

## ABOUT THE COURSE

The Vocational Higher Secondary course Civil Construction & Maintenance (CCM) has been renamed to Civil Construction Technology (CCT) in the Curriculum Revision in the year 2015. The present course incorporates the latest developments in the technology, study of modern equipments and their applications in the construction field.

The CCT course aims to mould professionals at supervisory level using entrepreneurship skills. The CCT is a multi-skill development course with intensive learning on surveying, buildings, quantity surveying and plumbing services. The course is so significant in a fastly developing country like India, where a lot of infrastructural developments are emerged day by day. The contents included have been to satisfy hundreds of job roles emerged by globalization.

There are public and private sector companies and corporations which require professionals at supervisory level. Self employment opportunities in disciplines related to Civil Construction are in plenty through the Government schemes.

Certification for the course is also important in the job market. The present CCT course follows a 4-tier system which divides the 2 year course into four modules. Each module in the course deals with a specific skill which provides an opportunity to perform better in the desired discipline. Each module is certified for the skill concerned, which aids the learner to utilize the self employment opportunities available under the State Administration. The course as a whole is certified at the end to enable the learner to be an entrepreneur in the discipline and for placement in public and private sectors. Also there exists opportunities to undergo higher studies in the technical or general stream.

## SUBJECT APPROACH

Civil Engineering is the mother of all Engineering streams. A major amount of our public fund has been invested in construction industry every year for the infrastructure development schemes & housing projects in India. The Technology advanced structures constructed are becoming even the landmark of a country today. The well-developed infrastructure is the token of development of a country in all aspects.

From the birth of mankind till today and in future also the graph of scope of the construction stream of Engineering is upwards. Considering all these aspects, the VHSE course of Kerala has been incorporated Civil Construction Technology as one of the key branches of its curriculum.

The CCT aims at casting skilled technicians, supervisors and self

employers through entrepreneurship training. The revised curriculum contains different areas of advanced surveying, traditional and advanced materials, traditional and new trends in building construction, quantity surveying, drafting both manually and computer-aided and advanced water supply and sanitary systems. The curriculum has been framed by brainstorming the latest need in upcoming construction industry by investigations like job analysis, job structure, job specification, etc from educationalists, academicians, experts in the construction industry, entrepreneurs and teachers.

The General Approach and Approach to Evaluation to all VHSE Courses is applicable to CCT course also. The same is not repeated here.

### JOB ROLES (CAREER PATH)

The course on Civil Construction & Technology (CCT) is visioned to master the latest technologies in Civil Construction. Steps have been taken to include latest trends in Civil construction technology. Various job-roles at the Government and Private sectors are given below. Scope for self employment is also there.

<b>GOVT/ SEMI GOVT SECTOR</b>	<b>PRIVATE SECTOR</b>	<b>SELF EMPLOYMENT</b>
Overseer in PWD, KSEB, KWA, etc.	Site Supervisor	Civil Engineering Consultant
Lab Technical Assistant	Quantity Surveyor	Civil Engineering Contractor
Work Superintendent	Plumbing Supervisor	Plumbing Contractor
Draughtsman in PWD, KSEB, KWA, etc.	Draughtsman	Freelance Surveyor
Surveyor in Survey Department	Marketing Executive	Freelance Valuator
	Sales Executive	Building Material Dealer
	Advertisement Executive & Customer Care Executive (Construction companies)	Land Developer
	Store Keeper	

## SYLLABUS

### Module I

#### Advanced Surveying

#### Theory - Advanced Surveying

#### Unit 1 Chain Surveying

**25 periods**

Chain Surveying

3 periods

Linear measurements (Chain/ Tape)

4 periods

Instruments used	3 periods
Ranging out survey lines (Direct method)	2 periods
Calculation of area (Triangulation only)	6 periods
Divide a given area into plots	3 periods
Read and locate position of a plot from litho map	4 periods
<b>Unit 2 Levelling</b>	<b>37 periods</b>
Instruments used	2 periods
Temporary adjustments	4 periods
Methods of levelling- Simple levelling & Differential levelling	5 periods
Reduction of levels (HI/ HC method only)	7 periods
Contouring - Contour Interval - Horizontal equivalent - Characteristics of contour lines - Uses - Locating contours - interpolation of contour lines	10 periods
Longitudinal sectioning and cross sectioning / Profile levelling	9 periods
<b>Unit 3 Total Station &amp; GPS</b>	<b>40 periