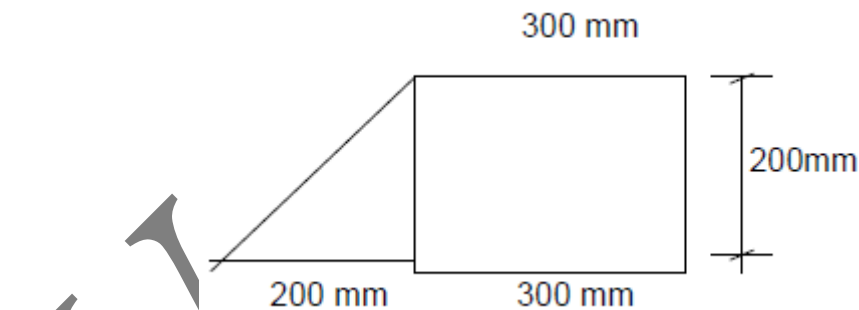
16. Draw the load extension curve or stress-strain curve for mild steel.
17. What are the assumptions made in a composite section?
18. Derive the relationship between SF and BM.
19. What are advantages of overhanging beam?
20. Draw any four-unsymmetrical section and show their centroidal positions therein?
21. Distinguish between section modulus and polar modulus .
22. Draw structural members subjected to twisting moment.
23. Compare flexural rigidity and torsion rigidity .
24. What are steps to be followed for the analysis of method of joints.
25. What is mean by space frame?

## PART – C

(6 x 10 =60)

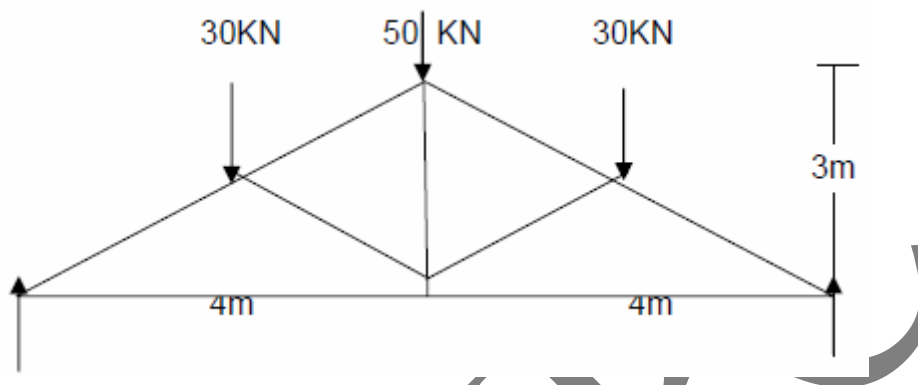
Answer any SIX questions .Each carries ten marks.

26. A bar of 12 mm diameter extends 1.0mm in 500 mm length under an axial tension of 26kN. Find the Young's modulus of the material.
27. Drive an expression for the volumetric strain of a prismatic bar due to uni-axial stress, assuming load as P, length of bar as L, area of cross section as A, modulus of elasticity as E and Poisson's ratio of the material as "Y". Now determine the change in volume of the bar if P=15 kN; L=1.2 m; A=300 mm<sup>2</sup>; E= 2.1x10<sup>5</sup> MPa and  $\nu = 0.3$ .
28. Simply supported beam of 12m span carries two point loads of 25kN and 40kN at 5m and 8m respectively from the left support in addition to its self weight of 2kN/m. Draw the SF and BM diagrams for the beam.
29. An overhanging beam of 8 metre length is supported at its left end and at 2m from its right end. The supported length of the beam carries an udl of 24 kN/m. A point load of 30kN is acting at the right end. Draw the SF and BM diagrams for the beam.
30. Find the position of centroid of the trapezium shown in the figure (direct formula shall not be used)

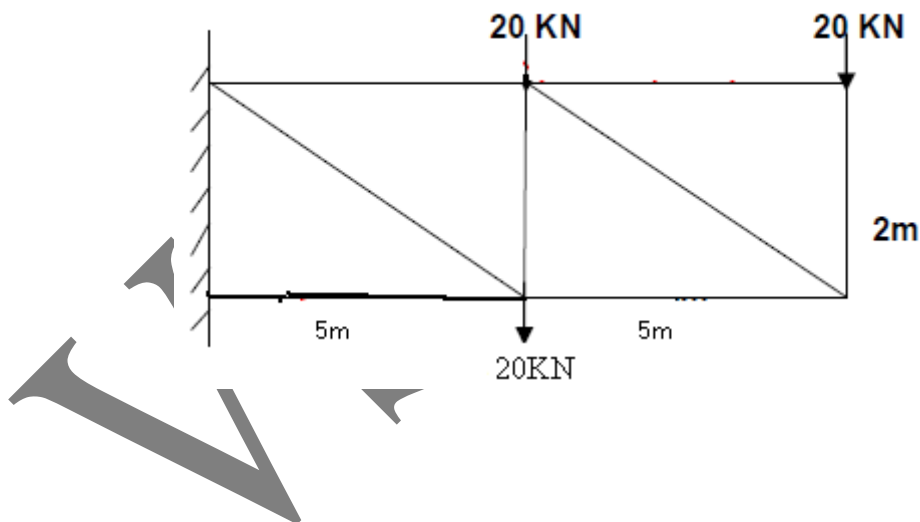


31. An I Section of top flange 200x12 mm, bottom flange 400x16mm has its clear web size 572x10mm, symmetrically placed, so that its overall depth is 600mm. Find the moment of inertia of the section about its major axis.
32. Derive the bending equation.
33. Determine the maximum power a hollow circular shaft of 120mm external diameter and 60mm internal diameter can transmit at a speed of 240 rpm if the shear stress in the shaft shall not exceed 80 N/mm<sup>2</sup>. Assume maximum torque as 1.25 times the mean torque.

34. Determine the magnitude and nature of the forces in all the members of the truss shown in the sketch by method of joints. (Any frame having less than 10 members)



35. Determine the forces in the members of the cantilever frame shown in the sketch by graphical method. (Any frame having less than 10 members)





**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**III TERM**

**2017 –2018 onwards**

**M10CE205 – CONSTRUCTION TECHNIQUES,  
EQUIPMENT AND PRACTICE**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering**

To be implemented for the student admitted on the year 2017-2018

Programme : Civil Engineering	Type of course : Theory
Course Title : <b>Construction Techniques, Equipment And Practice</b>	Course Code : M10CE205
Term : <b>III</b>	Course Group : <b>Core</b>
Teaching Scheme (L:T:P) : <b>5:0:0</b> (in Hours)	Credits : <b>5 Credits</b>
No of weeks per term : 15	Total Contact Hours : <b>75</b>
CIE : <b>25Marks</b>	TEE : <b>100 Marks</b>

**Pre-requisites** : Knowledge of basic Construction techniques

**Course Topics:**

Unit No	Unit Name	Hours
I	CONSTRUCTION EQUIPMENT	15
II	CONSTRUCTION PRACTICES	15
III	SUB STRUCTURE CONSTRUCTION	15
IV	SUPER STRUCTURE CONSTRUCTION	15
V	INDUSTRIAL STRUCTURES	15
	<b>Total</b>	<b>75</b>

**Course Outcomes:**

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

C.205.1. To choose and adopt the suitable equipment in the mechanized construction towards speedy completion of projects.

C.205.2. To learn various practices exercised in the construction field..

C.205.3. To acquire knowledge on various techniques used for underground and under water structures.

C.205.4. To get exposure on construction techniques involved in super structure.

C.205.5. To gain knowledge about various industrial structures and their utilities.

**Course Outcome linkage to Cognitive Level**

**COGNITIVE LEVEL LEGEND- R; REMEMBER U: UNDERSTAND, AP: APPLICATION AY: ANALYSIS C:CREATION,**

Course Outcome		CL	Linked PO	Teaching Hrs
C. 205.1	To choose and adopt the suitable equipment in the mechanized construction towards speedy completion of projects.	R/U/A	1,2,3,4	15
C. 205.2	To learn various practices exercised in the construction field.	R/U/A	1,2	15
C. 205.3	To acquire knowledge on various techniques used for underground and under water structures.	R/U/A	3,4	15
C. 205.4	To get exposure on construction techniques involved in super structure.	R/U/A	1,2,6,7	15
C. 205.5	To gain knowledge about various industrial structures and their utilities.	R/U/A	1,2,3,4	15
<b>Total sessions</b>				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 EQUIPMENT	15	33	3	10	20	20
II	CONSTRUCTION PRACTICES	15	33	3	10	20	20
III	SUB STRUCTURE CONSTRUCTION	15	33	3	10	20	20
IV	SUPER STRUCTURE CONSTRUCTION	15	33	3	10	20	20
V	INDUSTRIAL STRUCTURES	15	33	3	10	20	20
	<b>Total</b>	<b>75</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>Construction Techniques, Equipment And Practice</b>	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.*

**Course Content:**

**CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICE**

**DETAILED SYLLABUS**

**UNIT I**

**CONSTRUCTION EQUIPMENT**

**15 Hours**

Earth work - Selection of equipment for earth work - Earth moving operations - Types of earthwork equipment - Tractors, motor graders, scrapers, front end loaders and earth movers - Equipment for compaction, batching, mixing and concreting - Equipment for material handling and erection of structures - Equipment for trenching, tunneling and dredging.

**UNIT II**

**CONSTRUCTION PRACTICES**

**15 Hours**

Specifications - Construction co-ordination - Site clearance and marking - Earthwork - foundations and basements - Masonry - Bonds - Brick masonry - Stone masonry - Concrete hollow block masonry - Precast paver blocks - Flooring - Construction joints - Movement and expansion joints - Contraction joints - Form works - Centering and shuttering - Slip forms - Scaffolding, shoring and underpinning - Fabrication and erection of trusses - Acoustics - Sound insulation - Fire protection.

**UNIT III**

**SUB STRUCTURE CONSTRUCTION**

**15 Hours**

Trenchless techniques - Box jacking - Pipe jacking - Arch jacking - Tunneling techniques - Underground and underwater diaphragm walls - Piling techniques - Cofferdams - Well foundation and caisson - Sinking operations - Cable anchoring and grouting - Sheet piling - Shoring for deep cutting - Dewatering techniques and pumping equipment.

**UNIT IV**

**SUPER STRUCTURE CONSTRUCTION**

**15 Hours**

Launching girders - Bridge decks - Off shore platforms - Special forms of shells and domes - Techniques for heavy decks - In-situ pre-stressing in high rise structures - Material handling and erecting light weight components on tall structures - Articulated structures - Braced domes - Space decks.

**UNIT V**

**INDUSTRIAL STRUCTURES**

**15 Hours**

Chimneys - Cooling towers - Silos - Bunkers - High tension transmission and telecommunication towers - Support structures for heavy equipment and conveyors - Escalators - Conduits for oil and fluids conveyance.

**TEXT BOOKS:**

1. Peurifoy, Schexnayder, Shapira, "Construction Planning, Equipment and Methods", Tata McGraw Hill Education Private Ltd-Seventh edition, 2013.
2. Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, 1997.

**REFERENCE BOOKS:**

1. Gambhir, M.L, "Concrete Technology", Tata McGraw – Hill Publishing Company Ltd, New Delhi, 2011.
2. Varghese, P.C., "Building construction", Prentice Hall of India Pvt. Ltd, New Delhi, 2009.
3. Shetty, M.S, "Concrete Technology- Theory and Practice", S. Chand and Co. Pvt. Ltd, New Delhi, 2009

**E-Resources**

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE</b> (Term End Examination)	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires	1 to5 Effectiveness of Delivery of instructions & Assessment Methods	

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	30	50
3	Application	61	100
<b>Total</b>		<b>100</b>	<b>165</b>

**MODEL QUESTION**

Term : **III** Time : **3 Hrs**  
Programme : **Diploma in Civil Engineering** Max. Marks : **100**  
Course : **Construction Techniques, Equipment and Practice** Course Code : **M10CE205**

**PART-A**

**(10 x 1 = 10)**

**Answer any TEN questions. Each carries one marks.**

1. Write the selection of equipment for earthwork?
2. When are the scrappers used in construction?
3. Write the different types of earthwork equipment's?
4. Write the types of bonds in brick masonry?
5. What is meant by Expansion joint?
6. What is meant by slipform?
7. Define tunnelling process.
8. What is meant by cofferdam?
9. Define Grouting.
10. Define bridge deck?
11. Explain braced domes?
12. Define Girders.
13. Explain Bunkers.
14. What is meant by Escalator?
15. Define silo.

**PART-B**

**(6 x 5 = 30)**

**Answer any SIX questions. Each carries five marks.**

16. Compare the applications of two types of tractors.
17. Write notes on wheel dredger?
18. Write a short note site clearance and marking.
19. Explain about fire protection.
20. Discuss about coffer dams.
21. Explain the dewatering techniques and pumping equipment.
22. Explain general requirements in launching girders.
23. Give short notes on articulated structures.
24. Write the support structure for heavy equipment and conveyors.
25. Discuss about cooling towers.

**PART- C**

**(6 x 10 = 60)**

**Answer any SIX questions .Each carries ten marks.**

26. Describe the equipment's involved in the material handling and erection of structures?
27. Mention the various types of compaction equipment and their uses?
28. Explain the different types of stone masonry in detail with sketch.
29. Briefly discuss about the construction joints.
30. Explain the different types of jacking.
31. Brief about different types of piling techniques applied in sub structure construction.
32. Explain in detail about special forms of shells and domes with neat sketch.
33. Describe the In-situ pre-stressing in high rise structures.
34. Discuss the various types of Towers and Chimneys.
35. Discuss the process of high tension transmission and telecommunication towers.



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**III TERM**

**2017 –2018 onwards**

**M10CE206- SURVEYING-I**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering**

To be implemented for the student admitted on the year 2017 - 2018

Programme : Civil Engineering	Type of course : Theory
Course Title : <b>Surveying-I</b>	Course Code : M10CE206
Semester : <b>III</b>	Course Group : <b>Core</b>
Teaching Scheme (L:T:P) : <b>5:0:0</b> (in Hours)	Credits : <b>5 Credits</b>
No of weeks per term : <b>15</b>	Total Contact Hours : <b>75</b>
CIE : <b>25Marks</b>	TEE : <b>100 Marks</b>

**Pre-requisites** : Knowledge of Basic Science and Mathematics in Secondary Education.

**Course Topics:**

Unit No	Unit Name	Hours
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
	<b>Total</b>	<b>75</b>

**Course Outcomes:**

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

- C.206.1 Understand the basics in surveying and chain surveying.
- C.206.2 Understand the principles of compass surveying and its applications.
- C.206.3 Understand the basics in levelling, types of levelling instruments and methods of levelling
- C.206.4 Understand the types of levelling, errors and its applications.
- C.206.5 Concept of contour, its uses and methods of contouring. Understand the knowledge of basic concepts and principles of GPS

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		CL	Linked PO	Teaching Hrs
C.206.1	Understand the basics in surveying and chain surveying.	R/U/A	1,2,3,4,8.	13
C.206.2	Understand the principles of compass surveying and its applications.	R/U/A	1,2,3,4,5,8.	13
C.206.3	Understand the basics in levelling, types of levelling instruments and methods of levelling	R/U/A	1,2,3,4,8.	23
C.206.4	Understand the types of levelling, errors and its applications.	R/U/A	1,2,3, 5,7,8,10	13
C.206.5	Concept of contour, its uses and methods of contouring. Understand the knowledge of basic concepts and principles of GPS	R/U/A	1,2,3,4,5	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	33	3	10	20	20
II	COMPASS SURVEYING	13	33	3	10	20	20
III	LEVELLING	23	33	3	10	20	20
IV	LEVELLING (Continued)	13	33	3	10	20	20
V	CONTOUR SURVEYING AND GLOBAL POSITIONING SYSTEM	13	33	3	10	20	20
<b>Total</b>		<b>75</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Surveying-I	3	3	3	3	3	-	1	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.*

**Course Content:**

**1. INTRODUCTION TO SURVEYING AND CHAIN SURVEYING (13 Hours)**

**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

**2. COMPASS SURVEYING (13 Hours)**

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

**3. LEVELLING (23 Hours)**

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 levelling– Theory of Differential levelling (Fly levelling) –Levelling field book - Reduction of levels – Height of collimation and Rise and Fall method – Comparison of methods – Problems on reduction of levels - Missing entry calculations : Problems

#### 4. LEVELLING (CONTD.)

(13 Hours)

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

#### 5.1 CONTOUR SURVEYING

(13 Hours)

Definition – Contour – Contouring – Characteristics of contours – Methods of contouring – Direct and Indirect methods – Tacheometric contouring -Interpolation of contours – Different methods – Contour gradient – Uses of contour plan and map – Calculation of capacity of reservoir : Simple problems.

#### 5.2 GLOBAL POSITIONING SYSTEM (GPS)

Introduction - Maps – Types of Maps – Various Satellites used by GPS –Differential GPS - Fundamentals of GPS – Application of GPS – GPS Receivers – Hand held GPS Receiver – Function – Field procedure –Observation and processing applications in Civil Engineering.

#### TEXT BOOKS

1. Surveying and Levelling Vol- I & II by B C Punmia
2. Surveying by Duggal
3. Surveying by R Agor
4. Fundamentals of Surveying by S K Roy
5. Surveying and Levelling by N NBasak

#### E-Resources

1. [www.elearning.com/survey](http://www.elearning.com/survey)
2. <http://nptel.ac.in/video.php?subjectId=105104101>
3. <http://media.sakshat.ac.in/NPTEL-IIT-Videos/>
4. [http://nptel.iitk.ac.in/courses/Civil\\_Eng/IIT%20Roorkee/Surveying.htm](http://nptel.iitk.ac.in/courses/Civil_Eng/IIT%20Roorkee/Surveying.htm)
5. <http://nptel.iitk.ac.in/>

#### Course Delivery:

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	<b>What</b>		<b>To Whom</b>	<b>Frequency</b>	<b>Max Marks</b>	<b>Evidence Collected</b>	<b>Course Outcomes</b>
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires	1 to5 Effectiveness of Delivery of instructions & Assessment Methods	

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Composition of Educational Components:**

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	30	50
3	Application	61	100
<b>Total</b>		<b>100</b>	<b>165</b>

**MODEL QUESTION**

Term : **III**

Time : **3 Hrs.**

Program : **Diploma in Civil Engineering**

Max Marks : **100**

Course : **Surveying-I**

Course code : **M10CE206**

**PART –A**

**(10x1=10)**

**Answer any TEN questions. Each carries one marks.**

1. What is the primary objective of surveying?
2. State any one principle of surveying.
3. What is meant by perpendicular offset?
4. Define the term True meridian.
5. State the relation between fore bearing and back bearing.
6. The whole circle bearing of a line is  $275^\circ$ . Convert the value to reduced bearing.
7. State the abbreviation for M.S.L.
8. Define the term Bench mark.
9. What do you mean by Parallax?
10. What is the purpose of running Check levelling?
11. Give one example where Profile levelling is adopted.
12. State the formula for correction due to Curvature.
13. State any one method of Interpolation of contours.
14. Define the term Contour gradient.
15. State any one application of GPS.

## PART-B

(6 x 5 = 30)

Answer any SIX questions. Each carries five marks.

16. List out the errors and source of errors in chain surveying.

17. A line was measured with a tape which measures exactly 30m at 10°C. The length of the line was found to be 634m. The temperature during the measurement was 26°C. Find the true length of the line assuming the coefficient of thermal expansion as  $11.5 \times 10^{-6}$  per °C

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

19. 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°30'	292°30'
BC	14°15'	194°15'
CD	315°00'	135°00'
DA	215°15'	35°15'

20. Explain the temporary adjustments of a dumpy level.

21. 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.

22. What is reciprocal leveling? Explain with a neat sketch.

23. A level was set up at a point C at a distance of 350m from A and 750m from B. The staff reading on the staff held at A was 1.650 and on the staff held at B were 2.865. Find the differences in elevations of A and B. Also find the R.L of B if the R.L of A was +105.000.

24. What are the uses of contour plan and map?

25. Briefly explain three segments (Fundamental) on which GPS works

**PART-C**

**(6X10=60)**

**Answer any SIX questions .Each carries ten marks.**

26.( i) Briefly explain the procedure of ranging by direct method. (5)

ii) Briefly explain how a cross-staff is used to set perpendicular offsets. (5)

27. . A 30m tape was standardized at a pull of 90 N. A line was measured with this tape (10)

under a pull of 210N and was found to be 167m. Find the true length of the line if the cross-sectional area of the tape is  $1.8\text{mm}^2$  and the young's modulus of elasticity of steel is  $2.10 \times 10^5 \text{ N/mm}^2$

28. Draw a neat sketch of a prismatic compass and name the parts. Explain the functions of the components. (10)

29. The following bearings were observed in running a compass traverse. Calculate the interior angles of the traverse. Apply the required check. (10)

LINE	F.B	B.B
AB	45° 15'	225° 15'
BC	123° 15'	303° 15'
CD	181° 00'	1° 00'
DA	289° 30'	109° 30'

30. Explain the temporary adjustments of a dumpy level. (10)

31. The following staff readings were observed with a level : (10)

0.875, 1.235, 2.310, 1.385, 2.930, 3.125, 4.125, 0.120, 1.875, 2.030 and 2.765. The first reading was taken with the staff held upon a B.M. of elevation 132.135. The instrument have been moved after the second, fifth and eighth readings. Enter the readings in a field book form and reduce the level by rise and fall. Apply usual check.

32. What is Longitudinal sectioning? Explain the field procedure for carrying out L.S (10)

33. 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

34. Describe various characteristics of contours with neat sketches. (10)

35. (i) Briefly state the various satellite used by GPS. (5)

(ii) Briefly explain three segments (Fundamental) on which GPS works (5)



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**III TERM**

**2017 – 2018 onwards**

**M10CE209- CIVIL ENGINEERING DRAWING-I**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering**

To be implemented for the student admitted on the year 2017 - 2018

Programme : Civil Engineering	Type of course : Theory
Course Title : <b>CIVIL ENGINEERING DRAWING I</b>	Course Code : M10CE209
Semester : <b>III</b>	Course Group : <b>Core</b>
Teaching Scheme (L:T:P) : <b>5:0:0</b> (in Hours)	Credits : <b>4 Credits</b>
No of weeks per term : 15	Total Contact Hours : <b>75</b>
CIE : <b>25 Marks</b>	TEE : <b>100 Marks</b>

**Pre-requisites** : Knowledge of Basic Engineering drawing

**Course Topics:**

Unit No	Unit Name	Hours
I	INTRODUCTION	5
II	PLANNING OF BUILDING	5
III	BASIC DRAWING	10
IV	BUILDING DRAWINGS	55
	<b>Total</b>	<b>75</b>

**Course Outcomes:**

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

C.209.1 Know concepts of building planning considering climatic parameters, building bye laws, classification of buildings and design buildings

C.209.2 Understand and prepare building services drawings

C.209.3 Draw the basic drawing of door, roof truss and rainwater harvesting

C.209.4 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

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		CL	Linked PO	Teaching Hrs
C.209.1	Know concepts of building planning considering climatic parameters, building bye laws, classification of buildings and design buildings.	R/U/A	1,2,3,4,8.	5
C.209.2	Understand and prepare building services drawings	R/U/A	1,2,3,4,5,8.	5
C.209.3	Draw the basic drawing of door, roof truss and rainwater harvesting	R/U/A	1,2,3,4,8.	10
C.209.4	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	1,2,3,5,6,7,9,10	55
		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	5	5	5	-	-	5
II	PLANNING OF BUILDING	5	5	5	-	-	5
III	BASIC DRAWINGS	10	15	-	15	-	15
IV	BUILDING DRAWINGS	55	75	-	-	75	75
<b>Total</b>		<b>75</b>	<b>100</b>	<b>10</b>	<b>15</b>	<b>75</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Outcomes	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>CIVIL ENGINEERING DRAWING-I</b>	3	3	3	2	3	3	3	2	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  $\geq 40\%$  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.

**Course Content:**

Unit	Name of the Topic	Hours
I	<p><b>INTRODUCTION</b></p> <p><b>1. CONVENTION, SYMBOLS:</b> General – Conventions- Title block- Scales- Line work- Lettering- Symbols- Abbreviations</p> <p><b>2. BUILDING BYE-LAWS AND SUBMISSION DRAWINGS</b> Objects of bye-laws- Importance of bye-laws- Function of local authority- Set backs- Plot Coverage- Number of floors- Height of building- Built up Area- Floor space index (FSI)- Views and details necessary for the preparation of a civil engineering drawing- Site Plan – Necessity for Approval of plans from local body- Layout plan and key plan-Requirements for Submission of drawing for approval</p>	5Hrs
II	<p><b>PLANNING OF BUILDINGS</b></p> <p><b>1 PLANNING OF RESIDENTIAL BUILDINGS</b> Types of residential buildings- Usual requirements-Types of Rooms – Minimum Size requirement for each type of rooms – Furniture arrangement in each room- Position of stairs / lifts- Position of Doors/ Windows House drainage and Sanitary fittings – Sump/Water tanks-Plumbing Pipes -Preparation of line drawing for given requirements with dimensions, not to scale.</p> <p><b>2 PLANNING OF INDUSTRIAL STRUCTURES</b> Planning aspects - Requirements of industrial units - Sheets for pitched roof coverings – Rolling Shutters - Ramps- Stores- Public Toilets/ Bath rooms- Dining/ Resting rooms- Ventilation and Lighting - Preparation of line drawing for given requirement with measurements not to scale:</p> <p><b>3 PLANNING OF PUBLIC BUILDINGS</b> Types of public buildings - Miscellaneous public buildings – General requirements of Public Buildings -Landscape architecture- Preparation of line plan with dimensions for the given requirements , not to scale.</p>	5Hrs
III	<p><b>BASIC DRAWINGS</b> Standard symbols used in Civil Engineering Drawing. Draw the Elevation of:</p> <ol style="list-style-type: none"> <li>1. Fully panelled double leaf door.</li> <li>2. Fully Panelled single leaf door</li> <li>3. Flush door</li> <li>4. Fully Panelled window with grill</li> <li>5. Partly glazed and partly panelled window</li> <li>6. Lean- to - roof</li> <li>7. King post roof truss</li> <li>8. Steel roof truss</li> </ol>	10Hrs

	9. Rain water Harvesting – Recharging into the ground (a) Shallow well system (b) Percolation pit system.	
<b>Unit</b>	<b>Name of the Topic</b>	<b>Hours</b>
IV	<b>BUILDING DRAWINGS</b> 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	<b>55 Hrs</b>

**Reference Book :**

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

**IS-CODE**

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

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	<b>What</b>		<b>To Whom</b>	<b>Frequency</b>	<b>Max Marks</b>	<b>Evidence Collected</b>	<b>Course Outcomes</b>
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires	1 to5 Effectiveness of Delivery of instructions & Assessment Methods	

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 100)</b>
1	Remembering	10	10
2	Understanding	15	15
3	Application	75	75
<b>Total</b>		<b>100</b>	<b>100</b>

**MODEL QUESTION**

Term	: III	Time	: 3 Hrs.
Program	: Diploma in Civil Engineering	Max Marks	: 100
Course	: Civil Engineering Drawing-I	Course code	: M10CE209

**PART-A (25 marks)**

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

**I. Answer the following (2 x 5 = 10)**

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

**II. Answer the following (1 x 15 = 15)**

**The Sketches under drawn using Pencil and drawing instruments, not necessarily to scale.**

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

**PART-B (75 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. 1:4:8 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 mm 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 mm 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.

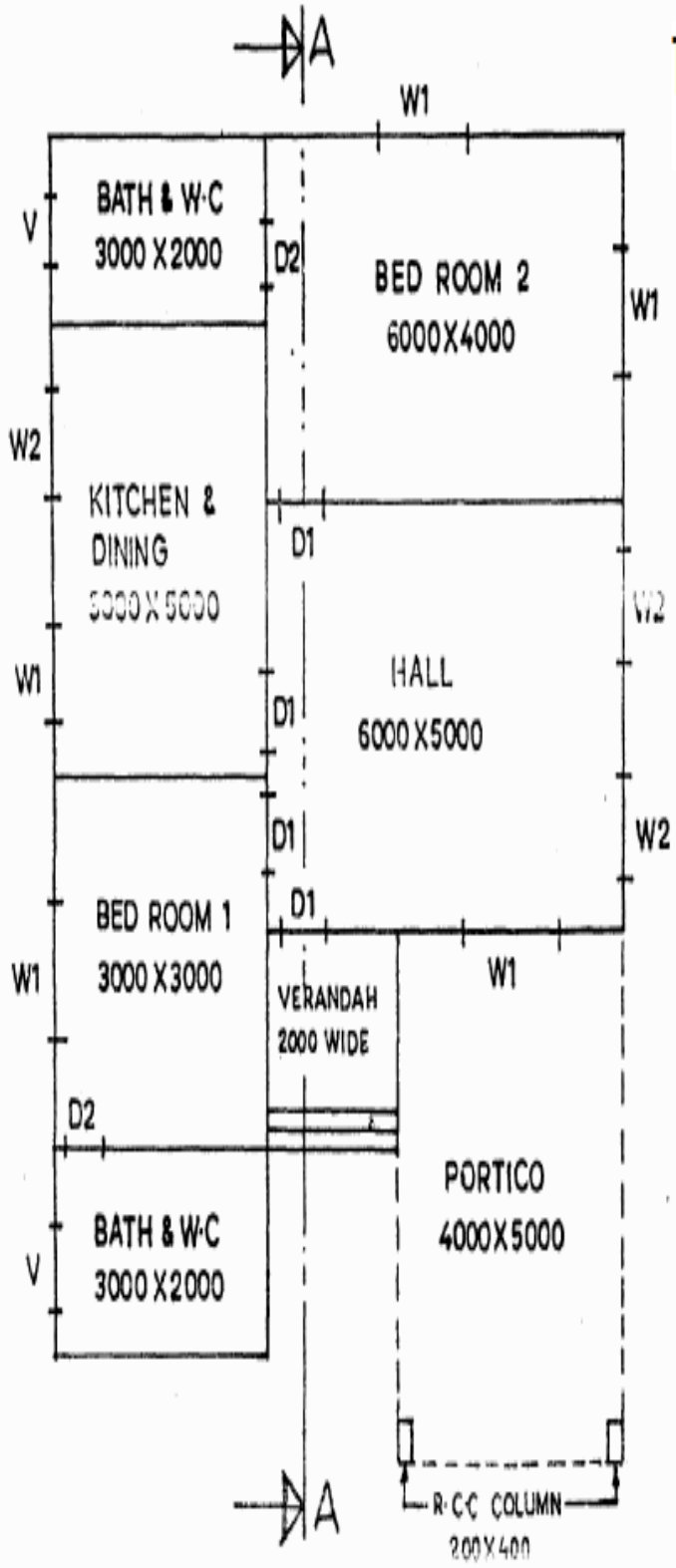
**Steps:-**

Provide steps of rise 150mm and tread 250 mm

Draw the following views to a suitable scale:-

- a) Plan of the building - 30 Marks
- b) Section on "AA" - 25 Marks
- c) Front Elevation - 20 Marks

Two Bed Room Building



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



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**III TERM**

**2017 –2018 onwards**

**M10CE308 – MATERIAL TESTING LAB & PLUMBING  
PRACTICES**

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

**VIRUDHUNAGAR – 626001**

**Diploma in Civil Engineering**

To be implemented for the student admitted on the year 2017-2018

Programme	: Civil Engineering	Type of course	: Practical
Course Title:	<b>Material Testing Lab &amp; Plumbing Practices</b>	Course Code	: M10CE308
Semester	: <b>III</b>	Course Group	: <b>Applied</b>
Teaching Scheme (L:T:P)	: <b>0:0:3</b> (in Hours)	Credits	: <b>2 Credits</b>
No of weeks / term	: <b>15</b>	Total Contact Hours	: <b>45</b>
CIE	: <b>25Marks</b>	TEE	: <b>75 Marks</b>

**Pre-requisites** : Knowledge of Strength of materials and Materials constructions

### Course Topics:

Unit No	Unit Name	Hours
I	Test on metal steel bars, wood and spring coils.	24
II	Identification, Cutting, threading and pasting of pipe fittings	21
	<b>Total</b>	45

### Course Outcomes:

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

C.308.1 Understand Shear, torsion, compression, tensile and flexural strength of various materials will be evaluated

C.308.2 Analyze to select a material for an application, for quality control and to predict how a material will react under other types of forces

C.308.3 Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

C.308.4 Conduct plumbing connections and prepare the estimation of the same.

C.308.5 Practical skills in the fitting, Plumbing and Sanitary trades.

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		Experiment linked	CL	Linked PO	Teaching Hrs
C.308.1	Understand Shear, torsion, compression, tensile and flexural strength of various materials will be evaluated.	1,2,3,4,5	R/U	1,4,8,9,10	12
C.308.2	Analyze to select a material for an application, for quality control and to predict how a material will react under other types of forces.	1,2,3,5,6	R/U	1,3,9,10	12
C.308.3	Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.	1,2,5,6	R/U	2,3,4,7,10	8
C.308.4	Conduct plumbing connections and prepare the estimation of the same.	1,2	R/U	2,3,4,7,10	8
C.308.5	Practical skills in the fitting, plumbing and sanitary trades.	3,4,5,6	R/U	1,2,4,7,10	5
Total Hrs					45

**Course-PO Attainment Matrix**

Course Outcomes	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>Material Testing Lab &amp; Plumbing Practices</b>	3	2	2	1	1	3	1	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.

**Course Content:**

**Material Testing Practical & Plumbing Practices**

**DETAILED SYLLABUS**

**Part-A**

**24 Hours**

1. Tension test on mild steel/deformed steel bars.
2. Deflection test on Simply Supported Beams of (a) wood and (b) steel to find Young's modulus
3. Torsion test on mild steel bar to determine the Modulus of Rigidity.
4. Double Shear test on Mild steel bar
5. Impact Test on Mild steel by performing Izod/Charpy test.
6. Test on Spring Open/Closed coil.

**Part-B**

**21 Hours**

1. Identifying Pipe fittings used in Water supply and Sanitary wares.
2. Study of Sanitary Wares.
3. Cutting, Threading and Joining of G.I. Pipes.
4. Cutting and Pasting of P.V.C. Pipes using solvents.
5. Making a Bathroom Connection from an Existing Water supply Main line.
6. Making Suction and Delivery Pipe Connections to a Centrifugal Pump.

**E-links:**

1. [http://site.iugaza.edu.ps/mymousa/files/Material\\_-Testing-lab-manual.pdf](http://site.iugaza.edu.ps/mymousa/files/Material_-Testing-lab-manual.pdf)
2. Valliammai Engineering College - Engineering Practices laboratory manual

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	Exercise & Observation	Students	Average of mark allotted for each exercise	10	Course file and Record notes	1 to 4
		IA Tests		Model Exam 1&2	5+5	Course File, Models & file	1 to 4
		Attendance		Daily Attendance	5	System Admin	-
		<b>TOTAL</b>		<b>25</b>			
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	75	Answer Scripts at Autonomous Exam Cell	1 to 4
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1&2 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to4 Effectiveness of Delivery of instructions & Assessment Methods

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	7
2	Understanding	26
3	Application	67
<b>Total</b>		<b>100</b>

**ALLOCATION OF MARKS**

<b>PART- A</b>	-	<b>50 Marks</b>
<b>PART- B</b>	-	<b>20 Marks</b>
<i>Viva-Voce</i> -		<b>5 Marks</b>
		-----
<b>TOTAL</b>		<b>75 Marks</b>
		-----

Sl.No	Description	PART-A Max. Marks (50)
1	Procedure	5
2	Tabulation and Observation	20
3	Calculations	15
4	Sketch / Graph	5
5	Accuracy of Result	5

Sl.No	Description	PART-B Max. Marks (20)
1	Procedure	5
2	Execution	10
3	Sketch	5



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**III TERM**

**2017 –2018 onwards**

**M10CE210- SURVEYING PRACTICE-I**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering**

To be implemented for the student admitted on the year 2017- 2018

Programme	: Civil Engineering	Type of course	: Practical
Course Title	: <b>Surveying Practice - I</b>	Course Code	: M10CE210
Semester	: <b>III</b>	Course Group	: <b>Core</b>
Teaching Scheme (L:T:P)	: <b>0:2:4</b> (in Hours)	Credits	: <b>4 Credits</b>
No of weeks per term	: 15	Total Contact Hours	: <b>90</b>
CIE	: <b>25Marks</b>	TEE	: <b>75 Marks</b>

**Pre-requisites** : Practical knowledge of Basic Science and Mathematics in Secondary Education

**Course Topics:**

Unit No	Unit Name	Hours
I	CHAIN AND COMPASS SURVEYING	36
II	GLOBAL POSITIONING SYSTEM (GPS)	12
III	LEVELLING	42
	Total	90

**Course Outcomes**

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

- C.210.1 Use of instruments in chain surveying and conducting experiments
- C.210.2 Use of instruments in compass surveying and conducting experiments.
- C.210.3 Use of instruments in levelling and conducting experiments on methods of levelling.
- C.210.4 Understand the knowledge of basic concepts and principles of GPS

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		Linked Experiments	CL	Linked PO	Teaching Hrs
C.210.1	Use of instruments in chain surveying and conducting experiments	1,2,3	R/U/A	1,2,3,4,8.	18
C.210.2	Use of instruments in compass surveying and conducting experiments.	4,5	R/U/A	1,2,3,4,8.	18
C.210.3	Use of instruments in levelling and conducting experiments on methods of levelling.	10,11,12,13,14	R/U/A	1,2,3,4,8	42
C.210.4	Understand the knowledge of basic concepts and principles of GPS	6,7,8,9	R/U/A	1,2,3,5,7,8,10	12
Total sessions					90

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Surveying Practice I	3	3	3	3	1	-	1	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.

**Course Content:**

**PART-A**

**I CHAIN COMPASS AND SURVEYING**

**36 Hours**

- 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

**II GLOBAL POSITIONING SYSTEM (GPS)**

**12 Hours**

- 2.1. Reading of various Maps like Taluk map and District map and Topo sheets
- 2.2. Study of Hand held GPS.
- 2.3. Measurement of Latitude, Longitude and Altitude using hand held GPS.
- 2.4. Selection and marking of routings (Way points) using hand heldGPS.

**PART-B**

**III LEVELLING**

**42 Hours**

- 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)

**Course Delivery:**

The course will be delivered through lectures, Demonstration and practices

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	Exercise & Observation	Students	Average of mark allotted for each exercise	10	Course file and Record notes	1 to 4
		IA Tests		Model Exam 1&2	5+5	Course File, Models & file	1 to 4
		Attendance		Daily Attendance	5	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	75	Answer Scripts at Autonomous Exam Cell	1 to 4
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1&2 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to4 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Tutorial - 1Hr.:**

Staff-in-charge will

1. Explain the concept of exercise to be conducted.
2. Ask students to write the formula.
3. Give clear instructions about exercises.

**Conduction/ Execution - 4 Hrs.:**

Student will do exercises individually under the supervision of the staff-in-charge.

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	7
2	Understanding	26
3	Application	67
<b>Total</b>		<b>100</b>

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

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

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**TOTAL MARKS = 75 MARKS**

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**ALLOCATION OF MARKS**

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		
	<b>TOTAL</b>	<b>75 MARKS</b>		



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**III TERM**

**2017 –2018 onwards**

**M10CE311 - CAD IN CIVIL ENGINEERING DRAWING - I**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
DIPLOMA IN CIVIL ENGINEERING  
M10- SCHEME**

(To be implemented from the student admitted from the year 2017 – 2018 onwards)

Programme : Civil Engineering	Type of course : Practical
Course Title: <b>CAD IN CIVIL ENGINEERING DRAWING - I</b>	Course Code : M10CE311
Semester : <b>III</b>	Course Group : <b>Applied</b>
Teaching Scheme (L:T:P) : <b>0:0:5</b> (in Hours)	Credits : <b>3 Credits</b>
No of weeks/ term : <b>15</b>	Total Contact Hours : <b>75</b>
CIE : <b>25Marks</b>	TEE : <b>75 Marks</b>

**Pre-requisites** : Knowledge of drafting software and Building Planning and Drawing.

**Course Topics:**

Unit No	Unit Name	Hours
I	Introduction of CAD software for Preparation of Drawings	4
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.	19
III	Draw the building drawing using available CAD software	52
	<b>Total</b>	75

**Course Outcomes:**

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

**C.211.1.** Knowing the basic concept and usage of CAD software.

**C.211.2.** Understand CADD workstation and demonstrate basic commands of Computer Aided Design and Drafting Software.

**C.211.3.** Prepare and plot 2D drawings of Building Components, Prepare the Approval drawing.

**C.211.4.** Create and plot 2D objects.

**C.211.5.** Create and plot 3D objects.

**Course Outcome linkage to Cognitive Level**

**COGNITIVE LEVEL LEGEND – R: REMEMBER U: UNDERSTAND, AP: APPLICATION AY: ANALYSIS C: CREATION**

Course Outcome		Experiments Linked	CL	Linked PO	Teaching Hrs
C.211.1	Knowing the basic concept and usage of CAD software.	1	R,U,A	1,4	03
C.211.2	Understand CADD workstation and demonstrate basic commands of Computer Aided Design and Drafting Software.	2	R,U,AP	2,3,5,10	10
C.211.3	Prepare and plot 2D drawings of Building Components, Prepare the Approval drawing	3,4,5,6,7	R,U,AP	1,2,3,	26
C.211.4	Create and plot 2D objects.	8,9,10,11,12	R,U,AP	1,2,3	26
C.211.5	Create and plot 3D objects.	14	R,U,AP	1,2,3	10
<b>Total sessions</b>					<b>75</b>

**Course-PO Attainment Matrix**

Course Outcomes	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Cad In Civil Engineering Drawing - I	3	3	3	1	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.

**Course Content:****PART-A****I. Introduction of CAD software for Preparation of Drawings (4 HOURS)**

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

**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. (19 HOURS)**

3. Section of semicircular Arch
4. Elevation of door, partly paneled and partly glazed
5. Preparation of Plan showing arrangement of furnitures / fixtures and other features with standard sizes for the followings (Each room to be drawn separately - features and Furnitures 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 (52 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<sup>2</sup> 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.
14. 3D View of single bed room building using any software (Not for Examination).

**E-Resources**

- <http://www.sketchup.com>
- <http://www.autodesk.in/products/3ds-max/overview>
- <http://www.we-r-here.com/cad/tutorials/index.htm>
- <http://www.cadtutor.net/tutorials/CADD/>
- [http://www.caddprimer.com/CADD\\_training\\_tutorial/CADD\\_training\\_lessons.html](http://www.caddprimer.com/CADD_training_tutorial/CADD_training_lessons.html)
- <http://www.CADDmark.com/>
- <http://www.CADDtutorials.net/>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	Exercise & Observation	Students	Average of mark allotted for each exercise	10	Course file and Record notes	1 to 4
		IA Tests		Model Exam 1&2	5+5	Course File, Models & file	1 to 4
		Attendance		Daily Attendance	5	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	75	Answer Scripts at Autonomous Exam Cell	1 to 4
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1&2 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to 4 Effectiveness of Delivery of instructions & Assessment Methods

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	7
2	Understanding	33
3	Application	60
<b>Total</b>		<b>100</b>

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

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

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



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**IV TERM**

**2017 – 2018 onwards**

**M10CE301 – THEORY OF STRUCTURES**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
DIPLOMA IN CIVIL ENGINEERING  
M10- SCHEME  
(To be implemented from the student admitted from the year 2017 – 2018 onwards)**

Programme	:Civil Engineering	Type of course	:Theory
Course Title	: <b>Theory of Structures</b>	Course Code	: M10CE301
Term	: <b>IV</b>	Course Group	: <b>Applied</b>
Teaching Scheme (L:T:P)	: <b>6:0:0</b> (in Hours)	Credits	: <b>6 Credits</b>
No of weeks/ term	: <b>15</b>	Total Contact Hours	: <b>90</b>
CIE	: <b>25Marks</b>	TEE	: <b>100 Marks</b>

**Pre-requisites** :Knowledge of Engineering Mechanics

**Course Topics:**

Unit No	Unit Name	Hours
I	SLOPE AND DEFLECTION OF BEAMS PROPPED CANTILEVERS	18
II	FIXED BEAMS CONTINUOUS BEAMS – THEOREM OF THREE MOMENTS METHOD	18
III	CONTINUOUS BEAMS – MOMENT DISTRIBUTION METHOD PORTAL FRAMES - MOMENT DISTRIBUTION METHOD	18
IV	COLUMNS AND STRUTS COMBINED BENDING AND DIRECT STRESSES	18
V	MASONRY DAMS EARTH PRESSURE AND RETAINING WALLS	18
	<b>Total</b>	90

**Course Outcomes:**

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

**C.301.1** To be knowledgeable about the deformation (Slope & deflection) of basic beams

**C.301.2** Continuous beams by Theorem of Three moments and draw SFD, BMD..

**C.301.3** Analyse Continuous beams, Portal frames and Substitute frames by Moment Distribution Method and draw SFD, BMD.

**C.301.4** To understand the types of column and apply the eulers theory to find the parameters for different end condition

**C.301.5** Calculate maximum and minimum bearing pressures and check the stability of Masonry Dams and Retaining walls

**Course Outcome linkage to Cognitive Level**

**Cognitive Level Legend- R; Remember U: Understand, Ap: Application Ay: Analysis**

Course Outcome		CL	Linked PO	Teaching Hrs
<b>C.301.1</b>	To be knowledgeable about the deformation (Slope & deflection) of basic beams	<i>R/U/A</i>	1,2	18
<b>C.301.2</b>	Analyze Continuous beams by Theorem of Three moments and draw SFD, BMD.	<i>R/U/A</i>	3,4	18
<b>C.301.3</b>	Analyze Continuous beams, Portal frames and Substitute frames by Moment Distribution Method and draw SFD, BMD.	<i>R/U/A</i>	1,2,6,7	18
<b>C.301.4</b>	To understand the types of column and apply the Euler's theory to find the parameters for different end condition.	<i>R/U/A</i>	1,2,3,4	18
<b>C.301.5</b>	Calculate maximum and minimum bearing pressures and check the stability of Masonry Dams and Retaining walls	<i>R/U/A</i>	1,2,3,4	18
<b>Total sessions</b>				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	33	3	10	20	20
II	FIXED BEAMS CONTINUOUS BEAMS – THEOREM OF THREE MOMENTS METHOD	18	33	3	10	20	20
III	CONTINUOUS BEAMS – MOMENT DISTRIBUTION METHOD PORTAL FRAMES - MOMENT DISTRIBUTION METHOD	18	33	3	10	20	20
IV	COLUMNS AND STRUTS COMBINED BENDING AND DIRECT STRESSES	18	33	3	10	20	20
V	MASONRY DAMS EARTH PRESSURE AND RETAINING WALLS	18	33	3	10	20	20
	<b>Total</b>	<b>90</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Outcomes	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Theory Of Structures	3	3	2	2	-	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.

**Course Content:**

**THEORY OF STRUCTURES**

**DETAILED SYLLABUS**

**UNIT-I**

**18 Hours**

**1.1 SLOPE AND DEFLECTION OF BEAMS**

Deflected shapes / Elastic curves of beams with different support conditions –Definition of Slope and Deflection- Flexural rigidity and Stiffness of beams- Mohr’s Theorems – Area Moment method for slope and deflection of beams – Derivation of expressions for maximum slope and maximum deflection of standard cases by area moment method for cantilever and simply supported beams subjected to symmetrical UDL & point loads – Numerical problems on determination of slopes and deflections at salient points of Cantilevers and Simply supported beams from first principles and by using formulae

**1.2 PROPPED CANTILEVERS**

Statically determinate and indeterminate Structures- Stable and Unstable Structures- Examples - Degree of Indeterminacy-Concept of Analysis of Indeterminate beams - Definition of Prop –Types of Props- Prop reaction from deflection consideration – Drawing SF and BM diagrams by area moment method for UDL throughout the span, central and non-central concentrated loads – Propped cantilever with overhang – Point of Contra flexure

**UNIT-II**

**18 Hours**

**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.

### **UNIT-III**

**18 Hours**

## **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

### **UNIT-IV**

**18 Hours**

## **4.1 COLUMNS AND STRUTS**

Columns and Struts – Definition – Short and Long columns – End conditions – Equivalent length / Effective length– Slenderness ratio – Axially loaded short column - Axially loaded long column – Euler’s theory of long columns – Derivation of expression for Critical load of Columns with hinged ends – Expressions for other standard cases of end conditions (separate derivations not required) – Problems – Derivation of Rankine’s formula for Crippling load of Columns– Factor of Safety- Safe load on Columns- Simple problems.

## **4.2 COMBINED BENDING AND DIRECT STRESSES**

Direct and Indirect stresses – Combination of stresses – Eccentric loads on Columns – Effects of Eccentric loads / Moments on Short columns – Combined direct and bending stresses – Maximum and Minimum stresses in Sections– Problems – Conditions for no tension – Limit of eccentricity – Middle third rule – Core or Kern for square, rectangular and circular sections – Chimneys subjected to uniform wind pressure –Combined stresses in Chimneys due to Self weight and Wind load- Chimneys of Hollow square and Hollow circular cross sections only – Problem

### **UNIT-V**

**18 Hours**

## **5.1 MASONRY DAMS**

Gravity Dams – Derivation of Expression for maximum and minimum stresses at Base – Stress distribution diagrams – Problems – Factors affecting Stability of masonry dams – Factor of safety- Problems on Stability of Dams– Minimum base width and maximum height of dam for no tension at base – Elementary profile of a dam – Minimum base width of elementary profile for no tension.

## 5.2 EARTH PRESSURE AND RETAINING WALLS

Definition – Angle of repose /Angle of Internal friction of soil– State of equilibrium of soil – Active and Passive earth pressures – Rankine’s theory of earth pressure – Assumptions – Lateral earth pressure with level back fill / level surcharge (Angular Surcharge Not required) – Earth pressure due to Submerged soils – (Soil retained on vertical back of wall only) – Maximum and minimum stresses at base of Trapezoidal Gravity walls– Stress distribution diagrams – Problems – Stability of earth retaining walls – Problems to check the stability of walls- Minimum base width for no tension.

### 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
4. V.N. Vazirani& M.M. Ratwani, “Analysis of structures”
5. R.L. Jindal , “Elementary Theory of Structures”
6. F.V. Warnock, “Strength of materials”
7. Madhan Mohan Dass, “ Structural Analysis” PHI Learning Pvt. Ltd., New Delhi.

### E-Resources

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>

### Course Delivery:

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE</b> (Term End Examination)	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires	1 to5 Effectiveness of Delivery of instructions & Assessment Methods	

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	31	50
3	Application	60	100
Total		100	165

**MODEL QUESTION**

Term	: IV	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 100
Course	: Theory of structures	Course Code	: M10CE301

**PART – A**

**(10 x 1=10)**

**Answer any TEN questions .Each carries one marks.**

1. Define the term “Slope”
2. What will be the deflection at mid span of a simply supported beam carrying udl?
3. What do you mean by indeterminate structures?
4. What will be the degree of indeterminacy of a fixed beam with only vertical loads?
5. How many points of contra flexure will be there in a fixed beam ?
6. What is meant by partially fixed end? Where you can expect partial fixity?
7. Define “carry over factor”
8. What is meant by substitute frame?
9. How many bays a Portal frame has?
10. What do you mean by “Critical load” of a column?
11. Define “Effective length” of a column
12. Differentiate direct stress and indirect stress
13. Which are the main factors affecting the stability of a masonry dam?
14. When tension is developed at the base of a dam?
15. Which side of a retaining wall has passive earth pressure?

**PART –B**

**(6x5=30)**

**Answer any SIX questions. Each carries five marks.**

16. Write the procedure to find slope and deflection.
17. Write short notes on types of prop.
18. Write any two advantages of fixed beam over simple supported beam.
19. Draw a neat sketch of continuous beam with four different end conditions.
20. Derive the equation for the stiffness of a beam when it is hinged at both ends.
21. What is mean by carry over moment and carry over factor.
22. Explain limit of eccentricity.
23. Distinguish between long column and short column.
24. What are the conditions for stability of no tension retaining wall
25. Write short notes an elementary profile of a dam.

## PART –C

(6x10= 60)

Answer any SIX questions .Each carries ten marks.

26. 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.  $EI=7.2 \times 10^4 \text{ kN.m}^2$ . Find the slope and deflection at the free end of the beam by area-moment method. .
27. A propped 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.
28. 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.
29. 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.
30. A two span continuous beam ABC is fixed at support A and simply supported at support C.  $AB=8\text{m}$ ;  $BC=4\text{m}$ . 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.
31. Explain with neat sketches how substitute frames are assumed and analyzed in the case of multi storey buildings.
32. 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:  $A=4211 \text{ mm}^2$ ;  $D=300\text{mm}$ ;  $b_f=100\text{mm}$ ;  $t_f=11.6\text{mm}$ ;  $t_w=6.7\text{mm}$ ;  $C_y=25.5\text{mm}$ ;  $I_{zz}=60.48 \times 10^6 \text{ mm}^4$ ;  $I_{yy}=2.46 \times 10^6 \text{ mm}^4$ . 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.
33. A hollow rectangular cross section of a masonry pillar has the overall dimension  $1600\text{mm} \times 1000\text{mm}$ . 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.
34. 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  $20 \text{ kN/m}^3$  and  $10 \text{ kN/m}^3$  respectively.
35. A masonry retaining wall of 7.2 m height retains earth of unit weight  $16 \text{ kN/m}^3$  and angle of repose  $35^\circ$  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 coefficient of friction between wall and earth is 0.6. Unit weight of wall may be taken as  $19 \text{ kN/m}^3$ .



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**IV TERM**

**2017 – 2018 onwards**

**M10CE302 – TRANSPORTATION ENGINEERING**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),****VIRUDHUNAGAR – 626001  
DIPLOMA IN CIVIL ENGINEERING  
M10- SCHEME****(To be implemented from the student admitted from the year 2017 – 2018 onwards)**

Programme	: Civil Engineering	Type of course	: Theory
Course Title	: <b>Transportation Engineering</b>	Course Code	: M10CE302
Term	: <b>IV</b>	Course Group	: <b>Applied</b>
Teaching Scheme (L:T:P)	: <b>5:0:0</b> (in Hours)	Credits	: <b>5 Credits</b>
No of weeks/ term	: <b>15</b>	Total Contact Hours	: <b>75</b>
CIE	: <b>25 Marks</b>	TEE	: <b>100 Marks</b>

**Pre-requisites** : Knowledge of Science and Geology in Secondary Education**Course Topics:**

Unit No	Unit Name	Hours
I	HIGHWAY ENGINEERING	15
II	HIGHWAY ENGINEERING ( Contd. )	15
III	RAILWAY ENGINEERING	15
IV	RAILWAY ENGINEERING ( Contd. )	15
V	BRIDGE ENGINEERING	15
	<b>Total</b>	<b>75</b>

**Course Outcomes:**

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

**C.302.1.** Understand the factors influencing road vehicle performance characteristics and design

**C.302.2.** Apply basic science principles in estimating stopping and passing sight distance requirements.

**C.302.3.** Understand basic traffic stream parameters and models, traffic flow models, and queuing theory .

**C.302.4.** Design basic traffic signal phasing and timing plan.

**C.302.5.** Given basic information, prepare a horizontal and vertical alignment, including superelevation

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		CL	Linked PO	Teaching Hrs
<b>C.302.1</b>	Understand the factors influencing road vehicle performance characteristics and design	<i>R/U/A</i>	1,3,5,7	15
<b>C.302.2</b>	Apply basic science principles in estimating stopping and passing sight distance requirements	<i>R/U/A</i>	2,5,7,9	15
<b>C.302.3</b>	Understand basic traffic stream parameters and models, traffic flow methods and queuing theory	<i>R/U/A</i>	1,3,4,5,8,10	15
<b>C.302.4</b>	Design basic traffic signal phasing and timing plan	<i>R/U/A</i>	1,2,5,7,8	15
<b>C.302.5</b>	Given basic information, prepare a horizontal and vertical alignment, including super elevation	<i>R/U/A</i>	1,2,3,5,7,10	15
<b>Total sessions</b>				<b>75</b>

**Course Content and Blue Print of Marks for End Examinations:**

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	HIGHWAY ENGINEERING	15	33	3	10	20	20
II	HIGHWAY ENGINEERING ( Contd. )	15	33	3	10	20	20
III	RAILWAY ENGINEERING	15	33	3	10	20	20
IV	RAILWAY ENGINEERING ( Contd. )	15	33	3	10	20	20
V	BRIDGE ENGINEERING	15	33	3	10	20	20
	<b>Total</b>	<b>75</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Outcomes	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Transportation engineering	2	2	2	1	3	-	2	1	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.

**Course Content:**

**DETAILED SYLLABUS**

**UNIT I:**

**(15Hours)**

**1.1 INTRODUCTION**

General – Development of Roads in India - Modes of transportation - Nagpur Plan - Ribbon development - Advantages of Roads - Importance of roads in India - Requirements of an ideal road – Indian Road Congress - Objects of Highway planning - Classifications of Highways.

**1.2 HIGHWAY PAVEMENTS**

Objectives - Types of Pavement - Flexible and Rigid Pavements - Comparative study of Flexible and Rigid pavements - Factors affecting the design of pavements - Other types of pavements (Description not reqd.)

**1.3 GEOMETRICAL DESIGN OF HIGHWAYS**

General - Road structure - Right of way - Land width - Width of formation - Road Camber - Super elevation - Sight distances – Road gradient - Road Curves - Horizontal curves - Vertical curves - Types - Widening of pavement on horizontal curves.

**1.4 TRAFFIC ENGINEERING**

Objectives - Traffic surveys - Road accidents - Causes of road accidents - Preventive measures - Parking - Methods of parking - Road junctions (Grade intersections and Grade separators) – Traffic signals - Advantages - Types of road signs - Expressways.

**1.5 SUB GRADE SOIL**

Significance - Soil mass as a three phase system - Grain size classification - Atterberg limits - Definition and description - I S Classification of soils - Compaction - Definition – Objects of Compaction - Standard Proctor Compaction test - Shear strength – Definition – Importance- Direct shear test.

**1.6 ROAD ARBORICULTURE AND LIGHTING**

Objects of Arboriculture - Selection of trees - Location of trees - Highway lighting - Benefits.

**UNIT II:**

**(15Hours)**

**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 Bituminous roads - Surface dressing - Types – Bituminous Concrete - Maintenance of Bituminous roads.

**2.5 CEMENT CONCRETE ROADS**

General - Advantages and disadvantages - Methods of construction of cement concrete roads with sketches - Construction procedure for concrete roads.

**2.6 HILL ROADS**

Factors considered in alignment - Formation of hill roads - Hair pin bends - Retaining and Breast walls.

**2.7 PLASTIC ROADS**

Introduction- Types of plastic wastes used for Road Construction – Process of Laying of Roads - Advantages

**UNIT III:**

**(15Hours)**

**3.1 INTRODUCTION**

Introduction to Railways - Classifications of Indian Railways - Rail Gauges - Types - Uniformity in gauges - Loading gauge - Construction gauge.

**3.2 RAILS**

General - Functions of rails - Requirements of an ideal rail - Types of rail sections - Length of rails - Welding of rails - Wear of rails – Coning of wheels - Hogged rails - Bending of rails - Creep of rails – Causes and prevention of creep.

**3.3 SLEEPERS AND BALLAST**

Functions of Sleepers - Types of sleepers - Requirements of sleepers - Materials for sleepers - Sleeper density – Ballast- Functions of Ballast - Requirements of ballast - Materials used as ballast.

### **3.4 RAIL FASTENINGS AND PLATE LAYING**

Rail joints - Types - Rail fastenings - Fish plates - Fish bolts - Spikes - Chairs and Keys - Bearing plates - Blocks - Elastic fastenings – Anchors and anti-creepers - Plate laying - Methods of plate laying – PQRS method of relaying.

### **3.5 MAINTENANCE OF TRACK**

Necessity - Maintenance of Track, Bridges and Rolling stock.

## **UNIT IV:**

(15Hours)

### **4.1 STATIONS AND YARDS**

Definition of station - Purpose of railway station - Types of stations - Wayside, Junction and Terminal stations - Platforms - Passenger and Goods platforms - Definition of Yard - Types of yard - Passenger yard, Goods yard, Marshalling yard and Locomotive yards - Level crossings.

### **4.2 STATION EQUIPMENTS**

General - Engine shed - Ash pits - Examination pits - Drop pits – Water columns - Triangles - Turn table - Traversers - Scotch Block – Buffer stops - Fouling marks - Derailing switch - Sand hump - Weigh bridges.

### **4.3 POINTS AND CROSSINGS**

Purpose - Some definitions - Turnouts - Right hand and left hand turnouts - Sleepers laid for points and crossings - Types of switches - Crossings - Types of crossings.

### **4.4 SIGNALLING**

General - Objects of signalling - Types of signalling - Based on function and location - Special signals - Control of movement of trains - Different methods - Following train system - Absolute block system - Automatic signalling - Pilot guard system - Centralized traffic control system.

### **4.5 INTERLOCKING**

Definition - Principles of interlocking - Methods of interlocking – Tappets and locks system - Key system - Route relay system - Improvements in interlocking and signalling.

### **4.6 RAPID TRANSPORT SYSTEM**

General - Under ground railways - Advantages - Tube railways – Its features

## **UNIT V:**

(15Hours)

### **5.1 INTRODUCTION**

Bridge definition - Components of bridge - IRC loadings - Selection of type of bridge - Scour - Afflux - Economic span - Waterway – Factors governing the ideal site for bridge - Alignment of bridge - Factors to be considered in alignment

### **5.2 FOUNDATIONS**

Functions of foundation - Types of foundations - Selection of foundations - Control of ground water for foundation – Caisson foundation - Cofferdam – Types.

### 5.3 CLASSIFICATION OF BRIDGES

Classification according to IRC loadings, Materials, Bridge floor, Type of superstructure - Culverts and Cause ways - Classifications with sketches - Conditions to construct causeways.

### 5.4 SUBSTRUCTURE

Abutments - Types - Piers - Types - Wing walls - Types.

### 5.5 SUPERSTRUCTURE

Types - Description - Simple bridge - Types according to bridge floor - Continuous bridge - Cantilever bridge - Balanced cantilever bridge - Arch bridge - Bow-string girder type bridge - Rigid frame bridge - Suspension bridge - Continuous steel bridges - Steel arched bridges.

### 5.6 BRIDGE BEARINGS

Definition - Purpose - Importance of bearings - Types of bearings – Elastomer bearings.

#### Text Books:

1. RANGWALA, "Highway Engineering", Charotar Publishing House Pvt. Ltd., Edition 2010
2. RANGWALA, "Railway Engineering", Charotar Publishing House Pvt. Ltd., Edition 2010
3. RANGWALA, "Bridge Engineering", Charotar Publishing House Pvt. Ltd., Edition 2009
4. SPCHANDOLA, "A Text Book of Transportation Engineering" S Chand & Company Ltd.,

#### E-Resources

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>

#### Course Delivery:

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
		<b>TOTAL</b>		<b>25</b>			
	TEE (Term End Examination)	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
Indirect Assessment	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to5 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	31	50
3	Application	60	100
<b>Total</b>		<b>100</b>	<b>165</b>

**MODEL QUESTION**

Term : IV

Time : 3 Hrs

Programme : Diploma in Civil Engineering

Max. Marks : 100

Course : Transportation Engineering

Course Code : M10CE302

**PART – A**

**(10x1=10)**

**Answer any TEN questions .Each carries one marks.**

1. Define Nagpur plan.
2. What are the methods of parking?
3. What is meant by highway lighting?
4. What are the factors affecting highway alignment?
5. What is the purpose of grader?
6. State the materials used for WBM road.
7. Define sleeper density.
8. What is meant by fish plates?
9. What are the different classifications of gauges ?
10. What is the purpose of railway station?
11. What are the types of switches?
12. Write any one principle of interlocking.
13. Define afflux.
14. What is the purpose of bearings?
15. What is meant by piers?

**PART – B**

**(6x5=30)**

**Answer any SIX questions. Each carries five marks.**

16. What are the requirements of an ideal road?
17. Explain road junction based on grade intersection.
18. What are the methods of cement concrete roads?
19. Explain the formation of hill roads.
20. Explain any one type of rail section.
21. What are the functions of ballast?
22. Give a Notes on Marshalling yard.
23. What are the types of crossings?
24. Draw a neat sketch for pipe culvert and R.C.C slab culvert.
25. Explain suspension bridge.

**PART – C**

**(6x10=60)**

**Answer any SIX questions .Each carries ten marks.**

26. Define road accident explain its causes and its preventive measures.
27. Explain standard proctor compaction test with neat sketch.
28. Explain the methods of soil stabilization.
29. Explain the construction procedure for WBM road.
30. What are the functions and requirements of sleepers?
31. Explain the methods of plate laying.
32. Define yard and explain the types of yard.
33. Explain the methods of controlling movement of trains.
34. Explain the different types of cofferdams.
35. Explain bow string Girder bridge and balanced cantilever bridge.



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**IV TERM**

**2017 –2018 onwards**

**M10CE303 – SURVEYING - II**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
DIPLOMA IN CIVIL ENGINEERING  
M10- SCHEME**

(To be implemented from the student admitted from the year 2017 – 2018 onwards)

Programme	: Civil Engineering	Type of course	: Theory
Course Title	: <b>Surveying-II</b>	Course Code	: M10CE303
Semester	: <b>IV</b>	Course Group	: <b>Applied</b>
Teaching Scheme (L:T:P)	: <b>5:0:0</b> (in Hours)	Credits	: <b>5 Credits</b>
No of weeks/ term	: <b>15</b>	Total Contact Hours	: <b>75</b>
CIE	: <b>25Marks</b>	TEE	: <b>100 Marks</b>

**Pre-requisites** : Knowledge of Surveying – I and Mathematics.

**Course Topics:**

Unit No	Unit Name	Hours
I	THEODOLITE SURVEYING	13
II	TACHEOMETRIC SURVEYING	13
III	TRIGONOMETRICAL LEVELLING REMOTE SENSING, PHOTOGRAMMETRIC SURVEYING AND HYDROGRAPHIC SURVEYING	23
IV	CURVES	13
V	TOTAL STATION AND GIS	13
	<b>Total</b>	75

**Course Out comes:**

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

- C.303.1** 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
- C.303.2.** Understand the principles and use of Tacheometric survey in rough terrain.
- C.303.3.** Understand the usage of Theodolite in any civil engineering projects before planning and during execution.
- C.303.4.** To Understand the knowledge of basic concepts and principles of Photogrammetric Surveying, Remote sensing, Hydrographic Surveying.
- C.303.5.** 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
<b>C.303.1</b>	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	<b>R,U,A</b>	1,2,3,4,5,8	13
<b>C.303.2</b>	Understand the principles and use of Tacheometric survey in rough terrain.	<b>R,U,A</b>	1,2,3,4,5,8	13
<b>C.303.3</b>	Understand the usage of Theodolite in any civil engineering projects before planning and during execution.	<b>R,U,A</b>	1,2,3,4,8	23
<b>C.303.4</b>	To Understand the knowledge of basic concepts and principles of Photogrammetric Surveying, Remote sensing, Hydrographic Surveying.	<b>R,U,A</b>	1,2,3,4,5,8	13
<b>C.303.5</b>	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	<b>R,U,A</b>	1,2,3,4,5,8	13
<b>Total sessions</b>				<b>75</b>

**Course Content and Blue Print of Marks for End Examinations:**

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	THEODOLITE SURVEYING	13	33	3	10	20	20
II	TACHEOMETRIC SURVEYING	13	33	3	10	20	20
III	TRIGONOMETRICAL LEVELLING REMOTE SENSING, PHOTOGRAMMETRIC SURVEYING AND HYDROGRAPHIC SURVEYING	23	33	3	10	20	20
IV	CURVES	13	33	3	10	20	20
V	TOTAL STATION AND GIS	13	33	3	10	20	20
	<b>Total</b>	<b>75</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Outcomes	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Surveying - II	3	3	3	3	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  $\geq 40\%$  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.

**Course Content:**

**1. THEODOLITE SURVEYING (13 Hours)**

Introduction - Types of Theodolites : Transit and non-transit Theodolite, Vernier and Micrometer Theodolites – Electronic Theodolite (Principles and description only) – Component parts of a transit Theodolite – Functions – Technical terms used in Theodolite surveying – Temporary adjustments – Fundamental lines and relationship between them – Measurement of horizontal angle by method of repetition and reiteration – Measurement of vertical angle and deflection angle – Reading bearing of a line – Theodolite traversing – Methods – Field checks in closed traverse - Latitude and departure – Consecutive coordinates - Independent coordinates – Problems on computation of area of closed traverse – Balancing the traverse – Omitted measurements – Problems

**2. TACHEOMETRIC SURVEYING (13 Hours)**

Introduction – Instruments used in tacheometry – Systems of tacheometry : Stadia and Tangential tacheometry – Principles – Fixed hair method of tacheometry – Distance and Elevation formulae – Anallactic lens (No proof) : Advantages and uses – Simple problems – Distomats (Description only) – Direct reading tacheometers - Determination of constants of a tacheometer : Problems – Tacheometric traverse – Errors in tacheometric surveying

**3.1 TRIGONOMETRICAL LEVELLING (23 Hours)**

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 - Hydrographic surveying – Definition- Uses – Sounding: Definition, Purpose, Instruments needed – Steps in hydrographic surveying

**4. CURVES (13 Hours)**

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

**TOTAL STATION AND GEOGRAPHICAL INFORMATION SYSTEM**

**5.1 TOTAL STATION (13 Hours)**

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).

**TEXT BOOKS**

1. Kanetkar.T.P. & S.V.Kulkarni, “Surveying and levelling part 1 & 2”, Puna vidyarthi griha, Prakashan, 23<sup>rd</sup> edition, Reprint 2008.
2. Punmia.B.C, Ashok K.Jain & Arun K. Jain,”Surveying Volume I”, Laxmi, Publications Private Limited., 16<sup>th</sup> edition, 2011.
3. Punmia.B.C, Ashok Jain & Arun K. Jain,”Surveying Volume II & III”, Laxmi, Publications Private Limited., 15<sup>th</sup> edition, 2011.
4. Mimi Das Saikia, Bhargab Mohan Das & Madan Mohan Das, “Surveying”, PHI Learning Private Limited, Edition 2010.
5. S. K. Roy, “Fundamentals of Surveying”, PHI Learning Private Limited, Edition 2010.
6. Sathesh Gopi, R.Sathikumar & N.Madhu, Advanced Surveying, (Total Station, GIS, Remote Sensing), Pearson Education, Chennai, 2007.
7. M.Anji Reddy, Remote sensing and Geographical information system, B.S Publications, Edition 2006.
8. Burrough P A, Principles of GIS for Land Resources Assessment, Oxford Publication, 2000.
9. Learning Material Development Project – NITTTTR, Taramani, Chennai, CD programme on GPS and GIS.

**E-Resources**

1. <http://nptel.ac.in/video.php?subjectId=105104101>
2. <http://media.sakshat.ac.in/NPTEL-IIT-Videos/>
3. [http://nptel.iitk.ac.in/courses/Civil\\_Eng/IIT%20Roorkee/Surveying.htm](http://nptel.iitk.ac.in/courses/Civil_Eng/IIT%20Roorkee/Surveying.htm)
4. <http://nptel.iitk.ac.in/>
5. <http://www.usouthal.edu/geography/allison/GY301/Total%20Station%20Setup%20and%20Operation.pdf>
6. <http://www.pentaxsurveying.com/en/pdfs/R400-MANUAL-PTL-EN.pdf>
7. <https://www.youtube.com/watch?v=QtEkZPEeeZk>
8. <https://www.youtube.com/watch?v=KQgq5xqSTUw>

**Course Delivery:**

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	TEE (Term End Examination)	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
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	End of Course Survey			End of the Course	Questionnaires	1 to5 Effectiveness of Delivery of instructions & Assessment Methods	

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

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Sl. No.	Educational Component	Weightage (%)	Total Marks (Out of 165)
1	Remembering	9	15
2	Understanding	31	50
3	Application	60	100
<b>Total</b>		<b>100</b>	<b>165</b>

**MODEL QUESTION**

Term : IV

Time : 3 Hrs.

Program : Diploma in Civil Engineering

Max Marks : 100

Course : Surveying-II

Course code : M10CE303

**PART –A**

**(10x1=10)**

**Answer any TEN questions .Each carries one marks.**

1. What is a Transit theodolite?
2. Define the term Changing face.
3. 5. What are the instruments used in Tacheometry?
4. Write the distance formula in a stadia tacheometry, if the line of sight is horizontal.
5. What is an Anallactic lens?
6. What is the function of an Optical plummet in a theodolite?
7. What is the objective of Trigonometrical levelling?
8. When do you adopt Single plane method to determine elevation of an object?
9. State any one application of Photogrammetric surveying.
10. State any three elements of simple circular curve.
11. Mention any two linear methods of setting out simple circular curve.
12. What do you mean by right handed curve?
13. What is the function of prism reflectors in total station?
14. Mention any two total station characteristics.
15. What do you mean by GIS?

PART –B

(6x5=30)

Answer any SIX questions. Each carries five marks.

16. Draw a neat sketch of a vernier theodolite and explain the functions of any five component parts.

17. 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 <sup>0</sup> 30'
BC	620	30 <sup>0</sup> 20'
CD	468	298 <sup>0</sup> 30'
DA	?	?

18. Briefly explain different systems of tacheometry

19. Determine the constants of a Tacheometer from the following readings taken with it

Horizontal distance from Instrument station to staff station	Staff Reading	
	Bottom	Top
40m	1.085	1.385
60m	0.925	1.525

20. Briefly write about the applications of Photogrammetric surveying.

21. A transit was setup at a distance of 187m from a temple. The angle of depression to the bottom of temple was 3<sup>0</sup>12' and the angle of elevation to its top was 10<sup>0</sup>12'. The elevation of the instrument axis was 176.150m. Find the height of the temple and elevation of its top.

22. Draw a neat sketch of simple circular curve and name the parts

23. Two straights intersect at an intersection angle of 75°. Calculate the following elements of the curve. Take the degree of curve as 6<sup>0</sup>.

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

24. Briefly write the field procedure for co-ordinate measurement, using Total station.

25. Briefly explain the application of GIS in Wasteland management.

PART-C

(6X10=60)

Answer any SIX questions .Each carries ten marks.

26. The following are the Lengths and Bearings of a Traverse ABCDE.

LINE	LENGTH	BEARING
AB	229.00	198°59'
BC	131.35	282°14'
CD	80.00	320°13'
DE	199.25	35°13'
EA	142.60	104°26'

Calculate the independent coordinates and its area.

27. 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	314° 48'
BC	1725	16° 34'
CD	1050	142° 06'
DA	?	?

28. A tacheometer fitted with an anallactic lens was set up at a station and the following readings were obtained on a vertically held staff .Find the horizontal distance from A to B and reduced level of B.

Station	Staff Station	Vertical Angle	Stadia hair readings (m)	Remarks
A	B.M	- 2° 18'	3.225, 3.550, 3.875	R.L of B.M = 743.565
	B	+ 8° 36'	1.650, 2.515, 3.380	

29. The following data refers to a Anallatic tacheometer having instrument constant 100.find the gradient between A and B if the following readings where taken and also determine the length of A and B.

FROM	TO	BEARING	VERTICAL ANGLE	HAIR READINGS
C	A	320°	+12°	0.905,1.725,2.545
C	B	50°	+10°	0.745,2.200,3.655

**30.** Determine the R.L of top of a transmission tower from the following observations:

<b>Inst. Station</b>	<b>Vertical angle to top of tower</b>	<b>Staff reading on B.M (m)</b>	<b>R.L of B.M.</b>
A	+ 18° 30'	2.815	105.000m
B	+ 12° 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.

**31. i)** Briefly describe the steps in hydrographic surveying.

ii) Briefly write about the applications of Photogrammetric surveying.

**32.** If the radius of a simple circular curve is 400m and the angle of intersection is 120°. Calculate the various elements of the curve.

**33.** Two tangents intersect at an intersection angle of 140° at Chainage 1265m. The radius on the curve is 300m. Calculate the necessary data for setting out a right hand curve by Rankine's Deflection angle method. The peg interval may be assumed as 20m and the least count of the theodolite is 20''

**34. (i)** State the various applications of Total station.

ii) Briefly write the field procedure to run a traverse survey using Total station.

**35. i)** Briefly explain the components of GIS.

ii) Briefly explain the application of GIS in Agriculture and Water resources.



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**IV TERM**

**2017 –2018 onwards**

**M10CE207 – ESTIMATING AND COSTING - I**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
DIPLOMA IN CIVIL ENGINEERING  
M10- SCHEME**

(To be implemented from the student admitted from the year 2017 – 2018 onwards)

Programme	: Civil Engineering	Type of course	: Theory
Course Title	: <b>ESTIMATING AND COSTING I</b>	Course Code	: <b>M10CE207</b>
Semester	: <b>IV</b>	Course Group	: <b>Core</b>
Teaching Scheme (L:T:P)	: <b>5:0:0</b> (in Hours)	Credits	: <b>5 Credits</b>
No of weeks/ term	: <b>15</b>	Total Contact Hours	: <b>75</b>
CIE	: <b>25Marks</b>	TEE	: <b>100 Marks</b>

**Pre-requisites** : Knowledge of Mathematics in Secondary Education

**Course Topics:**

Unit No	Unit Name	Hours
I	INTRODUCTION APPROXIMATE ESTIMATES	12
II	AREAS AND VOLUMES EMBANKMENTS AND CUTTINGS	12
III	ANALYSIS OF RATES	15
IV	TAKING OFF QUANTITIES BY TRADE SYSTEM	18
V	TAKING OFF QUANTITIES BY GROUP SYSTEM	18
	TOTAL	75

**Course Outcomes:**

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

*C.207.1.Explain types of estimate and duties of an estimator.*

*C.207.2 .Determine the irregular area and volume.*

*C.207.3 .Undertake rate analysis of civil engineering works.*

*C.207.4 .Estimate the various types of civil engineering works.*

*C.207.5 .Evaluate the actual value of any property.*

**Course Outcome linkage to Cognitive Level**

**COGNITIVE LEVEL LEGEND – R: REMEMBER U: UNDERSTAND,  
AP: APPLICATION AY: ANALYSIS C: CREATION**

Course Outcome		CL	Linked PO	Teaching Hrs
C.207.1	<i>Able to Explain types of estimate and duties of an estimator</i>	R/U/A	1,2,3,4,7,8	12
C.207.2	<i>Able to Determine the irregular area and volume.</i>	R/U/A	1,2,3	12
C.207.3	<i>Able to Undertake rate analysis of civil engineering works.</i>	R/U/A	1,2,3	15
C.207.4	<i>Estimate the various types of civil engineering works.</i>	R/U/A	1,2,3,8,9,10	18
C.207.5	<i>Able to Evaluate the actual value of any property</i>	R/U/A	1,2,3,8,9	18
		Total sessions		75

**Course Content and Blue Print of Marks for End Examinations:**

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
1	INTRODUCTION APPROXIMATE ESTIMATES	12	33	3	10	20	20
2	AREAS AND VOLUMES EMBANKMENTS AND CUTTINGS	12	33	3	10	20	20
3	ANALYSIS OF RATES	15	33	3	10	20	20
4	TAKING OFF QUANTITIES BY TRADE SYSTEM	18	33	3	10	20	20
5	TAKING OFF QUANTITIES BY GROUP SYSTEM	18	33	3	10	20	20
<b>Total</b>		<b>75</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Outcomes	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Estimating and costing – I	3	3	3	1	-	-	1	2	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.

**Course Content:**

**UNIT-1**

(12Hours)

**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

**UNIT-II**

(12Hours)

**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/ depths or with two level sections of uniform height/ depth.

**UNIT-III**

(15Hours)

**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.

**UNIT-IV**

**(18Hours)**

**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

**UNIT-V**

**(18Hours)**

**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)

**TEXT BOOKS**

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

**E-Resources**

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>
4. <https://en.wikipedia.org>wiki>
5. <https://www.slideshare.net>kmasz>topic>
6. [www.nprcet.org>ce702-estimation](http://www.nprcet.org>ce702-estimation)
7. <https://en.wikipedia.org>wiki>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to5 Effectiveness of Delivery of instructions & Assessment Methods

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	31	50
3	Application	60	100
<b>Total</b>		<b>100</b>	<b>165</b>

**MODEL QUESTION**

Term : IV

Time : 3 Hrs

Programme : Diploma in Civil Engineering

Max. Marks : 100

Course : Estimating and Costing-I

Course Code : M10CE207

**PART – A**

**(10x1=10)**

**Answer any TEN questions .Each carries one marks.**

1. What is Lump sum provision?
2. State any two necessity of approximate estimate.
3. Mention the painting coefficient for the following items of works (i) Panelled door (ii) Collapsible door
4. What do you meant by “Mean Area”?
5. Define an Embankment
6. State the Simpson’s rule to calculate the volume of irregular solids.
7. Prepare the material requirements of CM1:5 for  $1\text{m}^3$
8. How could the rates arrived for items of works not mentioned in the standard data book?
9. What is mean by Analysis of Rates?
10. Draw the standard format of detailed estimate
11. How the quantities are to be rounded off?
12. What is trade system?
13. Explain spacing of dimensions
14. Give a brief note about method of squaring
15. What is group system?

**PART – B**

**(6 x 5 = 30)**

**Answer any SIX questions. Each carries five marks.**

16. What is painting coefficient? State the painting coefficient for

- i) Panelled door
- ii) Glased window
- iii) Steel door.

17. List out the duties of Good Quantity Surveyor.

18. Calculate the distance of a road between 100m contour and 150m contour with a gradient of 1 in 20 in a hill road section.

19. Differentiate between a level section and two level section.

20. State the difference between sundries & lumpsum portion.

21. Write short notes on Schedule of Rates.

22. Explain about Trade system.

23. What do you mean by “casting and reducing the abstract”?

24. Briefly explain the method of writing the bill.

25. What are the functions of Abstract sheets?

**PART – C**

**(6 x 10 = 60)**

**Answer any SIX questions .Each carries ten marks.**

26. The Expenditure incurred in the construction of a single storey residential building of plinth area  $95\text{m}^2$  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  $125\text{m}^2$  at a place where the cost of materials 16% more and the cost of labour is 12% more. Estimate the approximate cost of the proposed building.

27. Differentiate cube rate from plinth area rate.

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

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

29. 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 Trapezoidal rule

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

30. 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  $10\text{m}^3$

31. R.C.C 1:2:4 for beams 300 X 500mm using 20mm size broken stone including reinforcement centering, shuttering etc. complete –  $1\text{m}^3$

**Material and Labour requirement:**

i) C.C 1:2:4 -  $10\text{m}^3$

- Broken stone 20mm size :  $9\text{m}^3$
- Sand :  $4.5\text{m}^3$
- 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 –  $10\text{m}^3$

- Rough Stone :  $11\text{m}^3$
- CM 1:5 :  $3.4\text{m}^3$
- 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 <sup>3</sup>	
C.C. 1:2:4	: 1 m <sup>3</sup>
Reinforcement	: 150kg/ m <sup>3</sup> 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 <sup>3</sup>
Broken stone 20mm size	: Rs. 1,600 / m <sup>3</sup>
Sand	: Rs. 1,500 / m <sup>3</sup>

**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

32. Takeout the quantities for the following items of work for the given “Residential building”

(Sketch-A) by Trade system

- (i) Earthwork Excavation for foundation
- (ii) R.C.C for roof slab and lintel only

33. Takeout the quantities for the following items of work for the given “Residential building”

(Sketch-A) by Trade system

R.R Masonry with C.M 1:6 for foundation footings and basement

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

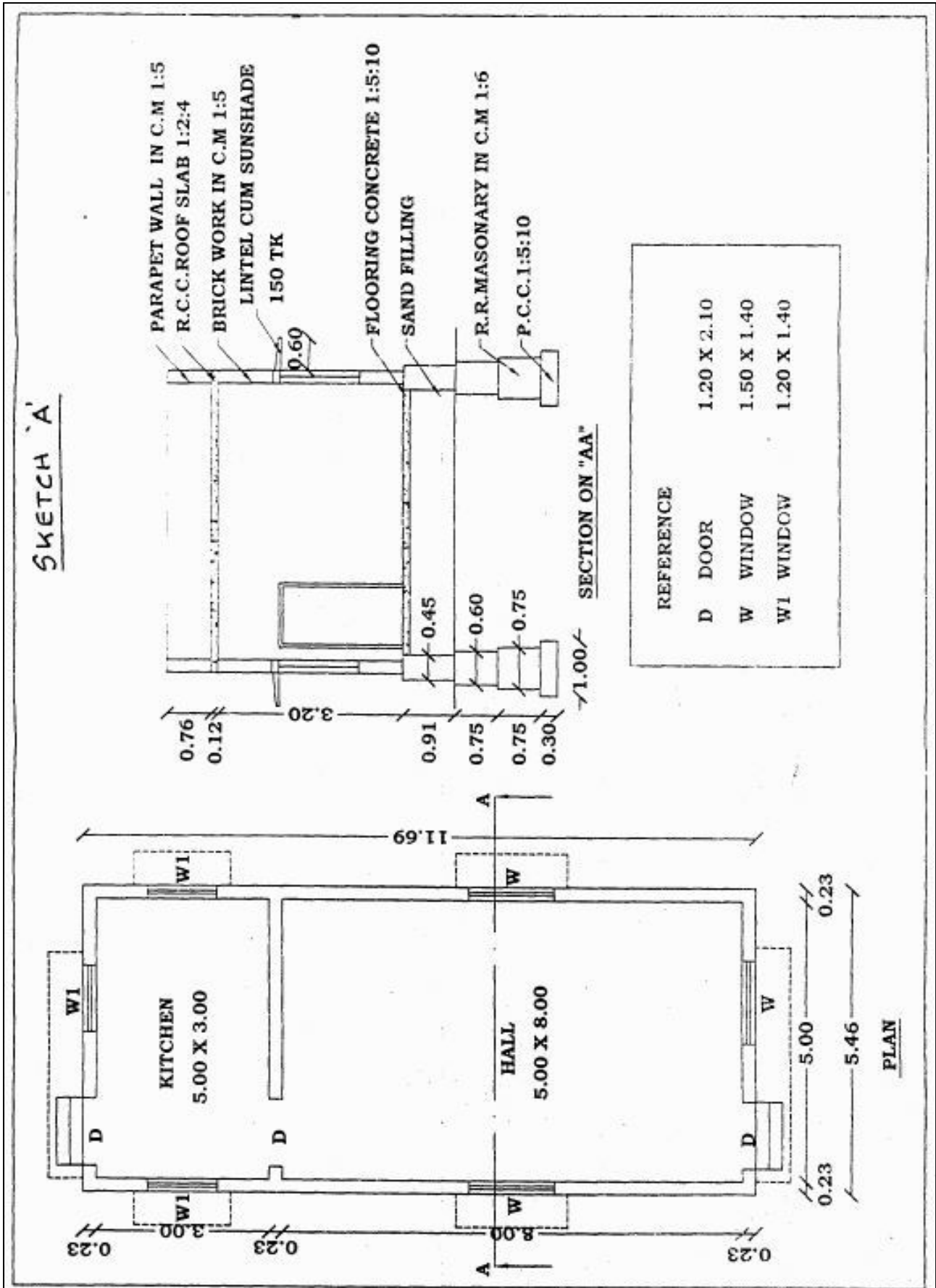
A) B.W in C.M 1:4 for footing and basement

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

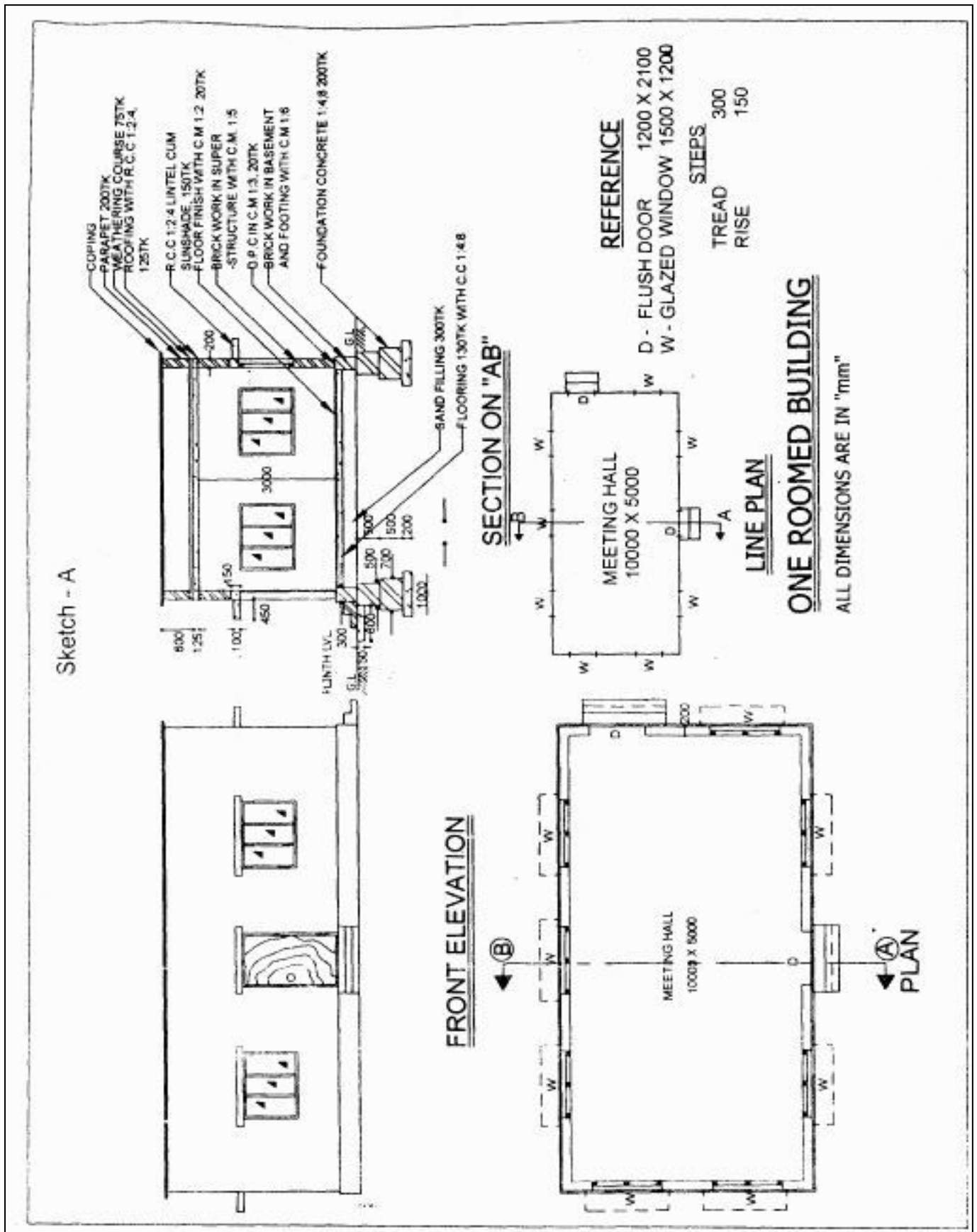
(i) Foundation concrete with C.C 1:4:8

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

VSVNPC



**SKETCH-A**



SKETCH-B



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**IV TERM**

**2017 –2018 onwards**

**M10CE309 – MATERIAL TESTING LAB-II**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
DIPLOMA IN CIVIL ENGINEERING  
M10- SCHEME**

(To be implemented from the student admitted from the year 2017 – 2018 onwards)

Programme	: Civil Engineering	Type of course	: Practical
Course Title	: <b>Material Testing Lab II</b>	Course Code	: M10CE309
Semester	: <b>IV</b>	Course Group	: <b>Applied</b>
Teaching Scheme (L:T:P)	: <b>0:1:2</b> (in Hours)	Credits	: <b>2 Credits</b>
No of weeks/ term	: <b>15</b>	Total Contact Hours	: <b>45</b>
CIE	: <b>25Marks</b>	TEE	: <b>75 Marks</b>

**Pre-requisites:**

**Knowledge in material testing lab – I and construction materials and construction practice.**

**Course Topics:**

Unit No	Unit Name	Hours
I	Test on Fine aggregate , soil and clay	18
II	Test on coarse aggregate	13
III	Test on Water sample	14
	Total	45

**Course Outcomes:**

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

**C.309.1** Understand the Physical properties of constituent materials of sand, clay and soil

**C.309.2** Understand strength of coarse aggregate materials will be evaluated.

**C.309.3** Understand the Test on Water analysis

**C.309.4** Analyze to select coarse and fine aggregate material for an application for quality control and to predict how a material will react under other types of forces.

**C.309.5** Understand the various soil test for civil construction

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		Experiments linked	CL	Linked PO	Teaching Hrs
C.309.1	Understand the Physical properties of constituent materials of sand, clay and soil	1	R/U/A	1,2,3, 6,10	9
C.309.2	Understand strength of coarse aggregate materials will be evaluated.	3,4,8,9,	R/U/A	1,2,3,4,5, 9,	9
C.309.3	Understand the Test on Water analysis	12,13,14,15	R/U/A	1,2,3, 7,9,10	9
C.309.4	Analyze to select coarse and fine aggregate material for an application, for quality control and to predict how a material will react under other types of forces.	10,11	R/U/A	1,2,4, 7,9,	9
C.309.5	Understand the various soil test for civil construction	2,5,6,7	R/U/A	1,2,4,6,7, 10	9
Total Hrs					45

**Course-PO Attainment Matrix**

Course Outcomes	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Material testing lab - II	3	3	2	2	1	1	2	-	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.

**Course Content:**

**Material Testing Practical II**

**DETAILED SYLLABUS**

**PART-A**

**18 Hours**

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

**PART-B**

**13 Hours**

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

**PART-C**

**14 Hours**

12. Determination of Total solids present in the given sample of water.
13. Determination of Turbidity of water by "Jackson candle turbidity meter."
14. Determination of settle able solids present in the given sample of water/ waste water by "Imhoff cone."

**E-links:**

1. [http://site.iugaza.edu.ps/mymousa/files/Material\\_-Testing-lab-manual.pdf](http://site.iugaza.edu.ps/mymousa/files/Material_-Testing-lab-manual.pdf)
2. [http://www.technicalsymposium.com/CIVIL\\_SEM5\\_CE2307LM.pdf](http://www.technicalsymposium.com/CIVIL_SEM5_CE2307LM.pdf)
3. <http://docslide.us/documents/som-bmt-lab-manual-final.html>

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	Exercise & Observation	Students	Average of mark allotted for each exercise	10	Course file and Record notes	1 to 4
		IA Tests		Model Exam 1&2	5+5	Course File, Models & file	1 to 4
		Attendance		Daily Attendance	5	System Admin	-
		<b>TOTAL</b>		<b>25</b>			
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	75	Answer Scripts at Autonomous Exam Cell	1 to 4
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1&2 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to 4 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Course Delivery:**

The Course will be delivered through Tutorial, classroom interaction and practical experiments.

**Tutorial - 1Hr.:**

Staff-in-charge will

1. Explain the concept of experiment to be conducted.
2. Ask students to read procedure

Give clear instructions about safety precautions to be followed while conducting experiment.

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	7
2	Understanding	26
3	Application	67
<b>Total</b>		<b>100</b>

**Conduction/ Execution – 2 Hrs.:**

Student will rig up the circuit diagram and conduct experiment individually under the supervision of the staff-in-charge.

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

**SCHEME OF EXAMINATION :**

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

**ALLOCATION OF MARKS**

<i>PART A</i>	-	<i>70 marks</i>
	(OR)	
<i>PART B</i>	-	<i>40 marks</i>
<i>PART C</i>	-	<i>30 marks</i>
<i>VIVA VOCE</i>	-	<i>05 marks</i>
<i>Total</i>	-	<i>75 marks</i>



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**IV TERM**

**2017 –2018 onwards**

**M10CE310- SURVEYING PRACTICE-II**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
DIPLOMA IN CIVIL ENGINEERING  
M9A- SCHEME**

(To be implemented from the student admitted from the year 2017 – 2018 onwards)

Programme	: Civil Engineering	Type of course	: <b>Practical</b>
Course Title	: <b>Surveying Practice-II</b>	Course Code	: M10CE310
Semester	: <b>IV</b>	Course Group	: <b>Applied</b>
Teaching Scheme (L:T:P)	: <b>0:2:4</b> (in Hours)	Credits	: <b>4 Credits</b>
No of weeks/ term	: <b>15</b>	Total Contact Hours	: <b>90</b>
CIE	: <b>25Marks</b>	TEE	: <b>75 Marks</b>

**Pre-requisites** : Knowledge of Surveying Practice – I & Surveying-II

**Course Topics:**

Unit No	Unit Name	Hours
I	THEODILITE SURVEYING	40
II	TACHEOMETRIC SURVEYING	28
III	TOTAL STATION	22
	Total	90

**Course Outcomes**

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

- C.310.1** Knowing the usage and operation of Theodolite in the field.
- C.310.2.** Apply the knowledge of Theodolite in different operations in civil engineering projects.
- C.310.3.** Apply the knowledge of principles and purpose of Tacheometry in finding out the constants.
- C.310.4.** Usage of total station in the field of civil engineering survey.
- C.310.5.** Manage the suggested or identified constructional problems, solve in teams, in order to improve future problem solving ability and able to present it.

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		Experiments Linked	CL	Linked PO	Teaching Hrs
C.310.1	Knowing the usage and operation of Theodolite in the field.	1,2,3	R/U/Ap	1,2,3,4,8.	18
C.310.2	Apply the knowledge of Theodolite in different operations in civil engineering projects.	4,5,6,7,8	R/U/Ap	1,2,3,4,8.	18
C.310.3	Apply the knowledge of principles and purpose of Tacheometry in finding out the constants.	9,10,11,12	R/U/Ap	1,2,3,4,8	24
C.310.4	Usage of total station in the field of civil engineering survey.	13,14,15,16,17	U/Ap	1,2,3,4,5,7,8,10	12
C.310.5	Manage the suggested or identified constructional problems, solve in teams, in order to improve future problem solving ability and able to present it.	-	U/Ap/Ay/C	1 to 10	18
				Total sessions	90

**Course-PO Attainment Matrix**

Course Outcomes	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Surveying Practice - II	3	3	3	3	1	-	1	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

**Course Content:**

**PART – A THEODOLITE SURVEYING**

**(40 Hours)**

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 Theodolite Station.
4. Determination of distance between two points when their bases are inaccessible, using Theodolite - Measuring Horizontal angles by reiteration method from a baseline.
5. Run closed theodolite traverse - Measuring length, included angles, and bearing at initial station. Plot the traverse.
6. Measurements of vertical angles to different points.
7. Determination of Elevation of an object when the base is accessible.
8. Determination of Elevation of an object when the base is inaccessible by :
  - a) Single plane method
  - b) Double plane method.

**PART-B TACHEOMETRIC SURVEYING**

**(28 Hours)**

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

**PART-C TOTAL STATION**

**(22 Hours)**

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.

**SURVEY CAMP : ( Outside the Campus )**

**Duration: 7 days**

The objective of the survey camp is to enable the students to get practical training in the field work. Groups of not more than six members in a group will carry out each exercise in Survey camp. The camp must involve work on a large area of not less than 30 acres outside the campus. At the end of the camp, each student shall have mapped and contoured the area. The camp record shall include all original field observations, calculations and plotting.

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

**Works to be conducted in survey camp :**

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

**Tutorial - 1Hr.:**

Staff-in-charge will

1. Explain the concept of exercise to be conducted.
2. Ask students to write the formula.
3. Give clear instructions about exercises.

**Conduction/ Execution - 4 Hrs.:**

Student will do exercises individually under the supervision of the staff-in-charge.

**Course Delivery:**

**Course Delivery:** The course will be delivered through lectures, demonstration, site visits, expert lectures.

**Course Assessment and Evaluation**

	<b>What</b>		<b>To Whom</b>	<b>Frequency</b>	<b>Max Marks</b>	<b>Evidence Collected</b>	<b>Course Outcomes</b>
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	Exercise & Observation	Students	Average of mark allotted for each exercise	10	Course file and Record notes	1 to 4
		IA Tests		Model Exam 1&2	5+5	Course File, Models & file	1 to 4
		Attendance		Daily Attendance	5	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	75	Answer Scripts at Autonomous Exam Cell	1 to 4
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1&2 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to4 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	7
2	Understanding	33
3	Application	60
<b>Total</b>		<b>100</b>

**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**

**TOTAL** **75 Marks**

**MARK ALLOCATION FOR PART – A & B**

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

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



**DIPLOMA IN CIVIL ENGINEERING**

**II YEAR**

**M10 – SCHEME**

**IV TERM**

**2017 – 2018 onwards**

**M10CE320 – COMPUTER APPLICATION IN ARCHITECTURE**

VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
 VIRUDHUNAGAR – 626001  
**Diploma in Civil Engineering**

To be implemented for the student admitted on the year 2017 - 2018

Programme : CIVIL ENGINEERING	Type of course : Practical
Course Title : COMPUTER APPLICATION IN ARCHITECTURE	Course Code : M10CE320
Term : IV	Course Group : Applied
Teaching Scheme : 0:1:4(L:T:P) (in Hours)	Credits : 3 Credits
No of weeks / term :15	Total Contact Hours : 75
CIE :25 Marks	TEE : 75 Marks

**Pre-requisites:** Basic knowledge on drafting, modeling, rendering in 2D and 3D for designed and existing buildings.

**Course Outcomes:**

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

- C.312.1. Develop 3D models of simple geometrical objects and render their surfaces.
- C.312.2. Apply suitable commands to generate 3D models of furniture and interior artifacts (viz. Lampshade, of buildings.
- C.312.3. Generate Plan, elevation, sectional views and 3D view of Interior layout of each unit in a Residential Building
- C.312.4. Develop Exterior 3D view of a residential Building along with landscaping elements

**COURSE CONTENT:-**

UNIT NO.	UNIT NAME	HOUR
1.	Introduction to 3D modelling	3
2.	3D Surface and Solid Modelling	9
3.	3D views of building components	23
4.	3D views of exterior and interiors of buildings	40
	TOTAL	75

**Course Outcome linkage to Cognitive Level:**

On successful completion of the course, the students will be able to attain following Course Outcomes

Course Outcome		Experiment linked	CL	Linked PO	Teaching Hrs
C.312.1	Develop 3D models of simple geometrical objects and render their surfaces.	2,8,10,12	R/U/A	2,3,4	3
C.312.2	Apply suitable commands to generate 3D models of furniture and interior artifacts (viz. Lampshade, of buildings.	1,3,7,8,9,12	R/U/A	2,3,4,5,6	9
C.312.3	Generate Plan, elevation, sectional views and 3D view of Interior layout of each unit in a Residential Building	7,8,12	R/U/A	3,4,5,6,10	23
C.312.4	Develop Exterior 3D view of a residential Building along with landscaping elements	4,5,6,8,10,11,12	R/U/A	3,4,5,6,10	40
				<b>Total</b>	<b>75 Hrs</b>

Legends: R = Remember U= Understand; A= Application and above levels (Bloom's revised taxonomy)

**Course-PO Attainment Matrix:**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>Computer Application in Architecture</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	-	-	-	<b>3</b>	<b>3</b>	<b>3</b>

**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.

**Course Contents:****DETAIL SYLLABUS****UNIT – I: Introduction to 3D modeling (3hrs)**

General features of CAD and 3D's Max/ Revit Architecture, Hardware and exposure to various software requirements in the preparation of 3D views and its Advantages.

**UNIT – II: 3D Surface and Solid Modeling (9hrs)**

1. 3D Surface and Solid Modeling: Ruled, Revolved and Tabulated Surfaces.
2. Solid Objects: Box, Sphere, Cylinder, Cone, Wedge and Torus.
3. Solid Editing: Union, Subtract, Extrude, Revolve, and Slice.
4. UCS Icon, Views, View ports, V port Settings.
5. Concept of Light, Shade, Colour and materials for rendering 3D models.
6. Creating views using camera for different levels and locations.

**UNIT – III: 3D views of building components (23hrs)**

3D of building components like Doors, Windows and Staircase.

**UNIT – IV: 3D views of exterior and interiors of buildings (40hrs)**

1. Develop rendered 3D view showing both exterior and interior of a residence with single bed and produce the print.
2. Develop rendered 3D view showing both exterior and interior of a residence with two or three bed room with duplex and produce the print out.

**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 Doors and windows
4. Develop Steps and pins
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 with duplex and produce the print out.
10. Develop rendered 3D view showing both interior of a residence with two bed room with duplex and produce the print out.
11. Develop rendered 3D view showing both exterior of a residence with three bed room with duplex and produce the print out.
12. Develop rendered 3D view showing both interior of a residence with three bed room with duplex and produce the print out.

VSVNPC

**Course Delivery:**

The Course will be delivered through Tutorial, classroom interaction and practical experiments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	Exercise & Observation	Students	Average of mark allotted for each exercise	10	Course file and Record notes	1 to 4
		IA Tests		Model Exam 1&2	5+5	Course File, Models & file	1 to 4
		Attendance		Daily Attendance	5	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	75	Answer Scripts at Autonomous Exam Cell	1 to 4
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1&2 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to4 Effectiveness of Delivery of instructions & Assessment Methods

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Tutorial - 1Hr.:**

Staff-in-charge will

1. Explain the concept of experiment to be conducted.
2. Teach required selection of commands shortcuts.
3. Ask students to draw the drawing.

**Conduction/ Execution- 1 Hrs.:**

Student individually drawn and commands used in the exercises individually under the supervision of the staff-in-charge.

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

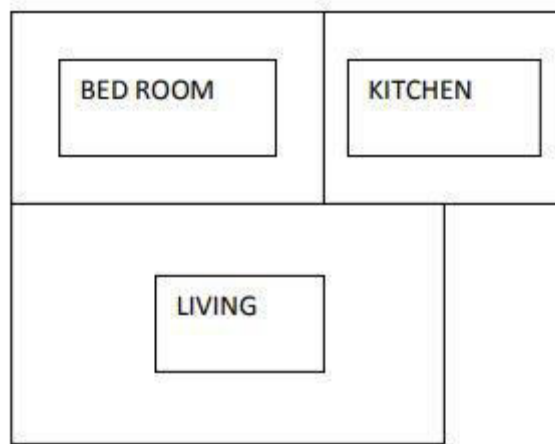
Sl. No.	Educational Component	Weightage (%)
1	Remembering	7
2	Understanding	30
3	Application	63
<b>Total</b>		<b>100</b>

**ALLOCATION OF MARKS**

Content	Max. Marks
PLAN	10
3D MODELING	40
RENDERING	20
Viva voce	5
Total	<b>75 Marks</b>

**Suggested Student Activities:**

1. Create a 3D model and render for the 2D plan.



**Rubrics / Criteria for Assessing Student Activities – Mini project (5 Marks):**

Dimension	Scale					Student Score(ex)		
	Unsatisfactory (1)	Developing (2)	Satisfactory (3)	Good (4)	Exemplary (5)	1	2	3
Understanding the activity	Not Completely	Completely	Ok	Exactly	Well Done	3		
Collection of data	Irrelevant	Less relevant	Relevant	More relevant	Most relevant	4		
Knowledge depth	Poor	Fair	Good	Very Good	Excellent	3		
Presentation	Poor	Less Effective	Effective	Exactly Matched	Most Effectively Attained	4		
<b>TOTAL MARKS</b>					<b>14/4=3.5</b>	<b>4</b>		

## EQUIPMENTS/COMPONENTS REQUIRED

### DETAILS OF INSTRUMENTS:-

Computer, table and chair = each per student

### SOFTWARE: -

Cad software

3Ds Max / Revit Architecture

### Reference:-

### LINKS:-

1. [www.youtube.com/watch?v=KuU-lifKlxQ/](http://www.youtube.com/watch?v=KuU-lifKlxQ/)
2. <https://www.bing.com/videos/search?q=AutoCAD+3D+Tutorial&view=detail&mid=045E14C83CFADF637F80045E14C83CFADF637F80&FORM=VIRE2/>
3. <https://www.bing.com/videos/search?q=3d+using+cad&&view=detail&mid=0B5C596C9398E1C3A7810B5C596C9398E1C3A781&FORM=VRDGAR/>
4. <https://www.bing.com/videos/search?q=3d+rendering+using+cad&&view=detail&mid=23BFF6A4C007857EB5C723BFF6A4C007857EB5C7&FORM=VRDGAR/>

### TEXT BOOKS:-

1. AutoCAD Reference Guide: Everything You Wanted to Know about AutoCAD--Fast!  
By Dorothy Kent
2. Arshad N Siddique, Zahid Khab, Mukhtar Ahmed- Engineering Drawing with CADD



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**V TERM**

**2017 – 2018 onwards**

**M10CE304 – STRUCTURAL ENGINEERING**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 SCHEME**

(To be implemented from the student Admitted from the year 2017 - 2018 Onwards)

Programme	: Civil Engineering	Type of course	: Theory
Course Title	: <b>Structural Engineering</b>	Course Code	: M10CE304
Term	: <b>V</b>	Course Group	: <b>Applied</b>
Teaching Scheme (L:T:P)	: <b>6:0:0</b> (in Hours)	Credits	: <b>6 Credits</b>
No of Weeks	: <b>15</b>	Total Contact Hours	: <b>90</b>
CIE	: <b>25Marks</b>	TEE	: <b>100 Marks</b>

**Pre-requisites** :Basic knowledge on Engineering Mechanics and Theory of Structures

**Course Topics:**

Unit No	Unit Name	Hours
I	REINFORCED CEMENT CONCRETE STRUCTURES	18
II	DESIGN OF T-BEAMS AND LINTELS FOR FLEXURE BY LSM DESIGN OF CONTINUOUS BEAMS FOR FLEXURE AND SHEAR BY LSM	18
III	DESIGN OF ONE WAY SLABS AND STAIR CASES BY LSM DESIGN OF TWO WAY SLABS BY LSM	18
IV	DESIGN OF COLUMNS BY LSM DESIGN OF COLUMN FOOTINGS	18
V	STEEL STRUCTURES	18
	Total	90

**Course Outcomes:**

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

**C.304.1**Analyse and design simple RCC elements like singly / doubly reinforced rectangular beams.

**C.304.2**Analyse and design singly reinforced T-beams (Cantilevers, Simply supported/ Continuous beams, Lintels etc.) for shear and flexure by limit state method;

**C.304.3**Design One way/ Two way slabs and Staircases by limit state method;

**C.304.4**Design Axially loaded Columns and Footings by limit state method;

**C.304.5**Design simple Steel members like Tension members, Compression by limit state method..

**Course Outcome linkage to Cognitive Level**

Course Outcome		CL	Linked PO	Teaching Hrs
<b>C.304.1</b>	Analyse and design simple RCC elements like singly / doubly reinforced rectangular beams.	<i>R/U/A</i>	1,2,5,7,10	18
<b>C.304.2</b>	Analyse and design singly reinforced T-beams (Cantilevers, Simply supported/ Continuous beams, Lintels etc.) for shear and flexure by limit state method	<i>R/U/A</i>	1,2,5,7,10	18
<b>C.304.3</b>	Design One way/ Two way slabs and Staircases by limit state method	<i>R/U/A</i>	1,2,5,7,10	18
<b>C.304.4</b>	Design Axially loaded Columns and Footings by limit state method	<i>R/U/A</i>	1,2,5,7,10	18
<b>C.304.5</b>	Design simple Steel members like Tension members, Compression members by limit state method	<i>R/U/A</i>	1,2,5,7,10	18
<b>Total sessions</b>				<b>90</b>

**Course Content and Blue Print of Marks for TEE:**

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	33	3	10	20	20
II	DESING OF T-BEAMS AND LINTELS FOR FLEXURE BY LSM DESIGN OF CONTINUOUS BEAMS FOR FLEXURE AND SHEAR BY LSM	18	33	3	10	20	20
III	DESIGN OF ONE WAY SLABS AND STAIR CASES BY LSM DESIGN OF TWO WAY SLABS BY LSM	18	33	3	10	20	20
IV	DESIGN OF COLUMNS BY LSM DESIGN OF COLUMN FOOTINGS	18	33	3	10	20	20
V	STEEL STRUCTURES	18	33	3	10	20	20
	<b>Total</b>	<b>90</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Structural Drawing	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

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

**Course Content:**

**STRUCTURAL ENGINEERING**

**DETAILED SYLLABUS**

**REINFORCED CEMENT CONCRETE STRUCTURES**

**1.1 INTRODUCTION TO WORKING STRESS AND LIMIT STATE METHOD (18hours)**

Reinforced Cement Concrete- Materials used in R.C.C and their basic requirements – Purpose of providing reinforcement – Different types and grades of cement and steel – Characteristic strength and grades of concrete – Behaviour of R.C members in bending-Modular ratio and Equivalent area of R.C.Sections – Different types of loads on structures as per IS: 875-1987 - Different methods of design. Working Stress Method-Assumptions made in the W.S.M- Singly reinforced rectangular sections – Strain and stress distribution due to bending – Actual and Critical neutral axes – Under / Over reinforced sections- Balanced sections – Lever arm – Moment of resistance of singly reinforced rectangular sections (No problems).

Limit State Method -Concept –Advantages- Different limit states- Characteristic strength and design strength of materials – Characteristic loads and design loads - Partial safety factors for loads and material strength - Limit state of collapse in flexure – Assumptions – Stress Strain curves for concrete and steel – Stress block – Maximum strain in concrete – Limiting values of neutral axis of singly reinforced section for different grades of steel -Design stress in tension and compression steel– Moment of resistance of singly and doubly reinforced rectangular sections – Problems.

**1.2 DESIGN OF RECTANGULAR BEAMS FOR FLEXURE BY L.S.M**

Design requirements-Effective spans of cantilever and simply supported beams – Breadth and depth requirements of beams – Control of deflection – Minimum depth requirement for stiffness –Minimum concrete cover 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 udl only)- Problems- Practice on using Design Aids, SP16 (not for examination).

**2.1 DESIGN OF T-BEAMS AND LINTELS FOR FLEXURE BY L.S.M (18hours)**

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- 2000-Design of rectangular continuous beams (Singly and Doubly Reinforced) using B.M. coefficients (equal spans & udl only) for sagging and hogging moments. Limit state of collapse in shear – Design shear strength of concrete – Design shear strengths of vertical / inclined stirrups and bent up bars –Principle of shear design – Critical sections for shear- S.F Coefficients specified by IS: 456- 2000– Nominal shear stress –Minimum shear reinforcement- Design of vertical stirrups, inclined stirrups and bent up bars for rectangular beams using limit state method –Simple problems- Practice on use of Design Aids (not for examination).

**3.1 DESIGN OF ONE WAY SLABS AND STAIRCASES BY L.S.M (18hours)**

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.

**4.1 DESIGN OF COLUMNS BY L.S.M (18hours)**

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.

## STEEL STRUCTURES

### 5.1 DESIGN OF TENSION MEMBERS BY L.S.M

(18hours)

General- Characteristic Actions, Partial Safety Factors for Loads, Design Actions- Ultimate Strength, Partial Safety Factors for Materials, Design Strengths of Materials - Rolled Steel Sections - Different forms of Tension members – Gross area, Net area and Net Effective sectional area of Tension members– Maximum permitted values of Effective Slenderness Ratio –Design Strength of Tension members against Yielding of Gross section, Rupture of Critical section and Block Shear- Design Strength of given Plates/ Angles connected to gussets by bolts/welds- Design of ties using single/ double angles, T-sections and channels.

### 5.2 DESIGN OF COMPRESSION MEMBERS BY L.S.M

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).

#### Text 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. B C Punmia, “ R C C Designs”, Laxmi Publications, 2006
8. S SBhavikatti, “ Design of R C C and Structural Elements” ( RCC Vol I), New Age International Publications, 2011
9. I S 456-2000; I S 875-1987; I S 800 -2007.
10. Explanatory hand book SP24, Design Aid SP 16, Detailing of Reinforcement,SP 34
11. M.R.Shiyekar “LimitState Design in Structural Steel”, PHI Learning Pvt Ltd, 2011

#### E-Resources

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>

#### Course Delivery:

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
		<b>TOTAL</b>		<b>25</b>			
	<b>TEE</b> (Term End Examination)	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms	1,2,3 Delivery of course	
	End of Course Survey			End of the Course	Questionnaires	1 to5 Effectiveness of Delivery of instructions & Assessment Methods	

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	31	50
3	Application	60	100
<b>Total</b>		<b>100</b>	<b>165</b>

**MODEL QUESTION**

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 100
Course	: Structural Engineering	Course Code	: M10CE304

**PART – A**

**(10x1=10)**

**Answer any TEN questions .Each carries one marks.**

1. What is meant by limit state?
2. How design load is determined from characteristic load?
3. What is meant by doubly reinforced section?
4. How the width of lintel is being chosen?
5. Write any one advantage of T-beam over rectangular beam
6. Where inverted T-beams are provided?
7. When a slab is to be designed as a one way slab?
8. What is meant by restrained slab?
9. When torsion reinforcement has to be provided in two way slabs?
10. State the minimum value of eccentricity to be considered in the design of columns
11. Why lateral ties are provided in columns?
12. What is the purpose of footing?
13. Write the formula for the net effective area of tension plate connected by staggered bolts
14. When the cross section of a steel member is classified as compact section?
15. Write the formula for calculating the strength of fillet weld.

**PART – B**

**(6x5=30)**

**Answer any SIX questions. Each carries five marks.**

16. Explain the principle of equivalent area used in the analysis of RC sections.
17. Why the deflection of beam has to be controlled.
18. Draw a cross section of T-beam and indicate all notations.
19. Explain principles of Shear design.
20. What is the difference between the one way slab and two way slab?
21. Write the step by step procedure of stair case design.
22. Distinguish between axially loaded and eccentrically loaded column?
23. Write a note on minimum depth of foundation below Ground level.
24. List the types of weld. Explain briefly on welded joints.
25. Write the short notes on bracing .

## PART – C

(6x10=60)

Answer any SIX questions .Each carries ten marks.

26. 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.
27. 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.
28. 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
29. 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.
30. 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<sup>3</sup>. The imposed load is 3KN/m<sup>2</sup>. 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.
31. 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<sup>2</sup>. Use M20 grade concrete and Fe 415 grade steel (Check for stiffness not necessary ).
32. Design a circular RC column with lateral ties to carry an axial load of 1250 KN. Take  $f_{ck}$  as 20 MPa and  $f_{yk}$  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.
33. 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 bearing capacity of soil is 150 KN/m<sup>2</sup> Use M20 grade concrete and Fe 415 grade steel. Check for shear not required.

34. 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<sup>2</sup> and 400 N/m<sup>2</sup>. Connection need not be designed.
35. A laterally supported cantilever beam of 3 m effective span carries a load of 12.5 KN/minclusive 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.

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**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 SCHEME**

**V TERM**

**2017 – 2018 onwards**

**M10CE305 – ENVIRONMENTAL ENGINEERING AND  
POLLUTION CONTROL**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 SCHEME**

(To be implemented from the student Admitted from the year 2017 - 2018 Onwards)

Programme : Civil Engineering	Type of course : Theory
Course Title: <b>ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL</b>	Course Code : M10CE305
Semester : <b>V</b>	Course Group : <b>Applied</b>
Teaching Scheme (L:T:P) : <b>5:0:0</b> (in Hours)	Credits : <b>5 Credits</b>
No of Weeks : <b>15</b>	Total Contact Hours : <b>75</b>
CIE : <b>25Marks</b>	TEE : <b>100 Marks</b>

<b>Pre-requisites</b>	: Knowledge of Science regarding Water, Sanitation and Pollution in Secondary Education
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**Course Topics:**

Unit No	Unit Name	Hours
I	WATER SUPPLY ENGINEERING	15
II	WATER SUPPLY ENGINEERING ( Contd. )	15
III	SANITARY ENGINEERING	15
IV	SANITARY ENGINEERING ( Contd. )	15
V	POLLUTION CONTROL	15
	<b>Total</b>	75

**Course Outcomes:**

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

**C.305.1** Understand the quality of water , Testing procedure and standards of drinking water and various pipe materials.

**C.305.2** Understand the various treatments and Distribution systems of water.

**C.305.3** Understand the concept of waste, types of sewage, sewerage system and various Sewer Appurtenances.

**C.305.4** Understand the various treatment methods and disposal of sewage and Solid waste management.

**C.305.5** Understand the sources, effects and control of Water, Soil, Noise and Air Pollution.

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		CL	Linked PO	Teaching Hrs
<b>C.305.1</b>	Understand the quality of water, Testing procedure and standards of drinking water.	R/U/A	1,2,3,4,5,7,9,10	15
<b>C.305.2</b>	Understand the various treatments and distribution system of water.	R/U/A	1,2,4,6,7,10	15
<b>C.305.3</b>	Understand the concept of waste, types of sewage , sewerage system and various sewer appurtenances.	R/U/A	1,2,4,7,9,10	15
<b>C.305.4</b>	Understand the various treatment methods and disposal of sewage and solid waste management.	R/U/A	1,2,4,6,7,9,10	15
<b>C.305.5</b>	Understand the sources , effects and control of Water, Soil , Noise and Air pollution	R/U/A	1,2,4,5,6,7,8,9,10	15
		Total sessions		75

**Course Content and Blue Print of Marks for SEE:**

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	WATER SUPPLY ENGINEERING	15	33	3	10	20	20
II	WATER SUPPLY ENGINEERING ( Contd. )	15	33	3	10	20	20
III	SANITARY ENGINEERING	15	33	3	10	20	20
IV	SANITARY ENGINEERING ( Contd, )	15	33	3	10	20	20
V	POLLUTION CONTROL	15	33	3	10	20	20
		75	165	15	50	100	100

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Environmental Engineering & Pollution Control	3	3	1	3	1	3	3	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.

**Course Content:**

**ENVIRONMENTAL ENGINEERING & POLLUTION CONTROL**

**PART I - WATER SUPPLY ENGINEERING**

**UNIT - I**

**15 Hrs**

**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

**UNIT - II**

**15 Hrs**

**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.

## **PART II - SANITARY ENGINEERING**

### **UNIT - III**

**15 Hrs.**

#### **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).

### **UNIT -IV**

**15 Hrs**

#### **4.1 TREATMENT AND DISPOSAL OF SEWAGE**

Objects of sewage treatment - flow diagram of sewage treatment plants - treatment of sewage - primary and secondary treatments - screens - skimming tanks - grit chambers - sedimentation tanks – filters - types and description of filters - activated sludge process - septic tanks for isolated buildings - construction and working of septic tanks - disposal of septic tank effluent – soak pits, dispersion trenches - oxidation ponds – sludge

#### **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

## **PART III - POLLUTION CONTROL**

### **UNIT - V**

**15 Hrs.**

#### **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.

### 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
4. Dr.SURESH K.DHAMEJA- Environmental engineering and management,S.K.Kataria&Sons,New Delhi.
5. S.K.GARG- Water supply and sanitary engineering,Khanna publishers, Delhi.
6. M.ANJI REDDI- Text book of Environmental science and technology,BS Publications, Hyderabad.
7. P.VENUGOPALA RAO – Principles of Environmental science and engineering, PHI learningpvt. Ltd., New Delhi.
8. B C Punmia, “Environmental Engineering”, Laxmi Publications, 2010
9. B C Punmia, “Waste Water Engineering”, Laxmi Publications, 2010.

### E-Resources

1. WWW.DESWARE.NET
2. WWW.TATVAGLOBAL.COM
3. WWW.ZAPMETASEARCH.COM
4. WWW.TNPCB.GOV.IN
5. WWW.TUTEFELA.COM

### Course Delivery:

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
		<b>TOTAL</b>		<b>25</b>			
	TEE (Term End Examination)	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
Indirect Assessment	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to5 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)	Total Marks (Out of 140)
1	Remembering	9	15
2	Understanding	31	50
3	Application	60	100
<b>Total</b>		<b>100</b>	<b>165</b>

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MODEL QUESTION

Term : V Time : 3 Hrs  
Programme : Diploma in Civil Engineering Max. Marks : 100  
Course : Environmental Engineering & Pollution Control Course Code : M10CE304

**PART - A ( 10x1= 10)**

**Answer any TEN questions .Each carries one marks.**

- 1 What is Per capita demand.
- 2 What is Infiltration Gallery.
- 3 Define pH value.
- 4 What do you mean water treatment.
- 5 Name any two miscellaneous methods water treatment process
- 6 What is gravity system of distribution
- 7 Define Sullage
- 8 What is sewer appurtenances
- 9 Name any two shape of sewer
- 10 State the main function of primary sewage treatment.
- 11 What is Soak pit.
- 12 What is solid waste.
- 13 Define Environment.
- 14 What is Noise pollution
- 15 What is Ozone layer.

**PART - B (6x5 =30)**

**Answer any SIX questions. Each carries five marks.**

- 16 Explain how the corrosion in a pipe is controlled
- 17 Explain how the water sample is collected for testing.
- 18 Explain the R.O. process of water with a sketch.
- 19 Give a brief note about the coagulation process of water.
- 20 List out all the sewer appurtenances
- 21 List out all the materials used for sewer ( construction )
- 22 Give a brief note about Oxidation Pond with a neat sketch
- 23 Explain the working of Grid chamber with a sketch
- 24 Give a brief note about Green House Effect.
- 25 State the effects of Water Pollution

**PART - C**

**(6x10=60)**

**Answer any SIX questions .Each carries ten marks.**

- 26 Define Intake. Name its different types and explain the River Intake with a neat sketch.
- 27 List out all the Physical tests to be conducted for water and explain any two tests in detail.
- 28 Explain the construction and working of Rapid sand filter with a neat sketch.
- 29 Name the different layouts of distribution of water and explain any two methods in detail with sketches.
- 30 Discuss in detail the different methods of Ventilation provided along the sewer line.
- 31 Explain the construction and working of a Manhole with neat sketch.
- 32 Discuss in detail the Activated Sludge Process with Flow Diagram.
- 33 Name the different methods of Solid waste disposal and explain the Compositing method in detail with neat sketches.
- 34 Name the different Air Pollution controlling devices and explain the construction and working of any one device in detail.
- 35
  - a) Explain the sources and effects of Land Pollution.
  - b) Environmental Degradation.



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**V TERM**

**2017 –2018 onwards**

**M10CE401- WATER RESOURCES MANAGEMENT**

VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 SCHEME

(To be implemented from the student Admitted from the year 2017-2018 Onwards)

Programme : Civil Engineering	Type of course : Theory
Course Title: WATER RESOURCES MANAGEMENT	Course Code : M10CE401
Semester : V	Course Group : Diversified
Teaching Scheme (L:T:P) : 5:0:0 (in Hours)	Credits : 5 Credits
No of weeks/Term : 15	Total Contact Hours : 75
CIE : 25Marks	TEE : 100 Marks

**Pre-requisites** : Knowledge of Science in Secondary Education

**Course Topics:**

Unit No	Unit Name	Hours
I	INTRODUCTIONHYDROLOGY	13
II	GROUND WATERMANAGEMENT OF GROUND WATER	13
III	RIVERS AND RIVER TRAINING WORKSSTORAGE WORKS	23
IV	DISTRIBUTION WORKSMANAGEMENT OF CANAL IRRIGATION	13
V	WATER SHED MANAGEMENT WATER HARVESTING AND RECYCLING	13
	<b>Total</b>	75

**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 and concept 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

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		CL	Linked PO	Teaching Hrs
<b>C.401.1</b>	Understand the hydrological cycle and application of hydrology in engineering	R/U/A	1,2,3,4,5,9	13
<b>C.401.2</b>	Understand the ground water resources and. Concept of basin management	R/U/A	1,2,3,4,5,9,10	13
<b>C.401.3</b>	Study the river training works and process of storage works	R/U/A	1,2,3,4,5,6	23
<b>C.401.4</b>	Understand the concept of distribution works and management of canal irrigation	R/U/A	1,2,3,4,5,9,10	13
<b>C.401.5</b>	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 SEE:**

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
1	INTRODUCTION OF HYDROLOGY	13	33	3	10	20	20
2	GROUND WATERMANAGEMENT OF GROUND WATER	13	33	3	10	20	20
3	RIVERS AND RIVER TRAINING WORKSSTORAGE WORKS	23	33	3	10	20	20
4	DISTRIBUTION WORKSMANAGEMENT OF CANAL IRRIGATION	13	33	3	10	20	20
5	WATER SHED MANAGEMENT WATER HARVESTING AND RECYCLING	13	33	3	10	20	20
<b>Total</b>		<b>75</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>WATER RESOURCES MANAGEMENT</b>	3	2	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.*

**Course Content:**

**1.1 INTRODUCTION**

**(13 Hours)**

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

**2.1 GROUND WATER**

**(13 Hours)**

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.

**3.1 RIVERS AND RIVER TRAINING WORKS**

**(23 Hours)**

Classification of river - Major rivers in India and Tamil Nadu – Inter linking of rivers in India and its importance – flood - flood forecasting - flood control in India. River training - objectives of river training - classification of river training - methods of river training – levees -guide banks – spurs – types - artificial cut-offs – launching apron - pitching of banks - pitched islands - miscellaneous methods.

**3.2 STORAGE WORKS**

Surface storage - purpose of surface storage – tanks – types – tank weirs – tank outlet – reservoirs – types - storage capacity of reservoir - methods of determination of storage capacity of reservoir – reservoir losses – dams - classification of dams - selection of dam site – Earth dams – types - methods of construction- causes of failure of earth dam - remedial measures – spillway - types - spillway crest gates-types – sluiceway - types.

**4.1 DISTRIBUTION WORKS****(13 Hours)**

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.

**5.1 WATER SHED MANAGEMENT****(13 Hours)**

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

**TEXT BOOKS**

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.
3. David Keith Todd.,Ground water Hydrology,Johnwiley&sons,Singapore.
4. Dilip Kumar Majumdar, Irrigation water management - Principles and Practice, PHI Pvt.Ltd.NewDelhi-1.
5. Madan Mohan Das&Mimi Das Saikia, Irrigation and water power Engineering, PHI learning pvt. Ltd., NewDelhi-1
6. K.Subramanya, Engineering hydrology,Tata McGraw-Hill publishing company ltd.,New Delhi.

## E-Resources

1. [www.elearning.com/water resource management](http://www.elearning.com/water resource management)
2. <http://nptel.ac.in/video.php?subjectId=105104101>
3. <http://media.sakshat.ac.in/NPTEL-IIT-Videos/>
4. [http://nptel.iitk.ac.in/courses/Civil\\_Eng/IIT%20Roorkee/water resources.html](http://nptel.iitk.ac.in/courses/Civil_Eng/IIT%20Roorkee/water resources.html)
5. <http://nptel.iitk.ac.in/>

## Course Delivery:

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

VSVNPC

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
		<b>TOTAL</b>		<b>25</b>			
	TEE (Term End Examination)	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
Indirect Assessment	Student Feedback on course		Students	Middle of the Course	Feed Back Forms	1,2,3 Delivery of course	
	End of Course Survey			End of the Course	Questionnaires	1 to5 Effectiveness of Delivery of instructions & Assessment Methods	

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weight age (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	31	50
3	Application	60	100
<b>Total</b>		<b>100</b>	<b>165</b>

MODEL QUESTION

Term : V  
Programme : **Diploma in Civil Engineering**  
Course : **Water Resource Management**

Time : **3 Hrs**  
Max. Marks : **100**  
Course Code : **M10CE401**

**PART – A**

**(10x1=10)**

**Answer any ten questions .Each carries one marks**

1. State the importance of water resources.
2. State the factors involved in water resources management.
3. Define hydrology.
4. State any two uses of unit hydrograph.
5. Define Darcy's law.
6. Define aquifer.
7. State any two methods of artificial recharge.
8. State the levels of study in ground water basin investigation.
9. Name any four major rivers in India.
10. What are the methods of river training?
11. What is a storage work?
12. Name the reservoir losses.
13. State the classification of canals.
14. State the different types of cross drainage works.
15. Define crop rotation.

**PART – B**

**(6x5=30)**

**Answer any six questions. Each carries five marks.**

16. Write short notes on world water inventory.
17. State the necessity for conserving water resources.
18. How do you measure the yield of a well?
19. Briefly explain the types of aquifers
20. Explain the various types of spurs
21. State the objectives of river training works.
22. Explain different types of cross drainage works with sketches
23. Explain any three types of canal lining
24. Explain contour bunding and bench terracing
25. Explain surface and sub surface drains

**PART – C**

**(6x10=60)**

**Answer any six questions .Each carries ten marks.**

26. Explain the different types of rain gauges with neat sketches and also state their merits and demerits.
27. What are the Necessity for conservation and development of water resources
28. Explain the methods of artificial recharge in detail
29. Explain the details of ground water exploration
30. With neat sketches, explain the causes of failure of earth dam and suggest suitable remedial measures
31. Explain types of spillway
32. Explain the various methods of improving canal irrigation management
33. What are the need and objectives of for canal irrigation management
34. Write short notes on water logging and soil reclamation.
35. Explain the types of ponds.



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**V TERM**

**2017 –2018 onwards**

**M10CE402- APPLICATIONS OF GIS IN CIVIL ENGINEERING**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 SCHEME**

(To be implemented from the student admitted from the year 2017- 2018 Onwards)

Programme : Civil Engineering	Type of course : Theory
Course Title: APPLICATIONS OF GIS IN CIVIL ENGINEERING	Course Code : M10CE402
Term : <b>V</b>	Course Group : <b>Diversified</b>
Teaching Scheme (L:T:P) : <b>5:0:0</b> (in Hours)	Credits : <b>5 Credits</b>
No of Weeks : <b>15</b>	Total Contact Hours : <b>75</b>
CIE : <b>25Marks</b>	TEE : <b>100 Marks</b>

<b>Pre-requisites</b>	: Knowledge of Science and Geology in Secondary Education
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**Course Topics:**

Unit No	Unit Name	Hours
I	INTRODUCTION TO GIS MAP AND MAP SCALES	13
II	GEOREFERENCING AND PROJECTION SPATIAL DATABASE MANAGEMENT SYSTEMS	13
III	DATA MODELS AND DATA STRUCTURES	13
IV	SPATIAL DATA INPUT AND EDITING SPATIAL ANALYSIS	23
V	CARTOGRAPHIC PRINCIPLES AND DESIGN INTERPOLATION	13
	<b>Total</b>	<b>75</b>

**Course Outcomes:**

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

**C.402.1** Understand and analyze the functional basics of G.I.S.

**C.402.2** Classify the maps, coordinate systems and projections.

**C.402.3** Understand the concepts of vector data and raster data and types

**C.402.4** Process spatial and attribute data and prepare maps.

**C.402.5** Understand the concept of cartographic principle and study the methods of interpolation.

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		CL	Linked PO	Teaching Hrs
<b>C.402.1</b>	Understand and analyse the functional basics of G.I.S.	<i>R/U</i>	1,2,3,4,5,7	13
<b>C.402.2</b>	Classify the maps, coordinate systems and projections.	<i>U/A</i>	1,2,3,4,5,9	13
<b>C.402.3</b>	Understand the concepts of vector data and raster data and types	<i>R/U</i>	1,2,3,4,9,10	13
<b>C.402.4</b>	Process spatial and attribute data and prepare maps.	<i>U/A</i>	1,2,3,4	23
<b>C.402.5</b>	Understand the concept of cartographic principle and study the methods of interpolation.	<i>U/A</i>	1,2,3,4	13
			Total sessions	75

**Course Content and Blue Print of Marks for TEE:**

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	INTRODUCTION TO GIS MAP AND MAP SCALES	13	33	3	10	20	20
II	GEOREFERENCING AND PROJECTION SPATIAL DATABASE MANAGEMENT SYSTEMS	13	33	3	10	20	20
III	DATA MODELS AND DATA STRUCTURES	13	33	3	10	20	20
IV	SPATIAL DATA INPUT AND EDITING SPATIAL ANALYSIS	23	33	3	10	20	20
V	CARTOGRAPHIC PRINCIPLES AND DESIGN INTERPOLATION	13	33	3	10	20	20
<b>Total</b>		<b>75</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
APPLICATIONS OF GIS IN CIVIL ENGINEERING	3	3	3	3	2	-	1	-	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  $\geq 40\%$  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.

**Course Content:**

**UNIT – I 13 Hours**

**INTRODUCTION TO REMOTE SENSING**

Basic Concepts of Remote Sensing – Energy Sources and Radiation principles – electromagnetic radiation – characteristic of real remote sensing system, platforms, sensors, satellite, Indian Remote Sensing satellite

**UNIT – II 13 Hours**

**PHOTOGRAMMETRY**

Geometric elements of a vertical photograph – Stereoscopic plotting instruments, Ortho photos, Flight planning

**UNIT – III 13 Hours**

**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

**UNIT – IV****23 Hours****INTRODUCTION TO GIS**

Basic Concepts of GIS – Introduction to GIS - History of development of GIS -Elements of GIS, Computer hardware – Software, Data Input, Verification, Storage and Output

**UNIT –V****13 Hours****GIS ANALYSIS**

Map Overlay - Vector and raster data model, mapping concept, data storage and database management - development of map overlay, overlay operation Errors and quality control – Current issues and Trends in GIS application in Civil Engineering

**Reference Book :**

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

**E-Resources**

1. [geology.wlu.edu/harbour/geol260/lecture-notes/notes.html](http://geology.wlu.edu/harbour/geol260/lecture-notes/notes.html)
2. <https://www.smartzworld.com/notes/remote-sensing-notes-pdf-rs-notes-pdf>
3. [Nptel.ac.in/courses/105102015/](http://Nptel.ac.in/courses/105102015/)
4. <http://media.sakshat.ac.in/NPTEL-IIT-Videos/>
5. [gi.iitk.ac.in/gi/nptel-lectures](http://gi.iitk.ac.in/gi/nptel-lectures)

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE</b> (Term End Examination)	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires	1 to5 Effectiveness of Delivery of instructions & Assessment Methods	

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	31	50
3	Application	60	100
<b>Total</b>		<b>100</b>	<b>165</b>

**MODEL QUESTION**

Term : V Time : 3 Hrs  
Programme : Diploma in Civil Engineering Max. Marks : 100  
Course : Applications of GIS in Civil engineering Course Code : M10CE402

**PART – A (10x1=10)**

**Answer any ten questions .Each carries one marks**

1. How are remote sensing images obtained are or converted into digital form?
2. Why are digital forms used?
3. What are the four major areas of computer operations in digital image processing?
4. What is image enhancement?
5. What is image classification?
6. What is data-set merging?
7. How are digital numbers used in application to remote sensing images?
8. How are data stored and used by computers?
9. What is GIS?
10. What are the four functions to be included in all GIS?
11. Which are the areas of GIS application in commercial industry?
12. What is reverse geocoding?
13. What is geo-processing?
14. What is database organization?
15. What are the advantages and disadvantages of employing object-oriented GIS database?

**PART-B (6x5=30)**

**Answer any six questions. Each carries five marks.**

16. What are the five basic steps for image classification?
17. Differentiate between unsupervised classification and supervised classification?
18. What are the advantages to be guided by multi sensor image merging?
19. What are the other image variations which computers can produce from the input data?
20. What are the advantages to be gained by multi sensor image merging?
21. What is the size in pixels of a MSS land at image and a TM lands at image?
22. Describe the difference between raster and vector data models used to represent maps in a GIS.
23. Summarize the various definitions of a GIS.
24. What is the difference between projected coordinated system and geographic Co-ordinate system?
25. Describe the differences between raster and vector based GIS.

PART – C

(6x10=60)

Answer any six questions .Each carries ten marks

26. Draw the electromagnetic spectrum used in RS. Explain how the radiation take placed in different wave length.
27. Write about IRS satellite.
28. What are the stereoscopes? Explain any one of its types?
29. Explain the process of obtaining Stereo coverage?
30. What is image enhancement? Explain in detail.
31. Explain image classification.
32. Differentiate between spatial data & attribute data, Give some examples?
33. Summarize the various definitions of GIS. What elements does each have in common?
34. What are the types of errors deducted while overlaying? How are they rectified?
35. What are dumb maps? Why they and what are would make them intelligent.

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**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**V TERM**

**2017 – 2018 onwards**

**M10CE403 – BUILDING SERVICES AND SOLAR ENERGY FOR  
BUILDINGS**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 SCHEME**

(To be implemented from the student Admitted from the year 2017-2018 Onwards)

Programme : Civil Engineering	Type of course : Theory
Course Title: <b>BUILDING SERVICES AND SOLAR ENERGY FOR BUILDINGS</b>	Course Code : <b>M10CE403</b>
Term : <b>V</b>	Course Group : <b>Diversified</b>
Teaching Scheme (L:T:P) : <b>5:0:0</b> (in Hours)	Credits : <b>5 Credits</b>
No of Weeks : <b>15</b>	Total Contact Hours : <b>75</b>
CIE : <b>25Marks</b>	TEE : <b>100 Marks</b>

**Pre-requisites** : Knowledge of Mathematics, Science in Secondary Education

**Course Topics:**

Unit No	Unit Name	Hours
I	ELECTRICAL SERVICES, ELECTRICAL LAYOUT, SOLAR THERMAL SYSTEMS FOR BUILDINGS	13
II	MECHANICAL SERVICES ,AIR-CONDITIONING	13
III	LIGHTING, VENTILATION	13
IV	FIRE-PROTECTION ,ACOUSTICS AND SOUND INSULATIONS	23
V	MAINTENANCE OF BUILDINGS, DEFECTS AND REPAIR WORKS IN BUILDINGS, PASSIVE SOLAR BUILDING DESIGN	13
	<b>Total</b>	75

**Course Outcomes:**

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

**C.403.1** Understand the basic concept of electrical components and prepare the electrical layout, applications of solar power.

**C.403.2** Study the application of mechanical services in buildings and types of air conditioning.

**C.403.3** Understand the concepts and functions of lighting and types of mechanical ventilation.

**C.403.4** Study the fire protection devices, applications of acoustics in buildings.

**C.403.5** Understand the concept of maintenance and repairing works in building and design the passive solar building.

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		CL	Linked PO	Teaching Hrs
C.403.1	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
C.403.2	Study the application of mechanical services in buildings and types of air conditioning	R/U	1,2,3,4,5	13
C.403.3	Understand the concepts and functions of lighting and types of mechanical ventilation	U/A	1,2,3,4	13
C.403.4	Study the fire protection devices, applications of acoustics in buildings	U/A	1,2,3,5,6	23
C.403.5	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 TEE:**

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	ELECTRICAL SERVICES, ELECTRICAL LAYOUT ,SOLAR THERMAL SYSTEMS FOR BUILDINGS	13	33	3	10	20	20
II	MECHANICAL SERVICES ,AIR-CONDITIONING	13	33	3	10	20	20
III	LIGHTING, VENTILATION	13	33	3	10	20	20
IV	FIRE-PROTECTION ,ACOUSTICS AND SOUND INSULATIONS	23	33	3	10	20	20
V	MAINTENANCE OF BUILDINGS, DEFECTS AND REPAIR WORKS IN BUILDINGS, PASSIVE SOLAR BUILDING DESIGN	13	33	3	10	20	20
	<b>Total</b>	<b>75</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
BUILDING SERVICES AND SOLAR ENERGY FOR BUILDINGS	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.*

**Course Content:**

**1.1 ELECTRICAL SERVICES**

**(13 Hours)**

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.

**1.3 SOLAR THERMAL SYSTEMS FOR BUILDINGS**

Solar Collectors – cookers – Thermal Energy storage systems and their integration with buildings – Advantages and Limitations

**2.1 MECHANICAL SERVICES**

**(13 Hours)**

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.

### **3.1 LIGHTING**

**(13 Hours)**

Natural and Artificial Lighting – Requirements of good lighting – Day light factors – Day light Penetration – Aims of good lighting – General Principles of openings to afford good lighting – Reflection factors – Illumination – Units of measurement – Lux, candela, Luminous flux – Orientation of buildings – External reflected component – Internal reflected component – Necessity of artificial lighting – Arrangement of luminaries – Distribution of Illumination – Utilization factor – Temperature rise due to artificial lighting – Remedial measures.

### **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.

### **4.1 FIRE PROTECTION**

**(23 Hours)**

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.

### **5.1 MAINTENANCE OF BUILDINGS**

**(13 Hours)**

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

## 5.3 PASSIVE SOLAR BUILDING DESIGN

Introduction - Passive Energy Gain – Solar Path in Passive Design – Passive solar heat Transfer Principles- Site specific considerations – Efficiency and Economics of passive solar heating

### TEXT BOOKS

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

### E-Resources

1. [www.eai.in](http://www.eai.in)
2. <http://www.solarenergy.org>
3. <http://nptel.iitk.ac.in/courses/112105051>

### Course Delivery:

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
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\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)	Total Marks (Out of 165)
1	Remembering	9	15
2	Understanding	31	50
3	Application	60	100
<b>Total</b>		<b>100</b>	<b>165</b>

VSVNPC

**MODEL QUESTION**

Term	: V	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 100
Course	: Building Services & Solar energy for buildings	Course Code	: M10CE403

**PART – A**

**(10x1=10)**

**Answer any ten questions .Each carries one marks.**

1. Mention any two symbols for electrical installations.
2. What is the use of junction box?
3. Define Earthing.
4. What is the use of lift?
5. Write any two types of elevators.
6. Mention any two purposes of air conditioning.
7. Write any two requirements of good lighting.
8. Define lux.
9. Write the necessity of ventilation.
10. Write any two causes of fire.
11. Define fire alarm system.
12. Write any two characteristics of sound.
13. Write any two types of maintenance works in buildings.
14. Write any two types of cracks in concrete.
15. Write any two defects in buildings.

**PART – B**

**(6x5=30)**

**Answer any six questions. Each carries five marks.**

16. Explain the various wiring systems adopted in building.
17. Draw a neat sketch of layout of electrical fittings in a residential building.
18. Describe escalator and its uses.
19. Explain in details about indoor air-conditioner.
20. Describe about necessity of artificial lighting.
21. What are the methods of mechanical ventilation and explain any one detail.
22. Explain the factors to be considered for limiting fire spreading area.
23. State the different factors to be considered in acoustical design.
24. Describe the maintenance of water supply and drainage system in building.
25. Explain about thermal insulation combines with water proofing for flat concrete roofs

**PART – C**

**(6x10=60)**

**Answer any six questions .Each carries ten marks**

26. Explain the various wiring systems adopted in building
27. Draw a neat sketch of layout of electrical fittings in a residential building
28. Describe escalator and its uses
29. Explain in detail about indoor air conditioners
30. Describe about necessity of artificial lighting
31. What are the methods of Mechanical Ventilation and explain any one in detail?
32. Explain the factors to be considered for limiting fire spreading area?
33. State the different factors to be considered in acoustical design
34. Describe maintenance of water supply and drainage system in building
35. Explain about thermal insulation combined with water proofing for flat concrete roofs.

VSVNPC



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 SCHEME**

**V TERM**

**2017 – 2018 onwards**

**M10CE404 – SOIL MECHANICS AND FOUNDATION  
ENGINEERING**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 SCHEME**

(To be implemented from the student Admitted from the year 2017 - 2018 Onwards)

Programme <b>Civil Engineering</b>	Type of course : <b>Theory</b>
Course Title: <b>SOIL MECHANICS AND FOUNDATION ENGINEERING</b>	Course Code : <b>M10CE404</b>
Term : <b>V</b>	Course Group : <b>Diversified</b>
Teaching Scheme (L:T:P) : <b>5:0:0</b> (in Hours)	Credits : <b>5 Credits</b>
No of weeks : <b>15</b>	Total Contact Hours : <b>75</b>
CIE : <b>25 Marks</b>	TEE : <b>100 Marks</b>

**Pre-requisites** : Knowledge in Soil properties and Foundation illustration

**Course Topics:**

Unit No	Unit Name	Hours
I	INTRODUCTION TO EARTHQUAKE	15
II	SEISMIC EFFECTS ON STRUCTURES	15
III	BEHAVIOUR OF STRUCTURES DURING EARTHQUAKES	15
IV	CONCEPTS OF DESIGN OF EARTHQUAKE RESISTING BUILDINGS	15
V	RETROFITTING OF BUILDINGS BASE ISOLATION FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURE	15
	<b>Total</b>	75

**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.

**Course Outcome linkage to Cognitive Level**

**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	1,2,3,4,5,6,9	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	1,2,3,4,5,6,8,9,10	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	1,2,3,4,5,6,8,10	15
			<b>Total sessions</b>	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	33	3	10	20	20
II	CLASSIFICATION AND STRENGTH OF SOIL STABILIZATION OF SOIL AND SUB-SOIL SAMPLING	15	33	3	10	20	20
III	SEEPAGE ANALYSIS AND SEEPAGE BELOW HYDRAULIC STRUCTURES BEARING CAPACITY AND SETTLEMENT OF FOUNDATIONS	15	33	3	10	20	20
IV	FOUNDATIONS FOUNDATIONS IN EXPENSIVE SOIL	15	33	3	10	20	20
V	MACHINE FOUNDATION FOUNDATIONS OF TRANSMISSION LINE TOWERS	15	33	3	10	20	20
	<b>Total</b>	75	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>SOIL MECHANICS AND FOUNDATION ENGINEERING</b>	3	3	3	3	3	3	1	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.*

**Course Content**

**SOIL MECHANICS AND FOUNDATION ENGINEERING**

**DETAILED SYLLABUS**

**UNIT I: SOIL MECHANICS AND INDEX PROPERTIES HYDRAULIC PROPERTIES OF SOIL** **15hours**

**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 conditions

**UNIT II: CLASSIFICATION AND STRENGTH OF SOIL STABILIZATION OF SOIL AND SUB-SOIL SAMPLING** **15HOURS**

**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

## **UNIT III –SEEPAGE ANALYSIS AND SEEPAGE BELOW HYDRAULIC STRUCTURESBEARING CAPACITY AND SETTLEMENT OF FOUNDATIONS**

**15hours**

### **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

## **UNIT IV–FOUNDATIONSFOUNDATIONS IN EXPENSIVE SOIL**

**15 hours**

### **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

## UNIT V-MACHINE FOUNDATION

15hours

### 5.1 FOUNDATIONS OF TRANSMISSION LINE TOWERS

Introduction - Soil dynamics – Free vibration and Forced vibration - Definitions –Natural frequency - Barkan’s method- Pauw’s method - Types of machines and machine foundation - General requirements – Design of machine foundations - Reciprocating type - Centrifugal type - Impact type - Steps to design - Couzen theory - In-situ dynamic investigation of soil - Methods - IS code of practice – Design criteria - Isolation of foundation - Simple problems

### 5.2 FOUNDATIONS OF TRANSMISSION LINE TOWERS

Introduction - Necessity - Forces on Tower Foundations - General design criteria - Choice and type of foundations - Design procedures - Stability conditions - Description – No problems

#### Reference Book:

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

#### E-Resources

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, and exercises.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
		<b>TOTAL</b>		<b>25</b>			
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to 5 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	31	50
3	Application	60	100
<b>Total</b>		<b>100</b>	<b>165</b>

**MODEL QUESTION**

Term : V Time : 3 Hrs  
Programme : Diploma in Civil Engineering Max. Marks : 100  
Course : Soil mechanics and foundation Engineering Course Code : M10CE404

**PART-A**

(10X1 =10)

**Answer any ten questions .Each carries one marks.**

1. Define soil formation
2. Define plastic limit
3. What is meant by co efficient of permeability
4. Define shear strength of soil
5. Compare compaction and consolidation
6. What is meant by chunk sampling
7. Define hydraulic gradient
8. What are the uses of flownet
9. Define bearing capacity of soil
10. Define negative skin friction
11. What are the uses of piles
12. Write free swell test
13. Define soil dynamics
14. Write the formula for couzen theory
15. Write the necessity of foundation.

**PART-B**

(6X5=30)

**Answer any six questions. Each carries five marks**

16. Explain Atterberg limit.
17. Write factors affecting permeability
18. Explain the methods of compaction
19. Explain the objects of soil stabilization
20. Write the uses of flownet.
21. Explain shear failure
22. Write short notes on negative skinfriction.
23. Write short notes on swell potential.
24. Explain general requirements of machine foundation.
25. Explain the types of foundation.

**PART-C**

(6X10=60)

**Answer any six questions .Each carries ten marks.**

26. Explain atterberg limits in detail
27. Explain any two permeability test in detail
28. Explain the standard proctor compaction test
29. Explain geophysical method in soil stabilization
30. Give details on
  - i) Explain Quick sand condition
  - ii) what are the properties of flow net
31. Explain plate load test with neat sketch
32. Explain the types of foundations with neat sketch
33. State the “CNS” concept of replacement of soils
34. What are the conditions of choice and type of foundations in detail
35. Explain the design of mechanical foundation in detail



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**V TERM**

**2017 – 2018 onwards**

**M10CE312- CIVIL ENGINEERING DRAWING -II**

VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 SCHEME

(To be implemented from the student Admitted from the year 2017 - 2018 Onwards)

Programme : Civil Engineering	Type of course : Theory
Course Title: <b>CIVIL ENGINEERING DRAWING II</b>	Course Code : M10CE312
Semester : <b>V</b>	Course Group : Applied
Teaching Scheme (L:T:P) : <b>6:0:0</b> (in Hours)	Credits : <b>4 Credits</b>
No of Weeks : <b>15</b>	Total Contact Hours : <b>90</b>
CIE : <b>25Marks</b>	TEE : <b>100 Marks</b>

**Pre-requisites** : Knowledge of Public health, bridge and Structural Engineering drawing and various components

**Course Topics:**

Unit No	Unit Name	Hours
I	PUBLIC HEALTH ENGINEERING DRAWING	24
II	BRIDGE DRAWING	18
III	STRUCTURAL ENGINEERING DRAWING	48
	<b>Total</b>	<b>90</b>

**Course Outcomes:**

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

**C.402.1** Understand the Public health drawing.

**C.402.2** Understand the bridged drawing

**C.402.3** Understand the Structural Engineering drawing and bar bending schedule

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		CL	Linked PO	Teaching Hrs
<b>C.402.1</b>	Understand the basics of Public health engineering drawing and components	R/U	1,2,3,4,6,8	24
<b>C.402.2</b>	Understand basics bridge drawing and components	R/U	1,2,3,4,7	18
<b>C.402.3</b>	Understand the various type of structural Engineering drawing with bar bending schedule	R/U	1,2,3,4,5,8,9,10	48
Total sessions				90

**Course Content and Blue Print of Marks for SEE:**

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	50	10	15	40	25
II	BRIDGE DRAWING	18	50	10	15	40	25
III	STRUCTURAL ENGINEERING DRAWING WITH BAR BENDING SCHEDULE	48	100	10	20	40	50
<b>Total</b>		<b>90</b>	<b>200</b>	<b>30</b>	<b>50</b>	<b>120</b>	<b>100</b>

### Course-PO Attainment Matrix

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>CIVIL ENGINEERING DRAWING-II</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>

METHOD IS TO RELATE THE LEVEL OF PO WITH THE NUMBER OF HOURS DEVOTED TO THE COS WHICH ADDRESS THE GIVEN PO.

IF  $\geq 40\%$  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.

### Course Content:

Unit	Name of the Topic	Hours
I	<b>PUBLIC HEALTH ENGINEERING DRAWING</b> 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	<b>BRIDGE DRAWING</b> 5. Two Span Pipe Culvert 6. Two Span Tee Beam With square Returns	18 Hrs
II	<b>STRUCTURAL ENGINEERING DRAWING WITH BAR BENDING SCHEDULE</b> 5. Simply supported one – way slab 6. Simply supported two-way slab 7. Restrained two-way slab 8. Singly reinforced Simply supported beam 9. Doubly reinforced Continuous beam with two spans 10. Tee Beams supporting continuous slab 11. Dog-legged staircase 12. Lintel cum Sunshade 13. R.C.C Column with square Isolated footing	48 Hrs

**REFERENCE:**

1. Drawing manual –N.I. T.T.T.R – Chand & Co.
2. Structural Drawing and Detailing –Krishnamoorthy
3. M Chakraborti, “Civil Engineering Drawing”
4. Gurucharansingh & Subhash Chandar Sharma, “Civil Engineering Drawing”

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

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**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
		<b>TOTAL</b>		<b>25</b>			
	<b>TEE</b> (Term End Examination)	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms	1,2,3 Delivery of course	
	End of Course Survey			End of the Course	Questionnaires	1 to5 Effectiveness of Delivery of instructions & Assessment Methods	

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 200)</b>
1	Remembering	15	30
2	Understanding	25	50
3	Application	60	120
<b>Total</b>		<b>100</b>	<b>200</b>

MODEL QUESTION

Term : V Time : 3 Hrs  
Programme : Diploma in Civil Engineering Max. Marks : 100  
Course : Civil Engineering Drawing - II Course Code : M10CE312

- 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. (40)
- 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. (25)
- d. Neatness, scale, details. (10)

**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. (25)
  - 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. (25)
- b. Prepare a bar bending schedule. (30)



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 SCHEME**

**V TERM**

**2017 – 2018 onwards**

**M10CE313 – CONSTRUCTION PRACTICE LAB**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 SCHEME**

(To be implemented from the student Admitted from the year 2017-2018 Onwards)

Programme : Civil Engineering	Type of course : Practical
Course Title: <b>CONSTRUCTION PRACTICE LAB</b>	Course Code : M10CE313
Semester : <b>V</b>	Course Group : <b>Applied</b>
Teaching Scheme (L:T:P) : <b>0:1:3</b> (in Hours)	Credits : <b>2 Credits</b>
No of Weeks : <b>15</b>	Total Contact Hours : <b>60</b>
CIE : <b>25Marks</b>	EE : <b>75 Marks</b>

**Pre-requisites** : Knowledge of Engineering mathematics and Applied Science.

**Course Topics:**

Unit No	Unit Name	Hours
I	PREPARATION OF CENTERLINE PLAN AND FOUNDATION PLAN	12
II	ARRANEMENT OF BRICKS USING ENGLISH BOND	12
III	TEST ON FRESH AND HARDENED CONCRETE	12
IV	QUALITY CONTROL TEST ON CONCRETE MAKING MATERIALS	12
V	ARRANGEMENT OF REINFORCEMENT FOR BEAM,COLUMN AND LINTEL CUM SUNSHADE	12
	<b>Total</b>	60

**Course Outcomes**

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

- C.313.1 Conduct quality control tests on concrete making materials
- C.313.2 Understand and able to prepare and testing the concrete cubes
- C.313.3 Understand and able to prepare the centerline plan and foundation plan
- C.313.4 Conduct quality control test on fresh and hardened concrete
- C.313.5 Understand and able to arrange the bricks using English bond

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		Experiment linked	CL	Linked PO	Teaching Hrs
C.313.1	Conduct quality control test on concrete making materials	10,11,14,15	R/U	1,2,4,5,7,10	12
C.313.2	Understand and able to prepare and testing the concrete cubes	9	R/U	1,2,4,7,9,10	12
C.313.3	Understand and able to prepare the center line plan and foundation plan	1,2	R/U	1,2,3,4,7,9,10	12
C.313.4	Conduct quality control test on fresh and hardened concrete	7,8,12,	R/U	1,2,4,6,7,8,10	12
C.313.5	Understand and able to arrange the bricks using English bond	3,4,5	R/U	1,2,4,6,7,10	12
TOTAL					60 hrs

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>CONSTRUCTION PRACTICE LAB</b>	3	3	1	3	1	3	3	1	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.

**Course Content:**

<p style="text-align: center;"><b>PART A</b></p> <p>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</p>	<p><b>24 hours</b></p>
<p style="text-align: center;"><b>PART B</b></p> <p>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</p>	<p><b>36 hours</b></p>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Conduction/ Execution – 2 Hrs.:**

Student will rig up the circuit diagram and conduct experiment individually under the supervision of the staff-in-charge.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	Exercise & Observation	Students	Average of mark allotted for each exercise	10	Course file and Record notes	1 to 4
		IA Tests		Model Exam 1&2	5+5	Course File, Models & file	1 to 4
		Attendance		Daily Attendance	5	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	75	Answer Scripts at Autonomous Exam Cell	1 to 4
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1&2 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to4 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>
1	Remembering	7
2	Understanding	27
3	Application	66
<b>Total</b>		<b>100</b>

S.NO.	LIST OF THE EQUIPMENTS	QUANTITY REQUIRED
1.	Slump cone apparatus	2 no
2.	Compaction factor apparatus	1 no
3.	Concrete cube mould 150*150*150 3sets	3sets(9no)
4.	Concrete cube mould 100*100*100 3sets	3sets(9no)
5.	Sieve test for fine aggregate made of brace 200mm dia complete set	2sets
6.	Sieve test for coarse aggregate made of brace 200mm dia complete set	2sets
7.	Concrete mixing tray	2no
8.	Vee Bee Consistometer	1no
9.	Rebound Hammer	1no
10.	Weigh balance-digital upto 10kg capacity with accuracy battery backup with 8 hours	1gm 1no
11.	Apparatus to find Flakiness index, Elongation index and Angularity number for Coarse Aggregate	1no each

**ALLOCATION OF MARKS**

PART-A	20 marks
PART-B	50 marks
VIVA VOCE	05 marks
 Total	 75 Marks



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**V TERM**

**2017 –2018 onwards**

**M10CE314 - CAD IN CIVIL ENGINEERING DRAWING- II**

VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 SCHEME

(To be implemented from the student Admitted from the year 2017-2018 Onwards)

Programme : Civil Engineering	Type of course : Practical
Course Title: CAD IN CIVIL ENGINEERING DRAWING II	Course Code : M10CE314
Semester : V	Course Group : Applied
Teaching Scheme (L:T:P) : 0:1:4 (in Hours)	Credits : 3 Credits
No of Weeks : 15	Total Contact Hours : 75
IA : 25Marks	EE : 75 Marks

**Pre-requisites** : Knowledge of drafting software and Building Planning and Drawing.

**Course Topics:**

Unit No	Unit Name	Hours
I	Public Health Engineering	20
II	Bridge Drawing	15
III	Structural Engineering	40
	<b>Total</b>	75

**Course Outcomes:**

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

**C.314.1**Develop the Public Health Drawings.

**C.314.2**Develop the Bridge Drawings.

**C.314.3**Develop the Structural drawing in various Sectional views.

**Course Outcome linkage to Cognitive Level**

**COGNITIVE LEVEL LEGEND – R: REMEMBER U: UNDERSTAND, AP: APPLICATION AY: ANALYSIS C: CREATION**

Course Outcome		Linked experiments	CL	Linked PO	Teaching Hrs
<b>C.314.1</b>	To develop the Public Health Drawings	1,2,3	R/U/A	1,2,3,5,6,9,10	20
<b>C.314.2</b>	To develop the Bridge Drawings	4,5	R/U/A	1,2,3,5,10	15
<b>C.314.3</b>	To develop the Structural Drawing in various Sectional views.	6,7,8,9,10,11,12,13,14	R/U/A	1,2,3,9	40
	Total Hrs				75

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>CAD IN CIVIL ENGINEERING DRAWING II</b>	3	1	1	-	2	2	-	-	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.

**Course Content:****CAD IN CIVIL ENGINEERING DRAWING - II****DETAILED SYLLABUS****PART-A****(20Hours)****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

**PART B****(15Hours)****II BRIDGE DRAWING**

4. Steel foot over bridge across a Highway
5. Two span Tee Beam bridge with square return.

**III STRUCTURAL ENGINEERING****(40Hours)**

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

**E-Resources**

- <http://www.sketchup.com>
- <http://www.autodesk.in/products/3ds-max/overview>
- <http://www.we-r-here.com/cad/tutorials/index.htm>
- <http://www.cadtutor.net/tutorials/CADD/>
- [http://www.caddprimer.com/CADD\\_training\\_tutorial/CADD\\_training\\_lessons.html](http://www.caddprimer.com/CADD_training_tutorial/CADD_training_lessons.html)
- <http://www.CADDmark.com/>
- <http://www.CADDtutorials.net/>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	<b>What</b>		<b>To Whom</b>	<b>Frequency</b>	<b>Max Marks</b>	<b>Evidence Collected</b>	<b>Course Outcomes</b>
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	Exercise & Observation	Students	Average of mark allotted for each exercise	10	Course file and Record notes	1 to 4
		IA Tests		Model Exam 1&2	5+5	Course File, Models & file	1 to 4
		Attendance		Daily Attendance	5	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	75	Answer Scripts at Autonomous Exam Cell	1 to 4
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1&2 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to4 Effectiveness of Delivery of instructions & Assessment Methods

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	8
2	Understanding	32
3	Application	60
<b>Total</b>		100

**ALLOCATION OF MARKS:**

**In End examination, questions will be chosen as follows**

**By lot one question**

Plan / Elevation	40 marks
Cross section / longitudinal section	30 marks
Viva – voce	5 marks
<b>Total</b>	<b>75 MARKS</b>

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



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 SCHEME**

**V TERM**

2017 - 2018 onwards

**M10CE211 - COMMUNICATION AND LIFE  
SKILLS PRACTICAL**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 SCHEME**

(To be implemented from the student Admitted from the year 2017-2018 Onwards)

Programme : <b>CIVIL ENGINEERING</b>	Type of course : <b>Practical</b>
Course Title : <b>COMMUNICATION AND LIFE SKILLS PRACTICAL</b>	Course Code : <b>M10CE211</b>
Term : <b>V</b>	Course Group : <b>Core</b>
Teaching Scheme : <b>0:0:4</b>	Credits : <b>2</b>
No of weeks / term : <b>15</b>	Total Contact Hours : <b>60</b>
CIE : <b>25 Marks</b>	TEE : <b>75 Marks</b>

**Pre-requisites:**

- Knowledge of Communication English I & II.
- Listening, Speaking, Reading and Writing Skills as acquired in Secondary Education

**Course Outcomes:**

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

- C111.1 Attain proficiency in the four major skills of communication listening, speaking, reading, and Writing towards successfully integrating all of the four skills for the effective use of English in Communication.
- C111.2 Enhance the students English grammar skills using the grammatical components in written and verbal communication.
- C111.3 Communicate an idea in series logically sentences by describing an event such as objects, people, places and also conducting activity such as presentation and reporting.
- C111.4 Express ideas in clear and grammatically correct English using appropriate punctuation.
- C111.5 Develop their life skills.

**Course Outcome linkage to Cognitive Level:**

**On successful completion of the course, the students will be able to attain following Course Outcomes**

Course Outcome		Exercises linked	CL	Linked PO	Teaching Hrs.
C111.1	Attain proficiency in the four major skills of communication listening, speaking, reading, and Writing towards successfully integrating all of the four skills for the effective use of English in Communication	1,2,3,4,5,6,7,8,9	R/U/A	9	12
C111.2	Enhance the students English grammar skills using the grammatical components in written and verbal communication	2,3,4,8,9	R/U/A	10	12
C111.3	Communicate an idea in series logically sentences by describing an event such as objects, people, places and also conducting activity such as presentation and reporting	1,3,7	R/U/A	8,9	12
C111.4	Express ideas in clear and grammatically correct English using appropriate punctuation.	1,6	R/U/A	8,9	12
C111.5	Develop their life skills	2,9	R/U/A	7,8,9,10	12
			<b>Total sessions</b>		<b>60</b>

**Legends: R = Remember U= Understand; A= Application and above levels (Bloom's revised taxonomy)**

**Course-PO Attainment Matrix:**

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>COMMUNICATION AND LIFE SKILLS PRACTICAL</b>	-	-	-	-	-	-	-	1	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  $\geq 40\%$  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.*

**COURSE CONTENTS:**

**DETAILED SYLLABUS**

**COMMUNICATION AND LIFE SKILLS PRACTICAL  
SYLLABUS**

**PART A: MONODIC COMMUNICATION (15 hours/ periods)**

- a) **Vocabulary enrichment:** WORDS of common usage.
- b) **Introduction:** Introducing oneself -Introducing others – Introducing Yourself before an interview committee – Introduce your Family Members – Welcome address, vote of thanks.
- c) **Making an Oral Presentation:** Preparing the presentation - Talking about people, animals and places – Keywords technique and the rehearsal – Presentation outline – Performing the presentation – answering the questions.  
**Suggested topic in the Syllabus:** About My Country – Your Polytechnic College – Your Favorite Leader – Your Department.
- d) **Five Expressions:** Any five expressions commonly used in communication
- e) **Auditory/Oral comprehension** – A small passage – small dialogue -very short story – note - taking skill.
- f) **Frame questions:** Frame questions based on patterns.

**PART B: DYADIC COMMUNICATION**

**(15 hours/ periods)**

- a) **Playing Antakshari:** Recording important words and terminology alphabetically connected to the department concerned.
- b) **Dialogue:** preparing and performing - Meeting people, exchanging greetings and taking leave – Giving instructions and seeking clarifications – Thanking someone and responding to thanks - minimum seven exchanges including the courteous openings and closings – ten common contexts.

**Face –to –Face Dialogues Suggested in the Syllabus:**

Dialogue between Friends, Between a Conductor and a Passanger, Between a Doctor and a Patient, Between a Shopkeeper and a Buyer, Between a Teacher and a Student, Between a Tourist and a Guide.

**PART C: PROFESSIONAL COMMUNICATION**

**(15 hours/ periods)**

- a) Group Discussion - Taking part in a Group Discussion – focus on team spirit.

**Suggested Topic in the Syllabus:**

- |                                |                          |                                    |
|--------------------------------|--------------------------|------------------------------------|
| 1. Science is the boon or bane | 2. Importance of English |                                    |
| 3. Pollution                   | 4. Internet Usage        | 5. Indian Education is good or bad |

- b) Interview - Frequently asked questions in an interview – Mock interview – Body language.
- c) Resume Writing – components.

**PART D: LIFE SKILLS**

**(15 hours/ periods)**

- a) Entrepreneurship
- b) Motivation, goal-setting and self-esteem.
- c) Teamwork skills.
- d) Time management
- e) Emotional intelligence skills
- f) Career planning.
- g) Interview skills.
- h) Effective Management skills
- i) Logical Thinking
- j) Creative thinking

**LIST OF LAB EXERCISES**

1. Vocabulary Enrichment
2. Introduction
3. Oral presentation
4. Say any five Expressions
5. Auditory/Oral Comprehension
6. Frame a questions
7. Playing Antakshari
8. Dialogue Conversation
9. Group Discussion
10. Resume preparation

**E Resources:**

- 1) Malcolm Goodale, Professional Presentations with VCD, Cambridge University Press
- 2) B.JeanNaterop and Rod Revell, Telephoning in English with 2 Audio CDs Cambridge University Press
- 3) PriyadarshiPatnaik, Group Discussion and Interview Skills with VCD, Cambridge University Press
- 4) KamaleshSadanand and SusheelaPunitha, Spoken English: A Foundation Course for Speakers of Tamil, Orient BlackSwan.
- 5) S. P. Dhanavel, English and Soft Skills, Orient BlackSwan

**LABORATORY REQUIREMENT**

S.NO	ITEMS REQUIRED
1.	An echo-free room for housing a minimum of sixty students.
2	Necessary furniture and comfortable chairs
3	Public Address System.
4	A minimum of two Computers with internet access, with Audio for Listening Skill.
5	A minimum of Two different English dailies.
6	A minimum of one standard Tamil daily.
7	Headphone units – 30 Nos. with one control unit with a facility to play and record in Computer.
8	A minimum of Three Mikes with and without cords.
9	Colour Television (minimum size – 29”).
10	DVD/VCD Player with Home Theatre speakers.
11	Clip Chart, white board, smart board.
12	Projector.

**Course Delivery:**

The Course will be delivered through Lectures, Classroom Interaction, Animations, Group Discussion, Exercises and Assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	Communication Skills Exercises	Students	Communication Skills Record	10	Assignment papers & Course Log Book	1 to 5
		(Assignment) Life Skills		Given Topic	10	Course Log Book & File	1 to 5
		Attendance		Daily Attendance	05	Course log Book	1 to 5
				TOTAL	25		
	TEE (Term End Examination)	End Exam	Students	End of the Course	75	Answer Scripts at Autonomous Exam Cell	1 to 5
Indirect Assessment	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to 5 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Student Activities:**

1. Student's has to perform Communication Skills
2. Student's has to develop their Life Skills.

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1.	Remembrance	8
2.	Understanding	67
3.	Application	25
<b>Total</b>		<b>100</b>

**Scheme of Valuation Mark Pattern**

<b>End Examination</b>	<b>75 Marks</b>
Monodic Communication	35 Marks
Dyadic Communication	15 Marks
Professional Communication	20 Marks
Professional Appearance	5 Marks

**INTERNAL ASSESSMENT**

**25 MARKS**

Communication Skills (Record)	10 Marks
Life Skills (Assignment)	10 Marks
Attendance	05 Marks



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**VI TERM**

**2017 – 2018 onwards**

**M10CE306 – CONSTRUCTION MANAGEMENT WITH  
MIS**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 – SCHEME**

(To be implemented from the student admitted from the year 2017-2018 onwards)

Programme	:Civil engineering	Type of course	:Theory
Course Title:	<b>Construction Management with MIS</b>	Course Code	: M10CE306
Term	: <b>VI</b>	Course Group	: <b>Applied</b>
Teaching Scheme (L:T:P)	: <b>5:0:0</b> (in Hours)	Credits	: <b>5 Credits</b>
No.of weeks/term	: <b>15</b>	Total Contact Hours	: <b>75</b>
CIE	: <b>25Marks</b>	TEE	: <b>100 Marks</b>

**Pre-requisites** : Knowledge of Science and Maths in Secondary Education

**Course Topics:**

Unit No	Unit Name	Hours
I	CONSTRUCTION SECTOR IN INDIA FEASIBILITY STUDY PLANNING OF CIVIL ENGINEERING PROJECT CONTRACT MANAGEMENT	15
II	CONSTRUCTION ORGANISATION AND THEIR SUPERINTENDENCE DEPARTMENTAL PROCEDURE AND ACCOUNTING	15
III	SCHEDULING AND TIME MANAGEMENT RESOURCE MANAGEMENT	15
IV	QUALITY MANAGEMENT AND SAFETY CONSTRUCTION DISPUTES AND THEIR SETTLEMENT CONSTRUCTION LABOUR AND LEGISLATION ETHICS IN ENGINEERING	15
V	ENTREPRENEURSHIP INFORMATION MANAGEMENT AND COMPUTERS FINANCIAL MANAGEMENT	15
	<b>Total</b>	75

**Course Outcomes:**

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

- C.306.1 Identify the roles of individuals, companies, and agencies involved in the construction process
- C.306.2 Understand the structure of organizations with respect to span of control, power, authority, responsibility and decision making;.
- C.306.3 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.
- C.306.4 Employ appropriate practices to organize and manage personnel, materials, equipment, costs, time, and quality of a construction project. Create a construction project safety plan
- C.306.5 Analyze, evaluate, and select computer applications for the purpose of efficient and effective project management.

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		CL	Linked PO	Teaching Hrs
<b>C.306.1</b>	Identify the roles of individuals, companies, and agencies involved in the construction process	<i>R/U/A</i>	5,8	15
<b>C.306.2</b>	Understand the structure of organizations with respect to span of control, power, authority, responsibility and decision making	<i>R/U/A</i>	3,4,8,9,10	15
<b>C.306.3</b>	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	<i>R/U/A</i>	1,2,6	15
<b>C.306.4</b>	Employ appropriate practices to organize and manage personnel, materials, equipment, costs, time, and quality of a construction project. Create a construction project safety plan	<i>R/U/A</i>	7,8,9,10	15
<b>C.306.5</b>	Analyze, evaluate, and select computer applications for the purpose of efficient and effective project management	<i>R/U/A</i>	4,3	15
<b>Total sessions</b>				<b>75</b>

**Course Content and Blue Print of Marks for TEE:**

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	33	3	10	20	20
II	Construction organisation and their Superintendence Departmental procedure and accounting	15	33	3	10	20	20
III	Scheduling and time management Resource management	15	33	3	10	20	20
IV	Quality management and safety Construction disputes and their settlement Construction labour and legislation Ethics in engineering	15	33	3	10	20	20
V	Entrepreneurship Information management and computers Financial management	15	33	3	10	20	20
	<b>Total</b>	<b>75</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>Construction Management with MIS</b>	1	1	3	3	2	1	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.*

**Course Content:**

**CONSTRUCTION MANAGEMENT WITH MIS  
DETAILED SYLLABUS**

**UNIT-I**

**(15 hours)**

**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.

**UNIT-II**

**(15 hours)**

**2.1 CONSTRUCTION ORGANISATIONS AND THEIR SUPERINTENDENCE**

Forms of business organizations - sole proprietorship – Partnership – Joint stock company,- Co-operative society,- and State enterprises- Advantages and Disadvantages - delegation of responsibility, personnel requirements and division of works – Decentralization - Construction supervision and Superintendence – Requirements and Responsibilities of

Executives of the project – Qualities of Efficient construction Manager - Pay rolls and Records - Purchase and delivery of construction materials and equipments – Percentage completion report - Insurance record - Project office requirement - Organisation chart of a small / medium / large construction company (broad outline only).

## **2.2 DEPARTMENTAL PROCEDURE AND ACCOUNTING**

Organisation of P.W.D. - Responsibilities of officers - Accounting procedure (administrative sanctions, technical sanctions, payment of bills) – Imprest and Temporary accounts – Cash book - Works register - Accounting for consumable materials - Record for tools and plants – Importance of M-book and its entries – Work charged establishment – Nominal muster roll (N.M.R) – Daily labour reports (D.L.R)

### **UNIT-III**

**(15 hours)**

#### **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)

### **UNIT-IV**

**(15 hours)**

#### **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.

### **UNIT-V**

**(15 hours)**

#### **5.1 ENTREPRENEURSHIP**

Definition – Role and Significance – Risks and Rewards – Concepts of Entrepreneurship – Profile and requirement of entrepreneur – Programmes existing in India –

SISI, DIC, TANSIDCO – Funding and technical assistance to Entrepreneurship-  
NIDCO, ICICI, IDBI, IFCI, SFC

### 5.2 INFORMATION MANAGEMENT AND COMPUTERS

Introduction – Definition of MIS – Out lines of MIS – Use of computers in construction industry – Requirements of MIS – A data base approach – Definition –Benefits - A data base approach to contractor's account and its advantage – Basic concepts of estimation – Project management and operations simulation packages – Construction automation and Robotics.

### 5.3 FINANCIAL MANAGEMENT

Elements of cash flow – Time value of money – Interest rate of capital – Present value computation - NPV method – IRR method – simple problems - Global banking culture - Types of banks –Activities of Banks – Corporate finance – Personal, retail and rural banking – Treasury management.

#### Text Books:

1. Engineering Materials by S.C.Rangawala.
2. Engineering Materials by Sushilkumar.
3. Engineering Materials by G.J. Kulkarni.
4. Engineering Materials by P.C.Varghese.

#### E-Resources

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>

#### Course Delivery:

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	I A Tests	Students	Average of Two periodical Tests + Model test	10	Course log Book	1 to 5
		Assignments		Average of 3 Assignments	10	Course log Book & File	1 to 5
		Attendance		Student Attendance	05	Course log Book	1 to 5
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE</b> (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at Autonomous Exam cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle Of The Course	Feed Back Forms		1 to 3 Delivery of course
	End Of Course Survey			End Of The Course	Questionnaires		1 to 5 Effectiveness of Delivery of instructions & Assessment Methods

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)	Total Marks (Out of 165)
1	Remembering	9	15
2	Understanding	30	50
3	Application	61	100
<b>Total</b>		<b>100</b>	<b>165</b>

VSVNPC

**MODEL QUESTION**

Term : VI Time : 3 Hrs  
Programme : **Diploma in Civil Engineering** Max. Marks : 100  
Course : Construction Management with MIS Course Code : M10CE306

**PART-A**

**(10 x 1 = 10)**

**Answer any TEN questions .Each carries one marks.**

1. What is meant by Construction management?
2. What are the classifications of construction planning?
3. What is meant by Project Report?
4. Mention the different types of Construction organizations
5. State any two requirements of a project office.
6. What is cash book?
7. What is meant by Project scheduling?
8. What is the Bar chart?
- 9.. What is the expansion of CPM?
10. Define Quality Control.
11. When disputes are developed between the Owner and contractor ?
- 12.. Define labour wage act.
13. Define entrepreneurship.
14. What is SIDCO?
15. Define MIS.

**PART – B**

**(6 x 5 = 30)**

**Answer any SIX questions. Each carries five marks.**

16. What are the various stages of construction project. Explain any two in detail
17. What do you understand about land acquisition?
18. What are the advantages and disadvantages of sole proprietorship
19. Draw a neat Organisation Chart of medium construction company
20. Explain about “Machinery resources”
21. For a construction project the duration of various activities are given below. Draw the network diagram. Locate the critical path and estimate the project duration.

Activity	1 – 2	2 – 3	2 – 4	3 – 5	5 – 6	4 – 6
Duration (days)	7	4	5	5	3	4

22. What are the benefits of Safety Management?
23. Write a short notes on Payment of Wages Act
24. State the role and significance of Entrepreneurship
25. How computers are being used in the field of construction industry

**PART – C**

**(6 x 10 = 60)**

**Answer any SIX questions .Each carries ten marks.**

26. Explain in detail the various stages of a construction project
27. Explain objectives of planning and site utilization
28. Explain the basic difference between construction supervision and construction superintendence
29. Explain the duties and responsibilities of chief engineer and superintending engineers of State P.W.D.
30. 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.:

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

31. What are the advantages of network analysis?
32. (i) Explain the importance of safety in construction?

- (ii) What are the causes of disputes?
- 33. Explain the Engineering Ethics and Integrity
- 34. Mention the different types of entrepreneurial development programs existing in India
- 35. (i) Mention the objectives of MIS
  - (ii) Describe the scheme of financial assistance provided by commercial bank to business enterprises and professionals

VSVNPC



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 SCHEME**

**VI TERM**

**2017 – 2018 onwards**

**M10CE208 – HYDRAULICS**

VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 – SCHEME

(To be implemented from the student admitted from the year 2017-2018 onwards)

Programme	:Civil Engineering	Type of course	:Theory
Course Title	:HYDRAULICS	Course Code	: M10CE208
Term	: VI	Course Group	: Core
Teaching Scheme (L:T:P)	: 6:0:0 (in Hours)	Credits	: 6 Credits
No.of weeks/term	: 15	Total Contact Hours	: 90
CIE	: 25Marks	TEE	: 100 Marks

**Pre-requisites** :Knowledge of Engineering Mathematics and Applied Science.

**Course Topics:**

Unit No	Unit Name	Hours
I	INTRODUCTION, MEASUREMENT OF PRESSURE , HYDROSTATIC PRESSURE ON SURFACES.	21
II	FLOW OF FLUIDS, FLOW THROUGH ORIFICES AND MOUTH PIECES , FLOW THROUGH PIPES.	21
III	FLOW THROUGH NOTCHES, FLOW THROUGH WEIRS.	14
IV	FLOW THROUGH CHANNELS	16
V	GROUND WATER AND PUMPS.	18
	<b>Total</b>	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.

**Course Outcome linkage to Cognitive Level**

**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.	<i>R/U/Ap</i>	1,4,5,7,10	21
C.208.2	Understand and able to determine the discharge and co-efficient of discharge for Orifice, Mouthpiece, Orifice meter and Venturimeter.	<i>R/U/Ap</i>	1,4,5,7,9,10.	21
C.208.3	Understand and able to determine the discharge through Notches and Weirs.	<i>R/U/Ap</i>	1,2,4,7,9,10.	14
C.208.4	Understand and able to design most economical sections , measurement of velocity and lining of canals.	<i>U/Ap</i>	1,2,4,6,7,9,10	16
C.208.5	Understand the principles of Centrifugal pump, Reciprocating pump and other minor pumps.	<i>U/Ap</i>	1,2,4,5,7,10	18
		Total sessions		90

**Course Content and Blue Print of Marks for TEE:**

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	33	3	10	20	20
II	FLOW OF FLUIDS, FLOW THROUGH ORIFICES AND MOUTH PIECES , FLOW THROUGH PIPES.	21	33	3	10	20	20
III	FLOW THROUGH NOTCHES, FLOW THROUGH WEIRS.	14	33	3	10	20	20
IV	FLOW THROUGH CHANNELS	16	33	3	10	20	20
V	GROUND WATER AND PUMPS.	18	33	3	10	20	20
		<b>90</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
HYDRAULICS	3	3	-	3	3	1	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.

**Course Content:**

Unit	Name of the Topic	Hours
I	<p><b>1.1 INTRODUCTION</b>                      Hydraulics – Definition - Properties of fluids - Mass, force, weight, specific volume, specific gravity, specific weight, density, relative density, compressibility, viscosity, cohesion, adhesion, capillarity and surface tension - Dimensions and Units for area, volume, specific volume, velocity, acceleration, density, discharge, force, pressure and power.</p> <p><b>1.2 MEASUREMENT OF PRESSURE</b>                      Pressure of liquid at a point – Intensity of pressure - Pressure head of liquid – Conversion from intensity of pressure to pressure head and vice-versa - Formula and Simple problems - Types of pressures - Static pressure, Atmospheric pressure, Gauge pressure, Vacuum pressure and Absolute pressure – Simple problems - Measurement of pressure - Simple mercury barometer - Pressure measuring devices- Piezometer tube - Simple U-tube manometer - Differential manometer - Problems.</p> <p><b>1.3 HYDROSTATIC PRESSURE ON SURFACES</b>                      Pressure on plane surfaces - Horizontal, vertical and inclined surfaces-Totalpressure-Centre of pressure - Depth of centre of pressure – Resultant pressure – Problems on Practical application</p>	21 Hrs
II	<p><b>2.1 FLOW OF FLUIDS</b>                      Types of flow – Laminar and turbulent flow - Steady and unsteady flow – Uniform and Non-uniform flow - Equation for continuity of flow (law of conservation of mass) – Energy possessed by a fluid body – Potential energy and Potential Head – Pressure energy and Pressure Head - Kinetic Energy and Kinetic Head - Total Energy and Total Head – Bernoulli’s theorem – ( No proof) – Problems on Practical applications of Bernoulli’s theorem – Venturimeter - Orificemeter (Derivation not necessary) - Simple problems.</p> <p><b>2.2 FLOW THROUGH ORIFICES AND MOUTHPIECES</b>                      Definitions- Types of orifices - Vena contracta and its significance – Hydraulic coefficients Cd, Cv and Cc - Formula - Simple problems – Large orifice – Definition – Discharge formula – Simple problems – Practical applications of orifices – Types of mouthpieces - External and internal mouthpieces - Discharge formula - Simple problems.</p> <p><b>2.3 FLOW THROUGH PIPES</b>                      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</p>	21 Hrs

<p>III</p>	<p><b>3.1 FLOW THROUGH NOTCHES</b>                  Definitions- Types of notches – Rectangular, Triangular and Trapezoidal notches – Derivation of equations for discharges - Simple problems - Comparison of V-Notch and Rectangular Notch.  <b>3.2 FLOW THROUGH WEIRS</b>                  Definitions - Classification of weirs - Discharge over a rectangular weir and trapezoidal weir – Derivation – Simple problems – End contractions of a weir – Franci’s and Bazin’s formula – Simple problems - Cippoletti weir – Problems - Narrow crested weir – Sharp crested weir with free over fall - Broad crested weir - Drowned or Submerged weirs - Suppressed weir - Stepped weir – Problems - Definition of terms - Crest of sill, Nappe or Vein, Free discharge - Velocity of approach</p>	<p><b>14 Hrs</b></p>
<p>IV</p>	<p><b>4.1 FLOW THROUGH OPEN CHANNELS</b>                  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</p>	<p><b>16 Hrs</b></p>
<p>V</p>	<p><b>5.1 GROUND WATER</b>                  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.  <b>5.2 PUMPS</b>                  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</p>	<p><b>18 Hrs</b></p>

**E-Resources**

1. [www.elearning.com/Hydraulics](http://www.elearning.com/Hydraulics)
2. <http://nptel.ac.in/video.php?subjectId=106102101>
3. <http://media.sakshat.ac.in/NPTEL-IIT-Videos/>
4. [http://nptel.iitk.ac.in/courses/Civil\\_Eng/IIT%20Roorkee/Hydraulics.html](http://nptel.iitk.ac.in/courses/Civil_Eng/IIT%20Roorkee/Hydraulics.html)
5. <http://nptel.iitk.ac.in/>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	I A Tests	Students	Average of Two periodical Tests + Model test	10	Course log Book	1 to 5
		Assignments		Average of 3 Assignments	10	Course log Book & File	1 to 5
		Attendance		Student Attendance	05	Course log Book	1 to 5
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE</b> (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at Autonomous Exam cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle Of The Course	Feed Back Forms		1 to 3 Delivery of course
	End Of Course Survey			End Of The Course	Questionnaires		1 to 5 Effectiveness of Delivery of instructions & Assessment Methods

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Composition of Educational Components:**

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	30	50
3	Application	61	100
<b>Total</b>		<b>100</b>	<b>165</b>

**MODEL QUESTION**

PROGRAMME: CIVIL ENGINEERING

MAX.MARKS : 100

COURSE NAME: HYDRAULICS

DURATION : 3 HRS

YEAR/TERM : III/VI

**PART-A**

**(10x1=10)**

**Answer any 10 questions.Each carries ONE mark.**

- 1 Define Specific Gravity.
- 2 What is the use of Differential Manometer.
- 3 What is Sluice Gate.
- 4 Write the statement of Bernoullis Theorem
- 5 What is large Orifice.
- 6 State any two minor losses of fluids flowing in a pipe.
- 7 What is Notch.
- 8 Draw a neat of Broad crested weir.
- 9 What is Nappe.
- 10 What is Hydraulic mean depth.
- 11 Expand LDPE lining.
- 12 What is Specific Energy.
- 13 Define Aquifer
- 14 What is Turbine
- 15 What is Hand pump.

**PART-B**

**(6x 5 =30)**

**Answer any 6 questions. Each carries FIVE mark.**

- 16 List out any six properties of fluids.
- 17 Explain briefly the different types of pressures.
- 18 Give a brief note about the three Hydraulic co-efficients.  
A pipe line, 300 mm diameter and 400 m long connects two reservoirs .
- 19 The discharge through the pipe is 191 lps. Taking the friction factor as 0.02, determine the loss of head.
- 20 Derive the discharge formulae of Rectangular Notch.
- 21 Draw a neat sketch and indicate the parts of the following.
  - i. Stepped Weir.
  - ii. Sharp Crested Weir
- 22 Give a brief note about Channel losses.
- 23 Name any eight methods of lining of canals
- 24 Explain any one method of Rain water Harvesting with a neat sketch.
- 25 Explain the Priming of Centrifugal pump.

PART-C

(6x10= 60)

Answer any 6 questions. Each carries TEN mark.

26. A simple manometer is used to measure the pressure of oil of relative density 0.90 flowing in a pipe line. Its right limb is open to the atmosphere and left limb is connected to the pipe. The centre of the pipe is 120 mm below the level of mercury in the right limb. If the difference of mercury level in the two limbs is 300 mm, determine the intensity of pressure in a pipe line in Pa.

27. A triangular plate of 1.60 m base and 2.20 m height is immersed in water vertically with its apex above the base. The base is parallel to and at a depth of 2.90 m below the water surface. Find the a) Total pressure b) Depth of Centre of Pressure.

28. An Orifice 2.50 m wide and 1.50 m depth is provided in one side of a large tank. The water level on one side of the Orifice is 2.25 m above the top edge and the water on the other side of the Orifice is 0.75 m below the top edge. If  $C_d$  is 0.65 find the discharge through the Orifice.

29. Water is flowing through a horizontal tapered pipe having diameters of 150 mm and 50 mm. If the velocity of water at the larger section is 3.0 m/sec. Determine,

- i. Velocity head at the larger end
- ii. Velocity head at the smaller end.
- iii. Discharge in lps.

30. Water flows over a rectangular notch of 1.40 m breadth over a depth of 180 mm. Then the same quantity of water passes through a triangular right-angled notch. Find the depth of water passes through the notch. Take the  $C_d$  values of rectangular and triangular notches are as 0.62 and 0.60 respectively.

31. A Rectangular weir 12.0 m long is divided into 4 equal bays by three vertical posts, each 0.40 m thick. Find the discharge when the head is 0.85 m. Take  $C_d$  as 0.60.

32. An economical trapezoidal channel has a bed width of 4.6 m and side slopes of 1 : 1. It has a bed fall of 1 in 1400. Taking  $C$  as 65, find the discharge.

33. Name the different methods of measurement of velocity in a canal and explain any two methods in detail with a neat sketch.

34. A single acting Reciprocating pump has a piston diameter of 400 mm and a stroke of 350 mm. It operates at a speed of 55 rpm and lifts 33 litres of water per second to a height of 7.0 m. Calculate i) Theoretical Discharge ii)  $C_d$  iii) percentage of Slip iv) Theoretical Power v) Efficiency

35.a) Explain briefly the Sanitary Protections of a well.

b) State any three advantages and any three disadvantages of Centrifugal pump.



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**VI TERM**

**2017 –2018 onwards**

**M10CE405-ADVANCED CONSTRUCTION TECHNOLOGY AND  
NANO TECHNOLOGY**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 – SCHEME  
(To be implemented from the student admitted from the year 2017-2018 onwards)**

Programme	:Civil engineering	Type of course	:Theory
Course Title	: <b>ADVANCED CONSTRUCTION TECHNOLOGY AND NANO TECHNOLOGY</b>	Course Code	: M10CE405
Term	: <b>VI</b>	Course Group	: <b>Diversified</b>
Teaching Scheme (L:T:P)	: <b>5:0:0</b> (in Hours)	Credits	: <b>5 Credits</b>
No.of weeks/term	: <b>15</b>	Total Contact Hours	: <b>75</b>
CIE	: <b>25Marks</b>	TEE	: <b>100 Marks</b>

**Pre-requisites** :Knowledge of Science and Geology in Secondary Education

**Course Topics:**

Unit No	Unit Name	Hours
I	PILE FOUNDATIONS	15
II	MODIFIED CONCRETE	15
III	PRESTRESSED CONCRETE	15
IV	NANO TECHNOLOGY FOR CIVIL ENGINEERING	15
V	PRE-FABRICATION SYSTEM AND METHODS	15
	<b>Total</b>	75

**Course Outcomes:**

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

- C.405.1. Report the important operations of construction activities they visited where new techniques, machines and equipment are used.
- C.405.2 Describe important aspects , operations and safety points pertaining to a. ‘Deep Excavations’; b. Pile foundations ; c. Cofferd Dams; d. Caissons; e. Drilling and Blasting
- C.405.3. Discuss purpose, types, materials, design issues, and erection of temporary structures for construction activities.
- C.405.4. Describe equipment and tackles used , problems encountered and their solutions in erection of steel structures.
- C.405.5. Demonstrate proper techniques associated with residential and commercial construction.

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		CL	Linked PO	Teaching Hrs
C.405.1	Report the important operations of construction activities they visited where new techniques, machines and equipment are used.	R/U/A	3,4,6	15
C.405.2	Describe important aspects , operations and safety points pertaining to: a. ‘Deep Excavations’; b. Pile foundations ; c. Cofferd Dams; d. Caissons; e. Drilling and Blasting	R/U/A	3,4,7,10	15
C.405.3	Discuss purpose, types, materials, design issues, and erection of temporary structures for construction activities.	R/U/A	2,4,10,6	15
C.405.4	Describe equipment and tackles used,problems encountered and their solutions in erection of steel structures.	R/U/A	2,5,8	15
C.405.5	Demonstrate proper techniques associated with residential and commercial construction.	R/U/A	4,7,9	15
<b>Total sessions</b>				<b>75</b>

**Course Content and Blue Print of Marks for TEE:**

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
I	PILE FOUNDATIONS	15	33	3	10	20	20
II	MODIFIED CONCRETE	15	33	3	10	20	20
III	PRESTRESSED CONCRETE	15	33	3	10	20	20
IV	NANO TECHNOLOGY FOR CIVIL ENGINEERING	15	33	3	10	20	20
V	PRE-FABRICATION SYSTEM AND METHODS	15	33	3	10	20	20
<b>Total</b>		<b>75</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>ADVANCED CONSTRUCTION TECHNOLOGY AND NANO TECHNOLOGY</b>	-	2	3	3	1	3	3	1	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.

**Course Content:****DETAILED SYLLABUS****UNIT- I****(15Hours)****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

**1.3 PRESTRESSED CONCRETE**

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

**1.4 NANOTECHNOLOGY FOR CIVIL ENGINEERING**

Introduction – Nano Technology – Nano Technology in Construction – Concrete – Structural Composites – Coatings – Glass – Nano Sensors- Bulk insulating materials – Plastics – Plastic Solar Cell – Bitumen – smart materials- Nano technology in Fire protection

**UNIT II****(15 Hours)****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

## 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

### UNIT III

(15 Hours)

#### 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.

### UNIT IV

(15 Hours)

#### 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

**UNIT V**

**(15 Hours)**

**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.

**Text Books:**

1. Concrete Technology – M.S. Shetty
2. Fire Resistant Construction – Building Construction by S.P.Arora and S.P.Bindra
3. Earth quake Proof - Building Construction by Dr.Janardhanjha and Prof.Suresh Kumar
4. SinhaIS Code of Practice for Earth quake , IS Code of Practice for Fire resistance, IS Code of Practice for pre stressing (2005)
5. Pile foundation – RD Chellis, MIS
6. Construction and foundation Engg – Sinha &JanathaShau.
7. Principle Fine safty standards for building Construction – M.YaRoytman
8. Report on Nano technology and Construction – Surinder Mann
9. Krishna Raju. N. Prestressed Concrete, Tata McGraw Hill Company, New Delhi 1998.

**E-Resources**

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	I A Tests	Students	Average of Two periodical Tests + Model test	10	Course log Book	1 to 5
		Assignments		Average of 3 Assignments	10	Course log Book & File	1 to 5
		Attendance		Student Attendance	05	Course log Book	1 to 5
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE</b> (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at Autonomous Exam cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle Of The Course	Feed Back Forms		1 to 3 Delivery of course
	End Of Course Survey			End Of The Course	Questionnaires		1 to 5 Effectiveness of Delivery of instructions & Assessment Methods

\***CIE** – Continuous Internal Evaluation

\***TEE** – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)	Total Marks (Out of 165)
1	Remembering	9	15
2	Understanding	30	50
3	Application	61	100
<b>Total</b>		<b>100</b>	<b>165</b>

**MODEL QUESTION**

**Term** : VI

**Time** : 3 Hrs

**Programme** : Diploma in Civil Engineering

**Max. Marks** : 100

**Course** : Advanced Construction Technology  
and nano technology

**Course Code** : M10CE405

**PART – A**

**(10x1=10)**

**Answer any 10 questions. Each carries 1 mark.**

1. Define Pile.
2. What is light weight concrete?
3. Define nano sensor
4. Define pre tensioning.
5. Explain the need of High strength concrete and steel in prestressing.
6. Write the names of pre fabricated elements in a load bearing wall type construction.
7. What are the fire protection measures to be taken in public buildings?
8. Define the seismic coefficient
9. What are the causes of Earth quake?
10. Define shrinkage cracks
11. What are the major causes for defects in buildings?
12. What are the materials used for repairs in buildings?
13. Define energy efficiency.
14. What are escalators?
15. What are Independent Lifting Services?

**PART – B**

**(6x5=30)**

**Answer any 6 questions.Each carries 5 marks.**

16. Explain principle of pre stressing.
17. What are the nano technology involved in fire protection?
18. State the advantages of prefabrication system.
19. State the requirements of an ideal structural joint?
20. What are the precautionary measures to minimize dangers of fire?
21. Short notes on Emergency exit arrangements.
22. What is meant by mechanical demolition?
23. Briefly explain about structural cracks.
24. What is meant by strengthening of old buildings?
25. Explain mechanical modernization.

**PART – C**

**(6x10 = 60)**

**Answer any 6 questions.Each carries 10 marks.**

26. Describe the process of casting a precast concrete pile and draw a neat sketch of a typical concrete pile.
27. Explain plastic solar cell
28. What are the methods available for post tensioning and explain any one of them.
29. State the advantages and disadvantages of Pre fabrication system.
30. What are the general guidelines for planning an earthquake resistant buildings?
31. What are the precautions to be taken during Earth quake?
32. Explain the methods of repairing cracks in concrete.
33. Define structural cracking in concrete and what are the factors to be considered during demolition.
34. Explain about Passive house construction.
35. Explain briefly about Housing modernization and management.

VSVNPC



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**VI TERM**

**2017 –2018 onwards**

**M10CE406 – TOWN PLANNING AND HIGH RISE  
STRUCTURES**

VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Department of Civil Engineering  
(To be implemented from the student admitted from the year 2018-2019 onwards)

Programme : Civil engineering	Type of course : Theory
Course Title: <b>TOWN PLANNING AND HIGH RISE STRUCTURES</b>	Course Code : <b>M10CE406</b>
Semester : <b>VI</b>	Course Group : <b>Diversified</b>
Teaching Scheme (L:T:P) : <b>5:0:0</b> (in Hours)	Credits : <b>5 Credits</b>
No of week / term : 15	Total Contact Hours : <b>75</b>
CIE : <b>25Marks</b>	TEE : <b>100 Marks</b>

**Pre-requisites** : Knowledge of Science and Geology in Secondary Education

**Course Topics:**

Unit No	Unit Name	Hours
I	TOWN PLANNING PRINCIPLES	15
II	HOUSING,SLUMBS,TALL BUILDINGS,LOADING	15
III	PUBLIC BUILDINGS	15
IV	URBAN ROADS AND TRAFFIC MANAGEMENT	15
V	BUILDING BY LAWS AND MISCELLANEOUS TOPICS	15
	<b>Total</b>	<b>75</b>

**Course Outcomes:**

**C.406.1.** Demonstrate a technical and theoretical body of knowledge in urban and regional planning, including deep understanding in some areas of the discipline.

**C.406.2.** 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.

**C.406.3.** 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.

**C.406.4.** 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.

**C.406.5.** Graduates will demonstrate knowledge and appreciation of socially responsible planning practices, particularly in the area of sustainable development.

**Course Outcome linkage to Cognitive Level**

Course Outcome		CL	Linked PO	Teaching Hrs
C.406.1	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	2,3,5,8,10	15
C.406.2	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	2,6,7,9	15
C.406.3	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	3,4,6,10	15
C.406.4	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	3,4,5,10	15
C.406.5	Graduates will demonstrate knowledge and appreciation of socially responsible planning practices, particularly in the area of sustainable development.	R/U/A	2,5,8,9	15
<b>Total sessions</b>				75

**Course Content and Blue Print of Marks for SEE:**

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for			Marks weightage (%)
				R	U	A	
1	TOWN PLANNING PRINCIPLES	15	33	3	10	20	20
2	HOUSING,SLUMBS,TALL BUILDINGS,LOADING	15	33	3	10	20	20
3	PUBLIC BUILDINGS	15	33	3	10	20	20
4	URBAN ROADS AND TRAFFIC MANAGEMENT	15	33	3	10	20	20
5	BUILDING BY LAWS AND MISCELLANEOUS TOPICS	15	33	3	10	20	20
<b>Total</b>		<b>75</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Outcomes	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Town planning and high rise structures	2	2	-	3	1	-	-	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.

**Course Content:**

**TOWN PLANNING AND HIGH RISE STRUCTURES**

**DETAILED SYLLABUS**

**UNIT- I**

**(15Hours)**

**1.1 TOWN PLANNING PRINCIPLES**

General - Evolution of planning - Objects of town planning – Economic justification for town planning - Principles of Town planning - Necessity of town planning - Origin of towns - Growth of towns – Stages in town development - Personality of town - Distribution of land - Forms of planning - Site for an ideal town - Requirements of new towns - Planning of a modern town - Powers required for enforcement of Town planning scheme - Cost of Town planning - Present position of Town Planning in India.

**1.2 SURVEYS**

General – Necessity - Collection of Data - Types of surveys for planning a new town - Uses of surveys.

**1.3 ZONING**

Meaning of the term - Uses of land, objects and Principles of Zoning - Advantages of Zoning - Importance of Zoning - Aspects of Zoning – Transition Zone – Economy of Zoning – Special Economic Zone(SEZ) - Zoning powers - Maps for Zoning.

**UNIT II**

**(15Hours)**

**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.

### **UNIT III**

(15 Hours)

#### **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.

#### **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.

**UNIT – IV****(15Hours)****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.

**UNIT – V****(15Hours)****5.1 BUILDING BYE –LAWS**

General - Objects of bye-laws - Importance of bye-laws - Function of local authority - Responsibility of owner - Applicability of bye-laws – Set backs to buildings – Necessity of setbacks - Light plane – Plot coverage - Floor space index- Maximum Height of buildings - Off-street parking – Fire protection - Minimum width of streets and plot sizes – Some other terms - Principles underlying in framing building bye-laws – Building bye-laws for residential area of a typical town planning scheme – Building bye-laws for other types of buildings -Development control rules - General rules of metropolitan Area - CMDA rules.

**5.2 MISCELLANEOUS TOPICS**

Airports – Location - size - Noise control - Parts of an airports - Betterment and compensation – City blocks –Conurbations - Cul-de-sac streets - Focal point - Green belt - Public utility services - Rapid transit – Remote sensing application – Urban planning using remote sensing – Site suitability analysis Location of Bus Terminus, Whole sale markets,ExhibitionCentres etc., – Location for water/sewage treatment plants, location for waste disposal etc.,– Transportation planning.

**Text Books:**

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

**E-Resources**

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	I A Tests	Students	Average of Two periodical Tests + Model test	10	Course log Book	1 to 5
		Assignments		Average of 3 Assignments	10	Course log Book & File	1 to 5
		Attendance		Student Attendance	05	Course log Book	1 to 5
		<b>TOTAL</b>		<b>25</b>			
	<b>TEE</b> (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at Autonomous Exam cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle Of The Course	Feed Back Forms		1 to 3 Delivery of course
	End Of Course Survey			End Of The Course	Questionnaires		1 to 5 Effectiveness of Delivery of instructions & Assessment Methods

\***CIE** – Continuous Internal Evaluation

\***TEE** – Semester End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	30	50
3	Application	61	100
<b>Total</b>		<b>100</b>	<b>165</b>

MODEL EXAMINATION

Term : VI  
Programme : Diploma in Civil Engineering  
Course : Town planning and Course High rise structures

Time : 3 Hrs  
Max. Marks : 100  
Course Code :M10CE406

**Part A**

**(10 x 1= 10 marks)**

**Answer any 10 question. Each carries ONE mark.**

1. What is meant by the term “Town planning”?
2. What is meant by zoning?
3. What are the requirements of New towns?
4. Define “Housing”.
5. How a slum can be improved?
6. Write a critical note on good housing?.
7. Define “parkway”.
8. Name the groups of shops
9. Define “Green House”.
10. What are the major roles of an urban road?
11. What are the types of traffic signals?
12. Give a sketch of (i) By-pass road (ii) Outer ring road
13. What is the use of road signs?
14. Expand the term CMDA
15. Where is the rapid transit system employed?

**PART B**

**(6 x 5= 30 marks)**

**Answer any 6 questions. Each carries FIVE marks.**

16. Define Zoning. Explain the various aspects of zoning.
17. Explain the various principles of town planning.
18. Describe the various housing programme by HUDCO.
19. Explain critical notes on slum clearance.

20. Explain the salient features of landscape architecture.
21. Explain the data required for the preparation of a master plan of a town.
22. State the factors to be considered while design a road.
23. Mention the general principles to be observed in the design of road junction.
24. Describe the various important points in building bye-laws.
25. Mention the important applications of remote sensing.

**PART C**

**(6x 10 = 60 marks)**

**Answer any 6 questions. Each carries TEN marks.**

26. Explain the various principles of town planning.
27. Explain different types of surveys undertaken in the process of Town Planning.
28. Why was CIDCO formed? Give an idea about its functions and achievements?
29. Mention the aspects to be considered in the design of residential buildings.
30. Write short notes on (a) Different categories of refuse (b) Advantages of water carriage system in refuse disposal.
31. What are the drawings to be prepared for the master plan?
32. What are the factors which contributes road accidents?
33. Mention the requirements to be considered for approval of plan by local authority.
34. Enumerate the various parts of an airport.
35. What are the applications of remote sensing in transportation planning?



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**VI TERM**

**2017 –2018 onwards**

**M10CE407 –STEEL STRUCTURES**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 – SCHEME  
(To be implemented from the student admitted from the year 2017-2018 onwards)**

Programme	:Civil engineering	Type of course	:Theory
Course Title:	<b>STEEL STRUCTURES</b>	Course Code	: M10CE407
Term	: <b>VI</b>	Course Group	: <b>Diversified</b>
Teaching Scheme (L:T:P)	: <b>5:0:0</b> (in Hours)	Credits	: <b>5 Credits</b>
No.of weeks/term	: <b>15</b>	Total Contact Hours	: <b>75</b>
CIE	: <b>25Marks</b>	TEE	: <b>100 Marks</b>

**Pre-requisites** :Knowledge of Science and Mathematics in Secondary Education

**Course Topics:**

Unit No	Unit Name	Hours
I	INTRODUCTION TO PLASTIC ANALYSIS AND LSD	15
II	DESIGN OF TENSION AND COMPRESSION MEMBERS BY LSM	15
III	DESIGN OF FLEXURAL MEMBERS FOR BM AND SF BY LSM	15
IV	DESIGN OF SECTIONS FOR COMBINED ACTIONS	15
V	DESIGN OF CONNECTIONS AND DETAILING	15
	<b>Total</b>	75

**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

**Course Outcome linkage to Cognitive Level**

**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	1,4,6,10	15
C.407.3	Ability to analyze and design of beam-columns	R/U	1,5,7,10	15
C.407.4	Ability to analyze and design of simple bolted and welded connections	R/U/A	1,2,5,8,9	15
C.407.5	Ability to design steel framing system and connections of a building in a team setting	R/U/A	1,3,6,7,9,10	15
<b>Total sessions</b>				<b>75</b>

**Course Content and Blue Print of Marks for TEE:**

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	33	3	10	20	20
II	DESIGN OF TENSION AND COMPRESSION MEMBERS BY LSM	15	33	3	10	20	20
III	DESIGN OF FLEXURAL MEMBERS FOR BM AND SF BY LSM	15	33	3	10	20	20
IV	DESIGN OF SECTIONS FOR COMBINED ACTIONS	15	33	3	10	20	20
V	DESIGN OF CONNECTIONS AND DETAILING	15	33	3	10	20	20
<b>Total</b>		<b>75</b>	<b>165</b>	<b>15</b>	<b>50</b>	<b>100</b>	<b>100</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>STEEL STRUCTURES</b>	3	1	3	1	2	3	2	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  $\geq 40\%$  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.

**Course Content:****DETAILED SYLLABUS****UNIT- I****(15 Hours)****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

**UNIT II****(15 Hours)****DESIGN OF TENSION AND COMPRESSION MEMBERS BY L.S.M**

**Tension Members-** Design Strength of Tension members against yielding of gross section, against rupture of critical section and due to block shear– Design requirements–Problems on determination of design strength of given members and designing tension members using rolled steel sections for given loads– Design of bolted and welded connections for tension members –Problems.

**Compression Members-** Effective Length and Effective Sectional Area of Compression members – Design Stress and design strength– Buckling Class of cross sections– Imperfection factor– Stress reduction factor– Thickness of elements– Eccentricity of loads on columns– Single angle and double angle struts–Bolted and welded connections for struts– Design of Built up Columns– Connecting the components of built up columns by tacking bolts/ welds– Requirements of connections– Laced Columns– Single and Double laced systems– Requirements of lacing bars- Design of Lacings– Battened Columns– Requirements of battens– Design of battens– Problems

**Column Bases-** Slab base and Gusseted base – Code Provisions (IS:800- 2007) – Minimum thickness and Effective Area of Base plate– Design of Slab base and Gusseted base for Axially loaded columns using bolts / welds.

**UNIT III****(15 Hours)****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

**UNIT – IV**

**(15 Hours)**

**DESIGN OF SECTIONS FOR COMBINED ACTIONS**

**Sections subjected to Bending moment and High Shear force**—Effect of high shear on flexural capacity of sections—Limiting value of shear force for full moment capacity of sections– Reduced design strength of Plastic/Compact/Semi Compact sections subjected to high shear– Design of support sections of cantilevers and continuous beams– Problems

**Sections subjected to Bending moment and Axial Compression**

(Beam-Column)- Columns carrying eccentric loads, Columns subjected to vertical and horizontal loads (wind loads), Columns of frames, Principal rafters with purlins at non nodal points – Material failure and Buckling failure– Interaction equations – Overall buckling– Design problems( with axial compression and uni-axial BM only).

**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

**UNIT – V**

**(15 Hours)**

**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).

**Text Books:**

1. M.R.Shiyekar “LimitState Design in Structural Steel”, PHI Learning Pvt Ltd, 2011
2. K.S.Sai Ram “Design of Steel Structures” Pearson-Prentice Hall Kindersley Pvt Ltd
3. Dr.Subramaniam “Steel Structures.

**E-Resources**

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	I A Tests	Students	Average of Two periodical Tests + Model test	10	Course log Book	1 to 5
		Assignments		Average of 3 Assignments	10	Course log Book & File	1 to 5
		Attendance		Student Attendance	05	Course log Book	1 to 5
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE</b> (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at Autonomous Exam cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle Of The Course	Feed Back Forms		1 to 3 Delivery of course
	End Of Course Survey			End Of The Course	Questionnaires		1 to 5 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)	Total Marks (Out of 165)
1	Remembering	9	15
2	Understanding	30	50
3	Application	61	100
<b>Total</b>		<b>100</b>	<b>165</b>

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**MODEL QUESTION**

Term : VI Time : 3 Hrs  
Programme : Diploma in Civil Engineering Max. Marks : 100  
Course : Steel Structures Course Code : M10CE407

**PART – A**

**10x1=10**

**Answer any 10 question. Each carries ONE mark.**

1. Define the term “Shape factor”
2. What do you mean by “Collapse load”?
3. State any two advantages of limit state design with respect to steel structures.
4. Why expansion joints are to be provided in steel structures?
5. List the three different design strengths of a tie member.
6. What is the advantage of bolted connection?
7. Why lacings are provided in compression members?
8. How a slender compression member generally fails?
9. Why steel beams are provided with lateral supports?
10. Specify minimum thickness of web for a beam to avoid web buckling, as per IS:2007?
11. What is the effective length of a beam for torsional buckling under normal loading condition when its ends are partially restrained against torsion but not restrained against warping?
12. Which member of a steel roof system is subjected to bi-axial bending?
13. When a flexural member is said to be under high shear?
14. When a column is called “beam column”?
15. Give two examples for members subjected to combined bending and tension.

**PART – B**

**6x5=30**

**Answer any 6 question. Each carries FIVE mark.**

16. What are the assumptions made in the plastic method of analysis?
17. Explain briefly the serviceability requirements of structural elements to be considered in the limit state design.
18. Design the member of a roof truss to carry an axial force 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 plate by 4 numbers 40 mm diameter bolts at each end.
19. A single angle ISA 100 x 75 x 10 mm is 300 cm long. It is connected to the gusset plate by means of 2 rivets at each end. Determine the safe load carrying capacity of the street.
20. Differentiate the behaviors of laterally supported and laterally un-supported beams.

21. When a beam section has to be designed for the combined effects of bending and shear?
22. A steel column of effective length 4.0 meters is subjected to an axial compression of 600 KN and a bending moment of 25 KN.m about its major axis. Select suitable rolled steel I section for the column by limit state method, taking  $f_y$  of steel as 340MPa. Check for overall member strength is not necessary.
23. An ISLB 400@ 569 N/m is used as laterally supported cantilever beam. The support section of the beam is subjected to a design shear force of 360 KN. Determine the design bending strength of the section if  $f_y$  of steel is 300 MPa.
24. Draw a neat sketch of beam to column seat angle connection using fillet welds.
25. A single angle tension member ISA 100x100x8mm carries an axial force of 150KN. Find out the minimum overlapping length required, on a 10mm thick gusset plate, at its end if 5mm size fillet welds of permissible design shear strength 150 N/mm<sup>2</sup>.

**PART- C**

**(6x10=60)**

**Answer any 6 question. Each carries TEN mark.**

26. 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.
27. 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.
28. 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<sup>2</sup>. Yield strength of steel is 250 N/mm<sup>2</sup>. Suggest suitable size of weld if  $f_u=460$  N/mm<sup>2</sup>.
29. Design a simply supported steel beam using suitable I-Section to carry an udl of 50 KN/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.
30. 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  $f_y$  of steel as 340 MPa. Check for overall member strength is not necessary.
31. 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  $f_y$  of steel is 300 MPa.

32. 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<sup>2</sup> are used and
- (ii) 16mm dia bolts of design bolt value 50KN are used.

33. The discontinuous strut consists of two angles ISA 75x75x6mm and is 275 cm long. Find the allowable load in each of the following cases using IS 800 recommendation. The angles are connected to the same side of a 8 mm gusset.

34. Explain briefly the serviceability requirements of structural elements to be considered in the limit state design.

35. (i) Differentiate the behaviours of laterally supported and laterally un-supported beams.  
(ii) When a beam section has to be designed for the combined effects of bending and shear?

VSVNPC



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 SCHEME**

**VI TERM**

**2017 – 2018 onwards**

**M10CE408 – EARTHQUAKE ENGINEERING**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 – SCHEME**

(To be implemented from the student admitted from the year 2017-2018 onwards)

Programme <b>Civil Engineering</b>	Type of course : <b>Theory</b>
Course Title: <b>EARTHQUAKE ENGINEERING</b>	Course Code : <b>M10CE408</b>
Term : <b>VI</b>	Course Group : <b>Diversified</b>
Teaching Scheme (L:T:P) : <b>5:0:0</b> (in Hours)	Credits : <b>5 Credits</b>
No of weeks : <b>15</b>	Total Contact Hours : <b>75</b>
CIE : <b>25 Marks</b>	TEE : <b>100 Marks</b>

**Pre-requisites** : Knowledge in Practical Earthquake engineering

**Course Topics:**

Unit No	Unit Name	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	5.1 RETROFITTING OF BUILDINGS 5.2 BASE ISOLATION FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURE	15
	<b>Total</b>	<b>75</b>

**Course Outcomes:**

- 408.1. The course on Introduction to Earthquake Engineering provides the fundamental concepts, principles and application of earthquake engineering in seismic analysis and design of structures.
- 408.2. The course begins with the Seismology explaining the causes of occurrence of earthquake and its characterization.
- 408.3. The seismic analysis of the structures under earthquake excitation is developed. The structural system modelled as discrete and continuous system.
- 408.4. The concept of response spectrum analysis procedure to determine structure response and design earthquake forces is explained.
- 408.5. Learning and apply basic methods employed for analysis of civil engineering problems involving dynamics and earthquake.

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		CL	Linked PO	Teaching Hrs
CO1	The course on Introduction to Earthquake Engineering provides the fundamental concepts, principles and application of earthquake engineering in seismic analysis and design of structures.	R/U/A	1,3,6,7,10	15
CO2	The course begins with the Seismology explaining the causes of occurrence of earthquake and its characterization.	U/A	1,2,3,4,5,6,8,9,10,	15
CO3	The seismic analysis of the structures under earthquake excitation is developed. The structural system modeled as discrete and continuous system.	R/U	1,2,3,4,5,6,8	15
CO4	The concept of response spectrum analysis procedure to determine structure response and design earthquake forces is explained.	R/U/A	1,2,3,5,6,9	15
CO5	Learning and apply basic methods employed for analysis of civil engineering problems involving dynamics and earthquake.	R/U/A	1,2,3,4,5,6,8,10	15
			<b>Total sessions</b>	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	
1	INTRODUCTION TO EARTHQUAKE	15	33	3	10	20	20
2	SEISMIC EFFECTS ON STRUCTURES	15	33	3	10	20	20
3	BEHAVIOUR OF STRUCTURES DURING EARTHQUAKES	15	33	3	10	20	20
4	CONCEPTS OF DESIGN OF EARTHQUAKE RESISTING BUILDINGS	15	33	3	10	20	20
5	5.1 RETROFITTING OF BUILDINGS, BASE ISOLATION FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURE	15	33	3	10	20	20
<b>Total</b>		75	165	15	50	100	100

**Course-PO Attainment Matrix**

Course Outcomes	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
EARTHQUAKE ENGINEERING	2	2	-	3	1	-	-	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.

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**Course Content**
**EARTHQUAKE ENGINEERING****DETAILED SYLLABUS****UNIT I: INTRODUCTION TO EARTHQUAKE****15 Hours**

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 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 .

**UNIT II: SEISMIC EFFECTS ON STRUCTURES****15 HOURS**

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

**UNIT III – BEHAVIOUR OF STRUCTURES DURING EARTHQUAKES 15 Hours**

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

#### **UNIT IV– CONCEPTS OF DESIGN OF EARTHQUAKE RESISTING**

##### **BUILDINGS**

**15 Hours**

Earthquake proof building - Earthquake resisting building -Acceptable damages to building elements under minor and frequent Earth quakes, moderate and occasional earthquakes, and strong but rare earth quakes - General requirements of structures for earthquake resistance and structural safety – Concepts of ductility, Deformability and damageability - Concept of base isolation -Ductile performance of structures – Reinforcement detailing For ductility of RC structures - Flexible building elements - Special requirements for RC columns and beams to resist earthquake -Confining steel in columns - Special confining reinforcement for Short columns - Maximum spacing of ties and minimum lapping length of main bars in columns - Ductile detailing of RC buildings - Joints of framed structures–Reinforcements in Beam Column Joints - Providing Shear walls – Arrangement of shear walls –Boundary elements of shear 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.

#### **UNIT V RETROFITTING OF BUILDINGS**

**15 Hours**

-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

## 5.2 BASE ISOLATION FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURE

Base Isolation Concept, Isolation Systems and their Modeling – Linear theory of base isolation – Stability of elastomeric Bearings – Codal Provisions for Seismic isolation, Practical applications.

### Reference Book:

1. Earthquake Resistant Design of Structures by Pankaj Agarwal and Manish Shrikhande (2010) PHI Learning Pvt Ltd
2. Guidelines for Earthquake Resistant Non Engineered Construction by The Associated Cement Companies Ltd
3. Criteria for Earthquake Resistant Design of Structures - General Provisions and Buildings, IS: 1893 ( Part 1 ) - 2002
4. Code of practice for ductile detailing of RC structures subjected to Seismic forces, IS:13920-1993.
5. Earthquake Tips by C.V.R.Murty, IIT, Kanpur, Sponsored by BMTPC, New Delhi.
6. Geotechnical Earthquake Engineering Hand Book by Robert W.Day – McGRAW - HILL
7. David Key “Earthquake Design Practice of Buildings”, Thomas Telford, London,1998.

### E-Resources

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, and exercises.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	I A Tests	Students	Model Exam	10	Course Log Books	1 to 5
		Drawing File		Classroom – Drawings	10	Course Log Books and file	1 to 5
		Reports		Student Activity	05	Handwritten Report	1 to 5
		<b>TOTAL</b>		<b>25</b>			
	<b>TEE (Term End Examination)</b>	End Exam	Students	End Of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle Of The Course	Feed Back Forms		1,2,3 Delivery of course
	End Of Course Survey			End Of The Course	Questionnaires		1 to 5 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Suggested Student Activities:**

Each Student has to prepare and submit at least 3 pages of self hand written report considering any one of the following topics.

1. Prepare models of solids
2. Mark and develop simple sheet metal components
3. Report real time applications of EARTHQUAKE ENGINEERING.

**Rubrics/Criteria for Assessing Student Activities (Total 5 Marks)**

Dimension	Scale					Student Score(ex)
	1-Unsatisfactory	2-Developing	3-Satisfactory	4-Good	5-Exemplary	
Understanding the activity	Not Completely	Completely	Ok	Exactly	Well Done	3
basic concept	Not Understand	Less Effective	Partially Effective	Effective	Most Effective	4
Effect taken	Poor	Fair	Good	Very Good	Excellent	3
Presentation	Poor	Less Effective	Effective	Exactly Matched	Most Effectively Attained	4
<b>TOTAL MARKS</b>					14/4=3.5	<b>4</b>

**Questions for CIE and TEE will be designed to evaluate the various educational components such as:**

Sl. No	Bloom's Category	%
1	Remembrance	9
2	Understanding	30
3	Application	61

**MODEL QUESTION**

Term	: VI	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 100
Course	: Earthquake Engineering	Course Code	: M10CE408

**PART –A**

**(10 X 1 = 10)**

**Answer any TEN questions .Each carries one marks.**

1. Define engineering seismology.
2. State hypo centre.
3. State love waves.
4. Explain pounding of adjacent buildings.
5. State floating columns.
6. Say the flexibility of buildings.
7. What is fatigue fracture?
8. Write anyone type of damage in beams.
9. Write anyone type of joint.
10. Give anyone advantages of shear wall.
11. Give anyone special requirements for RC columns and beams to resist earthquake.
12. What is the minimum and maximum spacing of ties and lapping length of main bars in columns.
13. Define base isolation.
14. Define shotcrete.
15. Explain bracing of roof truss frames.

**PART –B**

**(6 X 5 = 30)**

**Answer any SIX questions. Each carries five marks.**

16. Explain the types of waves.
17. Discuss about the plate Tectonics.
18. Discuss about the effects of amplitude, duration and distance of earthquake.
19. Discuss the ductility and flexibility of buildings.
20. Explain the types of joints.
21. Explain the behaviour of RCC structures.
22. What are the special requirements for RC columns and beams to resist earthquake.
23. Explain the types of dampers.
24. Explain seismic strengthening techniques.
25. Explain base isolation concept.

**PART –C**

**(6 X 10 = 60)**

**Answer any SIX questions. Each carries ten marks.**

26. Discuss about plate tectonics and evolution of Indian sub continent in detail.
27. Explain about the instrument used for measuring earthquake and seismic zoning map of India.
28. Explain about the causes for seismic damages in buildings.
29. Give detail about short column effect, size and shape effect of buildings and its pounding effect.
30. Explain about the behaviour of structures on sloped ground and with load bearing walls.
31. Discuss the Soil characteristics and its impact on various types of structures during Earthquake  
Twisting of buildings.
32. Explain the concepts of ductility, deformability and damageability of buildings during earthquake.
33. Say about the reduction of earthquake effects and features for masonry buildings to resist earthquake.
34. Give detail on the retrofitting method and repairing techniques used for buildings.
35. Discuss about the strengthening of foundations.



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**VI TERM**

**2017 –2018 onwards**

**M10CO400 – NANO AND SOLAR ENGINEERING**

VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
 VIRUDHUNAGAR – 626001  
 Diploma in Civil Engineering  
 M10 – SCHEME

(To be implemented from the student admitted from the year 2017-2018 onwards)

Programme : <b>Civil Engineering</b>	Type of course : <b>Theory</b>
Course Title : <b>NANO AND SOLAR ENGINEERING</b>	Course Code : <b>M10CO400</b>
Term : <b>VI</b>	Course Group : <b>Diversified</b>
Teaching Scheme : <b>5:0:0(L:T:P) (in Hours)</b>	Credits : <b>5</b>
No of weeks / term : <b>15</b>	Total Contact Hours : <b>75</b>
CIE : <b>25 Marks</b>	TEE : <b>100 Marks</b>

**Pre-requisites** : Knowledge of Special Machines and Nano Manufacturing

**Course Topics:**

Unit No	Unit Name	Hours
I	Basics of Nano Science and Classes of Nano Science	15
II	Synthesis, Characterization & Application of Nano Material	15
III	Fundamentals of solar cell and its performance	15
IV	Solar cell classifications and its components	15
V	Types of solar system and design of Solar home System	15
	<b>Total Contact Hours</b>	<b>75</b>

**Course Outcomes:**

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

C.400.1	Able to Synthesis Nano particle through Chemical Route & Physical route and preparation of Nano Thin film by spin coating & dip coating process
C.400.2	Know to interpret the Nano film thickness , Electrical Property & Hydrophobic Property of Nano thin films
C.400.3	Able to measure Solar Radiation and determine the IV, PV characteristics of PV module
C.400.4	Understand the Working of By-pass Diode and Blocking Diode
C.400.5	Analyze the Power Flow of PV System for AC load and DC load with Battery

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

Course Outcome		CL	Linked PO	Teaching Hrs
C.400.1	Able to Synthesis Nano particle through Chemical Route & Physical route and preparation of Nano Thin film by spin coating & dip coating process.	R/U/A	1,2	15
C.400.2	Know to interpret the Nano film thickness, Electrical Property & Hydrophobic Property of Nano thin films.	U/A	1,2,5,10	15
C.400.3	Able to measure Solar Radiation and determine the IV, PV characteristics of PV module.	R/U	1,2,6,7	15
C.400.4	Understand the Working of By-pass Diode and Blocking Diode.	R/U/A	1,2	15
C.400.5	Analyze the Power Flow of PV System for AC load and DC load with Battery.	R/U/C	1,2	15
			<b>Total sessions</b>	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	C	
I	Basics of Nano Science and Classes of Nano Science	15	33	3	10	20	-	20
II	Synthesis, Characterization & Application of Nano Material	15	33	3	10	20	-	20
III	Fundamentals of solar cell and its performance	15	33	3	10	20	-	20
IV	Solar cell classifications and its components	15	33	3	10	20	-	20
V	Types of solar system and design of Solar home System	15	33	3	10	-	20	20
<b>Total</b>		75	165	15	50	80	20	100

## Course-PO Attainment Matrix:

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
NANO AND SOLAR ENGINEERING	3	3	-	-	1	1	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  $\geq 40\%$  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.

## Course Content:

## DETAILED SYLLABUS

**UNIT I Basics of Nano science and Classes of Nano science 15 HOURS**

Nano technology – Difference between bulk and Nano scale materials – Properties at the Nano scale –Size dependent behavior.

Quantum dots – Nano wells – Nano films and Nano wires – Bucky balls – Carbon Nano tubes – Single walled and Multi walled CNT.

**UNIT II Synthesis, Characterization and Application of Nano Material 15 Hours**

Top-Down approach – Nanolithography – Ball Milling - Bottom-Up approach – CVD (Chemical Vapor Deposition). Sol-gel processing – Spin Coating Method, Dip Coating Method.

Characterization of Nano Particles - SEM –XRD – UV Spectroscopy, PV Characteristics of Nano Thin Films using 4 probe methods.

Hydrophobic nature of Nano Thin films. Application of Nano Technology - Electronics – Textiles – Solar technology – Construction Materials –Nano Technology in medical science – Drug Delivery system for Cancer Treatment.

**UNIT III - FUNDAMENTALS OF SOLAR CELL AND ITS PERFORMANCE****15 Hours**

**Energy Resources:** Renewable energy sources scenario in India – Importance of renewable energy sources-Wind energy-Solar energy- Advantages of solar energy - Physics of the Sun - Solar spectrum - green house effect

**Concepts:** Photovoltaic effect - Principle of direct solar energy conversion into electricity in a solar cell -Solar cell, p-n junction – structure - I-V characteristics - effect of irradiation and temperature - fill factor - maximum power point – losses - cell efficiency

**UNIT IV – SOLAR CELL CLASSIFICATIONS AND ITS COMPONENTS****15 Hours**

Types of Solar cells - Solar Modules - Blocking Diode - By-pass Diode - Solar Array - Isolation Diode - **Batteries in Solar PV Systems:** Battery Types and Classifications, Construction of Lead – Acid battery, Lead-Acid Battery Chemistry, Modern Rechargeable Batteries, Methods of Battery Charging, **Charge controllers:** Shunt regulator, Series regulator, Methods of Charging the Battery by CR. **Inverters:** Basic Principle of operation, Types of Inverters.

**UNIT V TYPES OF SOLAR SYSTEM AND DESIGN OF SOLAR HOME SYSTEM****15 Hours**

**Classification:** Stand alone PV system - Grid connected PV System - Hybrid solar PV system  
**Design of Solar Home System (SHS)** - Selection of Solar PV module - Selection of Battery - Selection of Charge Controller - Selection of DC/AC Inverter - Selection of DC/DC converter - Selection of switch - Selection of the wire size for solar home system

**Text Books:**

1. Pradeep.T, Fundamentals of Nanoscience and Nanotechnology, Mc GrawHill,2012.
2. Chris Binns, Introduction to Nanoscience and Nanotechnology, 1<sup>st</sup> Edition,Willey – publication,2010
3. Sukhatme .S.P, Nayak .J.K, “Solar Energy”, Tata McGraw Hill Education Private Limited, New Delhi, 2010.
4. Unit III to Unit V *Training Manual For Engineers on Solar PV System* published by Government of Nepal, Ministry of Environment, Science and Technology.
5. Solar photovoltaic systems technical training manual by Herbert A Wade UNESCO publishing.

**Reference Books:**

1. C.P.Poole, Jr. Frank J.Owens, Introduction to Nanotechnology (Wiley India Pvt. Ltd.).
2. S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publishing Company).
3. K.K. Chattopadhyay and A.N. Banerjee, Introduction to Nanoscience & Technology
4. (PHI Learning Private Limited).
5. Chetan Singh Solanki., *Solar Photovoltaic: “Fundamentals, Technologies and Application”*, PHI Learning Pvt., Ltd., 2009.
6. John R. Balfour, Michael L. Shaw, Sharlave Jarosek., “Introduction to Photovoltaics”, Jones & Bartlett Publishers, Burlington, 2011.

**E Resources:**

1. <https://www.faaddoengineers.com>
2. <http://www.wikipedia.org>
3. <http://www.accessengineeringlibrary.com>
4. <http://www.nptel.ac.in>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, and exercises.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	IA Tests	Students	Average of two Periodical tests + Model Exam	10	Course File	1 to 5
		Assignments		Average of three assignment marks	10	Course file	1 to 5
		Attendance		Daily Attendance	05	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	75	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires	1 to5 Effectiveness of Delivery of instructions & Assessment Methods	

**Composition of Educational Components:**

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>	<b>Total Marks (Out of 165)</b>
1	Remembering	9	15
2	Understanding	30	50
3	Application	49	80
4	Create	12	20
<b>Total</b>		<b>100</b>	<b>165</b>

**MODEL QUESTION**

Term	: VI	Time	: 3 Hrs
Programme	: Common to all Branches	Max. Marks	: 100
Course	: Nano and Solar Engineering	Course Code	: M10CO400

**PART-A**

**Answer any 10 Questions-All Questions carry one mark. (10 x 1= 10)**

1. What is Nano technology?
2. Mention various forms of Nano materials
3. Write notes on fullerene.
4. What is top down approach?
5. Write the methods of nano coating.
6. What is TEM?
7. What is a renewable energy source?
8. What is photo voltaic effect?
9. What is cell efficiency?
10. What is a primary cell?
11. What is solar array?
12. Name the types of inverter.
13. What is a Hybrid PV system?
14. Draw the block diagram of Hybrid PV system.
15. Calculate the energy required to run a 10W lamp for 8 hours.

**PART-B**

**Answer any 6 Questions-All Questions carry Five marks. (6 x 5 = 30)**

16. What are the properties of nano scale materials?
17. Explain about nano wires.
18. Briefly explain spin coating method.
19. Write the applications of nano technology in medicine.
20. Write the advantages of solar energy.
21. Explain I-V characteristics of PV cells
22. Explain Blocking diode with block diagram.
23. Explain Shunt regulator type charge controller with block diagram.
24. Explain with Block diagram Stand alone PV System.
25. Discuss the selection of switch for solar home system.

## PART-C

Answer any 6 Questions-All Questions carry Ten marks.

(6 x10 = 60)

26.
  - i. Discuss the difference between nano and bulk materials.
  - ii. Write short notes on size dependant behavior of nano materials.
27. Explain Single walled and multi walled CNT.
28. Explain about SEM with block diagram.
29. Explain Ball milling process with neat sketch.
30. Draw the different types of wind turbines and explain the advantages and disadvantages of wind energy.
31. Explain the process of converting Solar energy into electric energy in a PV cell.
32. Explain about the construction of a Lead acid battery.
33. Explain the various methods of charging a battery.
34. Explain with block diagram the Working of Grid connected PV system.
35. Explain the design procedure for Solar Home system.



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**VI TERM**

**2017 –2018 onwards**

**M10CE307 – ESTIMATING AND COSTING-II**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),****VIRUDHUNAGAR – 626001****Diploma in Civil Engineering****M10 – SCHEME****(To be implemented from the student admitted from the year 2017 - 2018 onwards)**

Programme	:Civil engineering	Type of course	:Theory
Course Title	: <b>ESTIMATING AND COSTING II</b>	Course Code	: <b>M10CE307</b>
Semester	: <b>VI</b>	Course Group	: <b>Applied</b>
Teaching Scheme (L:T:P)	: <b>5:0:0</b> (in Hours)	Credits	: <b>5 Credits</b>
No.of weeks/term	: <b>15</b>	Total Contact Hours	: <b>75</b>
CIE	: <b>25Marks</b>	TEE	: <b>100 Marks</b>

**Pre-requisites** :Knowledge in Estimating and costing-I**Course Topics:**

<b>Unit No</b>	<b>Unit Name</b>	<b>Hours</b>
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
	<b>TOTAL</b>	<b>75</b>

**Course Outcomes:**

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

- C.307.1 Know about specification writing.
- C.307.2 Understand the valuation of buildings.
- C.307.3 Know about the rate analysis and bill preparation
- C.307.4 Prepare a detailed estimate for Public health, road and bridge structures.
- C.307.5 Prepare valuation reports and cost quality control.

**Course Outcome linkage to Cognitive Level**

**COGNITIVE LEVEL LEGEND – R:REMEMBER U: UNDERSTAND, AP: APPLICATION AY: ANALYSIS C: CREATION**

Course Outcome		CL	Linked PO	Teaching Hrs
C.307.1	<i>To know about specification writing.</i>	<i>R/U//C</i>	1,2,3,4	10
C.307.2	<i>To understand the valuation of buildings.</i>	<i>R/U/AP</i>	1,2,3,7,8	16
C.307.3	<i>To know about the rate analysis and bill preparation</i>	<i>R/U/AP</i>	1,2,3	13
C.307.4	<i>Prepare a detailed estimate for Public health, road and bridge structures.</i>	<i>U/AP/AY</i>	1,2,3,8,9	18
C.307.5	<i>Prepare valuation reports and cost quality control.</i>	<i>U/AP/AY</i>	1,2,3,5,8,10	18
		Total sessions		75

**Course Content and Blue Print of Marks for TEE:**

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	33	3	10	20	20
II	VALUATION RENT CALCULATION	16	33	3	10	20	20
III	ANALYSIS OF RATES FOR SANITARY AND WATER SUPPLY WORKS ANALYSIS OF RATES FOR BRIDGE / ROAD WORKS AND MISCELLANEOUS ITEMS	13	33	3	10	20	20
IV	TAKING OFF QUANTITIES OF P.H ENGINEERING STRUCTURES USING TRADE SYSTEM	18	33	3	10	20	20
V	TAKING OFF QUANTITIES OF ROAD / BRIDGE STRUCTURES USING TRADE SYSTEM	18	33	3	10	20	20
<b>Total</b>		75	165	15	50	100	100

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>ESTIMATING AND COSTING II</b>	3	3	3	2	1	-	1	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.*

**Course Content:****UNIT-1****(10 Hours)****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

**UNIT-II****(16 Hours)****2.1 Valuation**

Value - Difference between Cost and Value - Purpose of valuation – Definition of terms: Capital cost, Gross income and Net income, Outgoings, Capitalized value and Capital value, Scrap value, Salvage value, Obsolescence, Sinking fund, Depreciation, Years purchase, Book value, Market value, Rateable value, Deferred value of land, Lease, Mortgage, Annuity, Amortization - Factors affecting the value of a property - Classification of Properties - Types of Leases - Problems on determination of Sinking Fund - Problems on calculation of Depreciation - Methods of valuation of Buildings - Valuation based on Comparison / 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

### UNIT-III

(13 Hours)

#### 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)

### UNIT-IV

(18 Hours)

#### 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

**UNIT-V**

**(18 Hours)**

**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

**TEXT BOOKS**

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

**E-Resources**

1. <http://www.schandgroup.com>
2. <http://phindia.com>
3. <http://ikbooks.com>

**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	I A Tests	Students	Average of Two periodical Tests + Model test	10	Course log Book	1 to 5
		Assignments		Average of 3 Assignments	10	Course log Book & File	1 to 5
		Attendance		Student Attendance	05	Course log Book	1 to 5
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE</b> (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at Autonomous Exam cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle Of The Course	Feed Back Forms		1 to 3 Delivery of course
	End Of Course Survey			End Of The Course	Questionnaires		1 to 5 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)	Total Marks (Out of 165)
1	Remembering	9	15
2	Understanding	30	75
3	Application	61	75
<b>Total</b>		<b>100</b>	<b>165</b>

**MODEL QUESTION**

Term	: VI	Time	: 3 Hrs
Programme	: Diploma in Civil Engineering	Max. Marks	: 100
Course	: ESTIMATING AND COSTING II	Course Code	:M10CE204

**PART – A**

**(10 x1=10)**

**Answer any TEN questions .Each carries one marks.**

1. Differentiate general specification and detailed specification.
2. What particulars are to be incorporated in a detailed specification of materials?
3. Write any two points to be considered while writing a technical report for a project.
4. Define the term “salvage value”
5. Write the formula used to calculate the annual installment of sinking fund
6. Define “fair rent”.
7. Why rates are to be analyzed separately for each project site?
8. What particulars you need to arrive at a reasonable rate for earth work in trenches?
9. Write any two materials for which the lead cost is more than their actual cost.
10. Write any three items of works involved in the construction of a man hole.
11. How you estimate the quantity of steel reinforcement for various RCC elements?.
12. Where steining walls are provided?
13. Write any three items of works involved in the laying of a water bound macadam road.
14. What are the works involved in the construction of side drains for a road?.
15. State the unit of measurement for the fabrication of steel for the deck slab of a culvert.

**PART – B**

**(6x5=30)**

**Answer any SIX questions. Each carries five marks.**

16. Differentiate general specification and detailed specification
17. Write the necessities of reports.
18. Write short notes on
  - (i)Salvage value.
  - (ii)Obsolescence.
19. Write short notes on
  - (i)Sinking fund
  - (ii)Scrap value
20. Write short notes on types of leases.
21. 20 mm thick Premix Chipping carpet – 1m<sup>2</sup>Hgyh
22. Take the quantity of R.C.C slab for the over head tank shown in Sketch 1 using Trade system.
23. Take the quantity earth work excavation for the over head tank footing shown in Sketch 1 using Trade system

24. Take the quantity of pointing with CM 1:4 of the Tee-beam bridge shown in Sketch 2, using Trade system
25. Take the quantity of GI pipe railing on Both side parapet wall of the Tee-beam bridge shown in Sketch 2, using Trade system.

**PART –C**

**(6x10=60)**

**Answer any SIX questions .Each carries ten marks.**

26. (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)
27. (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)
28. (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)
29. (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<sup>2</sup>. The present market value of land in the locality is Rs.3000 per m<sup>2</sup>. 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)  
**(Analyze and determine the rates for the following items of work with the given data.**
30. (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)

31. Rough stone dry packing for aprons and revetments – 1 m<sup>3</sup>. (10)

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 <sup>3</sup>
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 <sup>3</sup>
Sand (medium)	0.15	m <sup>3</sup>
Cement	107	kg
3mm gauge wire mesh	12	m <sup>2</sup>
Chicken mesh	24	m <sup>2</sup>
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 <sup>3</sup>
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<sup>2</sup>.**

Binder Asphalt	255	kg
Stone chips	2.7	m <sup>3</sup>
Sand	0.3	m <sup>3</sup>

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 m<sup>3</sup>**

Rough stones	11	m <sup>3</sup>
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 <sup>3</sup>	250.00	30	20.00	60.00
Rough Stone	m <sup>3</sup>	800.00	20	20.00	80.00
Stone chips	m <sup>3</sup>	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 <sup>2</sup>		150.00	--	--	--

Chicken mesh 1m<sup>2</sup>                      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

32. Take the quantity of R.C.C in column footings for the over head tank shown in Sketch 1 using Trade system (10)

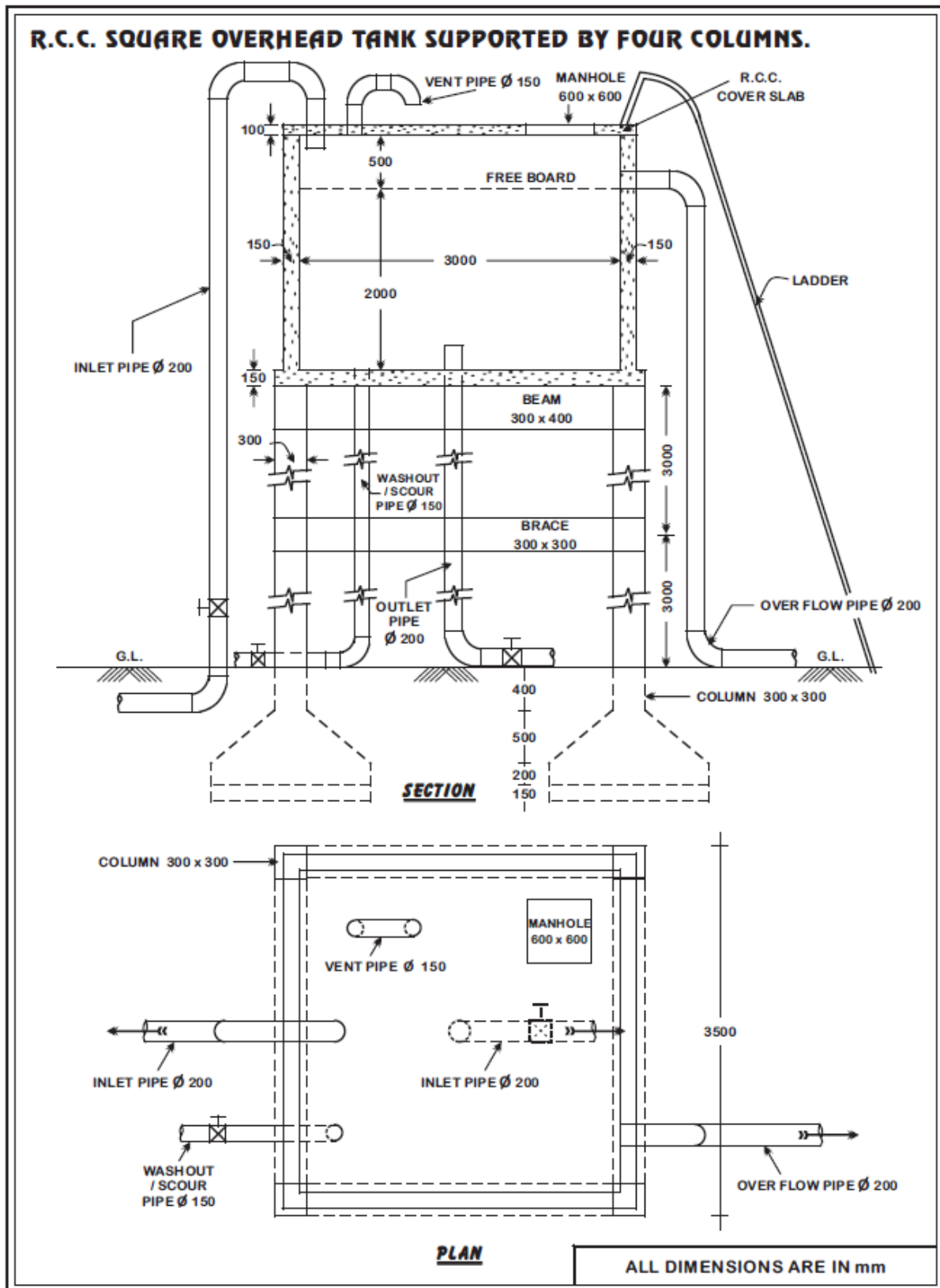
33. Take the area of plastering of the side walls (inner and outer) of the over head tank shown Sketch 1 using Trade system (10)

**(Sketch 1 – A plan and sectional elevation of a RCC over head tank with flat RCC roof.)**

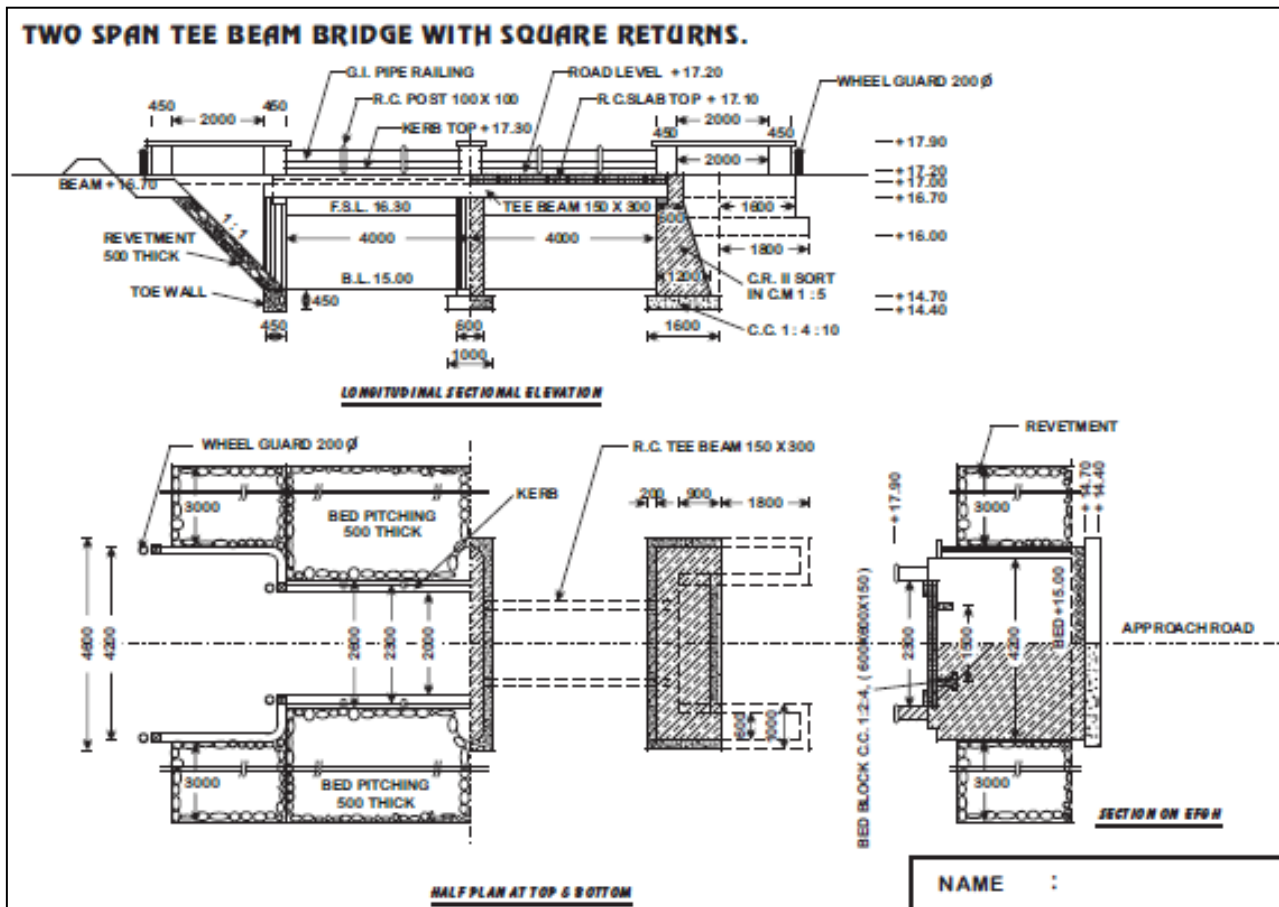
34. Take the quantity of brick work in abutment and wing walls of the Tee-beam bridge shown in Sketch 2, using Trade system (10)

35. Take the quantities of RCC in Beams and Slabs of the Tee beam bridge shown in Sketch 2 using Trade system. (10)

**(Sketch 2 – A sectional plan and sectional elevation of a single span Tee beam bridge).**



SKETCH - 1



SKETCH - 2



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 - SCHEME**

**VI TERM**

**2017 – 2018 onwards**

**M10CE315 – HYDRAULICS LAB**

VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 – SCHEME  
(To be implemented from the student admitted from the year 2017 - 2018 onwards)

Programme	:Civil engineering	Type of course	:Practical
Course Title	: <b>HYDRAULICS LAB</b>	Course Code	: M10CE315
Term	: <b>VI</b>	Course Group	: <b>Applied</b>
Teaching Scheme (L:T:P)	: <b>0:1:3</b> (in Hours)	Credits	: <b>2 Credits</b>
No.of weeks/term	: <b>15</b>	Total Contact Hours	: <b>60</b>
CIE	: <b>25Marks</b>	TEE	: <b>100 Marks</b>

**Pre-requisites** : Knowledge of Engineering mathematics and Applied Science.

**Course Topics:**

Unit No	Unit Name	Hours
I	FLOW OF FLUIDS	12
II	FLOW THROUGH ORIFICE	12
III	FLOW THROUGH EXTERNAL CYLINDRICAL MOUTH PIECE	12
IV	FLOW THROUGH PIPES FLOW THROUGH NOTCHES.	12
V	PUMPS	12
	<b>Total</b>	<b>60</b>

**Course Outcomes:**

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

- C.315.1 Understand to apply Bernoulli's equation and to determine the co-efficient of discharge of Venturimeter and Orifice meter.
- C.315.2 Understand and able to determine the co-efficient of discharge of Orifice
- C.315.3 Understand and able to determine the co-efficient of discharge of Mouthpiece.
- C.315.4 Understand and able to determine the friction factor and determine the co-efficient of discharge of Notches.
- C.315.5 Understand and able to determine the characteristic curves of pumps.

**Course Outcome linkage to Cognitive Level**

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

Course Outcome		Experiment linked	CL	Linked PO	Teaching Hrs
C.315.1	Understand to apply Bernoulli's equation and to determine the co-efficient of discharge of Venturimeter and Orifice meter.	1,2,3	R/U	1,2,4,5,7,10	12
C.315.2	Understand and able to determine the co-efficient of discharge of Orifice	4,5	R/U	1,2,4,7,9,10	12
C.315.3	Understand and able to determine the co-efficient of discharge of Mouthpiece.	6,7	R/U	1,2,3,4,7,9,10	12
C.315.4	Understand and able to determine the friction factor and determine the co-efficient of discharge of Notches.	8,9	R/U	1,2,4,6,7,8,10	12
C.315.5	Understand and able to determine the characteristic curves of pumps.	10,11	R/U	1,2,4,6,7,10	12
<b>TOTAL</b>					<b>60hrs</b>

**Course-PO Attainment Matrix**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>HYDRAULICS LAB</b>	3	3	1	3	1	2	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  $\geq 40\%$  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.

**Course Content:**

<p><b>Flow of Fluids:</b></p> <ol style="list-style-type: none"> <li>1. Verification of Bernoulli’s theorem.</li> <li>2. Flow through Venturimeter – Determination of Co-efficient of Discharge.</li> <li>3. Flow through Orificemeter – Determination of Co-efficient of Discharge.</li> </ol> <p><b>Flow through orifice :</b></p> <ol style="list-style-type: none"> <li>4. Determination of Co-efficient of Discharge by Time fall - Head method</li> <li>5. Determination of Co-efficient of Discharge by Constant head method</li> </ol> <p><b>Flow through external cylindrical mouth piece :</b></p> <ol style="list-style-type: none"> <li>6. Determination of Co-efficient of Discharge by Timing fall in head method</li> <li>7. Determination of Co-efficient of Discharge by Constant head method</li> </ol> <p><b>Flow through pipes :</b></p> <ol style="list-style-type: none"> <li>8. Determination of friction factor for the given GI pipe / PVC pipe.</li> </ol> <p><b>Flow through notch :</b></p> <ol style="list-style-type: none"> <li>9. Determination of Co-efficient of Discharge for Rectangular Notch / V-Notch</li> </ol> <p><b>Pumps :</b></p> <ol style="list-style-type: none"> <li>10. Reciprocating pump – To draw characteristic curves.</li> <li>11. Centrifugal pump – To draw characteristic curves</li> </ol>	<p><b>60 Hrs</b></p>
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**Course Delivery:**

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

**Course Assessment and Evaluation**

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	Exercise & Observation	Students	Average of mark allotted for each exercise	10	Course file and Record notes	1 to 4
		IA Tests		Model Exam 1&2	5+5	Course File, Models & file	1 to 4
		Attendance		Daily Attendance	5	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	100	Answer Scripts at Autonomous Exam Cell	1 to 4
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1&2 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to4 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

**ALLOCATION OF MARKS:**

S.No	Description	Marks
1	Procedure	10
2	Tabulation and Observation	25
3	Calculations	20
4	Sketch / Graph	10
5	Accuracy of result	5
6	Viva-Voce	5
	<b>TOTAL</b>	<b>75 Marks</b>

S.NO.	LIST OF THE EQUIPMENTS	QUANTITY REQUIRED
1.	Bernoulli's theorem apparatus (closed circuit)	1 No
2.	Venturimeter/Orificemeter apparatus (closed circuit) with all accessories	1 No
3.	Pipe Friction apparatus (closed circuit) with all accessories	1 No
4.	Orifice/Mouthpiece apparatus (closed circuit) with all accessories	1 No
5.	Notch apparatus (closed circuit) with accessories	1 No
6.	Reciprocating Pump test rig with accessories	1 No



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**VI TERM**

**2017 – 2018 onwards**

**M10CE416 – COMPUTER APPLICATIONS IN CIVIL ENGINEERING  
– ELECTIVE PRACTICAL**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 – SCHEME**

(To be implemented from the student admitted from the year 2017-2018 onwards)

Programme: <b>Civil Engineering</b>	Type of course : <b>Tutorial + Practical</b>
Course Title: <b>COMPUTER APPLICATIONS IN CIVIL ENGINEERING</b>	Course Code : <b>M10CE416</b>
Term : <b>VI</b>	Course Group : <b>Diversified</b>
Teaching Scheme: <b>0:1:4(L:T:P)</b> (in Hours)	Credits : <b>2 Credits</b>
No of weeks / term: <b>15</b>	Total Contact Hours : <b>75</b>
CIE : <b>25 Marks</b>	TEE : <b>75 Marks</b>

**Pre-requisites:** Knowledge of Digital electronics IC's and circuits.

**Course Outcome linkage to Cognitive Level:**

On successful completion of the course, the students will be able to attain following Course Outcomes

Course Outcome		Experiment linked	CL	Linked PO	Teaching Hrs
<b>C.316.1</b>	Familiarize in spread sheet	<b>1,2,3,4,5</b>	<b>U,A</b>	<b>1,6</b>	<b>15</b>
<b>C.316.2</b>	Knowledge about detailed drawings and Preparation of Bar Bending schedule	<b>6,7,8,9,10,11,12</b>	<b>R,A</b>	<b>2,4,6</b>	<b>15</b>
<b>C.316.3</b>	Familiarize in analysis and design of RCC structures	<b>13</b>	<b>R,A</b>	<b>3,4,10</b>	<b>15</b>
<b>C.316.4</b>	Develop the CPM / PERT Network for the proposed simple building project	<b>14</b>	<b>R,A</b>	<b>7,8,9</b>	<b>15</b>
<b>C.316.5</b>	Develop Aerial map of given area	<b>15</b>	<b>A</b>	<b>2,4,6</b>	<b>15</b>
				<b>Total sessions</b>	<b>75</b>

Legends: R = Remember U= Understand; A= Application and above levels (Bloom's revised taxonomy)

**Course Outcomes:**

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

**C.316.1** Familiarize in spread sheet

**C.316.2** Knowledge about detailed drawings and Preparation of Bar Bending schedule

**C.316.3** Familiarize in analysis and design of RCC structures

**C.316.4** Develop the CPM / PERT Network for the proposed simple building project

**C.316.5** Develop Aerial map of given area

**Course-PO Attainment Matrix:**

Course Name	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>COMPUTER APPLICATIONS IN CIVIL ENGINEERING</b>	2	2	1	2	-	3	1	1	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.

**Course Contents:**

Unit	Name of the Topic	Hours
PART- A	<p><b>I ELECTRONIC SPREAD SHEET USING SOFTWARE</b></p> <p>Using any one of the available packages mentioned below or any other Suitable package</p> <ol style="list-style-type: none"> <li>1. Prepare the Estimate sheet with given data (provide all the measurement details) and calculate the quantity using formula bar.</li> <li>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)</li> <li>3. Design and Analysis problems                             <ol style="list-style-type: none"> <li>i) Calculate Area and Elongation using Formula bar</li> <li>ii) Calculate Effective depth 'd' and Area of Steel 'Ast 'using Formula Bar</li> </ol> </li> <li>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</li> <li>5. Finding centre of gravity; <math>I_{ZZ}</math> and <math>I_{YY}</math> of I, L, T and channel sections</li> </ol> <p>Note: In addition to the above, similar exercises may be given for practice</p>	18Hrs

<b>PART-B</b>	<p><b>II RCC DETAILING USING SOFTWARE</b>                  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</p>	<b>30 Hrs</b>
<b>PART C</b>	<p><b>III RCC STRUCTURES ANALYSIS USING SOFTWARE</b>                  13. Carry out the analysis and design of RCC structures using any one of the available packages mentioned below or any other suitable packages</p> <p><b>IV CONSTRUCTION PROJECT MANAGEMENT USING SOFTWARE</b>                  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</p> <p><b>V DRAWING MAPS USING GIS SOFTWARE                  (FOR PRACTICE ONLY – NOT FOR EXAMINATION)</b>                  15. Develop Aerial map of given area using <b>any one</b> of the available packages mentioned below or any other suitable packages</p>	<p><b>15 Hrs</b></p> <p><b>7 Hrs</b></p> <p><b>5 Hrs</b></p>

**Resources:**

1. <https://www.tutorialspoint.com>
2. [http:// www.ni.com](http://www.ni.com)
3. [http:// www.futureelectronics.com](http://www.futureelectronics.com)

**Course Delivery:**

The Course will be delivered through Tutorial, classroom interaction and practical exercises.

**Tutorial - 1Hr.:**

Staff-in-charge will

1. Explain the concept of exercise to be conducted.
2. Ask students to write the formula.
3. Give clear instructions about exercises.

**Conduction/ Execution- 4 Hrs.:**

Student will do exercises individually under the supervision of the staff-in-charge.

**Course Assessment and Evaluation**

	<b>What</b>		<b>To Whom</b>	<b>Frequency</b>	<b>Max Marks</b>	<b>Evidence Collected</b>	<b>Course Outcomes</b>
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	IA Tests	Students	Model Exam	10	Exam papers	1 to 5
		Record Writing		Record Writing (Average of Marks allotted for each experiment)	10	Course Log Books & file	1 to 5
		Attendance		Daily Attendance	05	Course log Book	-
		Reports		Student Activity	-	-	-
		<b>TOTAL</b>		<b>25</b>			
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	75	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1,2,3 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to5 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*TEE – Term End Examination

**Composition of Educational Components:**

Questions for CIE and TEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

<i>PART – A</i>	<i>30 marks</i>
<i>PART – B</i>	<i>40 marks</i>
<i>Viva – voce</i>	<i>5 marks</i>
<i>Record works</i>	<i>25 marks</i>
<b>Total</b>	<b>100 marks</b>

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



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**VI TERM**

**2017 –2018 onwards**

**M10CO401 – NANO AND SOLAR ENGINEERING PRACTICAL**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 – SCHEME**

(To be implemented from the student admitted from the year 2017-2018 onwards)

<b>Programme</b> : Common to all branches	<b>Type of course</b> : Practical
<b>Course Title</b> : Nano and Solar Engineering Practical	<b>Course Code</b> : M10CO401
<b>Term</b> : VI	<b>Course Group</b> : Diversified
<b>Teaching Scheme</b> : 0:0:4 (L:T:P) (in Hours)	<b>Credits</b> : 2
<b>No. of weeks/Term</b> : 15	<b>Total Contact Hours</b> : 60
<b>CIE</b> : 25 Marks	<b>TEE</b> : 75 Marks

<b>Pre-requisites</b> : Knowledge of modern science in secondary education.
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### **Course Outcome:**

*On successful completion of the Course the student will be able to:*

1. Synthesis of Nano particles.
2. Analyze the characteristics of Nano particles.
3. Measurement of Solar radiation and understand the working and characteristics of a solar panel.
4. Effect of PV Module power.
5. Calculate the power flow in AC and DC load.

**Mapping Course Outcomes with Program Outcomes:  
(Course Outcome linkage to Cognitive Level)**

Course Outcome		Experiment linked	PO Mapped	Cognitive Level	Lab Sessions
C.CO401.1	Synthesis of Nano particles.	1,2,3	3,4,8	R/U/A	10
C.CO401.2	Analyze the characteristics of Nano particles.	4,5,6	3,4,8	U/A	10
C.CO401.3	Measurement of Solar radiation , understand the working and characteristics of a solar panel.	7,8,9,10,13,16	3,4,6,8	U/A	24
C.CO401.4	Effect of PV Module power.	11,12	3,4,8	U/A	8
C.CO401.5	Calculate the power flow in AC and DC load.	14,15	3,4,6,8	U/A	8

U-Understanding; A-application/ Analysis; App-Application

**Course-PO Attainment Matrix**

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Nano and Solar Engineering Practical	-	-	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  $\geq 40\%$  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.

**PART – A**  
**LIST OF NANO LAB EXPERIMENTS**

1. Preparation of Nano particles using Ball Mill.
2. Synthesis of Nano thin film on one side of substrate by Spin coating method.
3. Synthesis of Nano thin film on two sides of substrate by Dip coating method.
4. Measurement of Nano film thickness using Spectroscopic reflectometer.
5. Measurement of VI Characteristics of Nano film.
6. Comparison of Hydrophobic Characteristics of Natural and Synthetic Nano Materials

**PART – B**  
**LIST OF SOLAR LAB EXPERIMENTS**

7. Measurement of Solar Radiation using Solarimeter and Lux Meter.
8. I-V and P-V Characteristics of PV module with varying radiation.
9. I-V and P-V Characteristics of series connection of PV modules.
10. I-V and P-V Characteristics of parallel connection of PV modules.
11. Effect of variation in tilt angle on PV module power.
12. Effect of Shading on the output of Solar panel.
13. Working of diode as Blocking diode.
14. Power flow calculation of standalone PV system of AC load with battery.
15. Power flow calculation of standalone PV system of DC load with battery.
16. Find the MPP manually by varying the resistive load across the PV panel.

**PART – C**

1. Study the operation of a windmill (Not for examination)

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**Course Delivery:**

**The course will be delivered through four hours of hands on practice per week.**

Course Assessment and Evaluation

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE (Continuous Internal Evaluation)</b>	Exercise & Observation	Students	Average of mark allotted for each exercise	10	Course file and Record notes	1 to 5
		IA Tests		Model Exam 1&2	5+5	Course File, Models & file	1 to 5
		Attendance		Daily Attendance	5	System Admin	-
				<b>TOTAL</b>	<b>25</b>		
	<b>TEE (Term End Examination)</b>	End Exam	Students	End of the Course	75	Answer Scripts at Autonomous Exam Cell	1 to 5
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle of the Course	Feed Back Forms		1&2 Delivery of course
	End of Course Survey			End of the Course	Questionnaires		1 to 5 Effectiveness of Delivery of instructions & Assessment Methods

**END EXAMINATION:**

All the exercise should be given in the question paper and students are allowed to select by lot. (Nano or Solar)

**Details of allocation:-**

Procedure	30 marks
Sketches/Circuit diagram	10 marks
Tabulation	10 marks
Calculation/graph	10 marks
Result	10 marks
Viva – voce	05marks
<b>TOTAL</b>	<b>75 marks</b>

<b>Sl. No.</b>	<b>Educational Component</b>	<b>Weightage (%)</b>
1	Remembering	20
2	Understanding	20
3	Application/ Analysis	60
<b>Total</b>		<b>100</b>



**DIPLOMA IN CIVIL ENGINEERING**

**III YEAR**

**M10 – SCHEME**

**VI TERM**

**2017 –2018 onwards**

**M10CE410 – PROJECT WORK AND SEMINAR**

**VIRUDHUNAGAR S. VELLAICHAMY NADAR POLYTECHNIC COLLEGE (AUTONOMOUS),  
VIRUDHUNAGAR – 626001  
Diploma in Civil Engineering  
M10 – SCHEME**

(To be implemented from the student admitted from the year 2017 - 2018 onwards)

Programme : Civil engineering	Type of course : <b>Tutorial + Practical</b>
Course Title : <b>Project work and Seminar</b>	Course Code : M10CE410
Term : <b>VI</b>	Course Group : <b>Diversified</b>
Teaching Scheme in Hrs (L:T:P) : (0:0:5)	Credits : <b>4 Credits</b>
No. of weeks/term : <b>15</b>	Total Contact Hours : <b>75</b>
CIE : <b>25 Marks</b>	TEE : <b>75 Marks</b>

### Course Outcomes:

#### Seminar:-

C.410.1 To have an exposure to an innovative area of technology/Information.

C.410.2 To develop presentation skills.

C.410.3 To develop creative interaction among listeners.

#### Project work:-

C.410.1 To develop prototype/model of a product

C.410.2 To enhance team spirit and creative talents for achieving a goal.

C.410.3 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

C.410.4 Communicate with experts and the community and use their knowledge in developing the project.

C.410.5 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	3 <sup>rd</sup> week	05
First Review	4 <sup>th</sup> week	05
Second seminar	9 <sup>th</sup> week	05
Second review	10 <sup>th</sup> 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.

**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
<b>TOTAL MARKS</b>					17/5=3.4	<b>4</b>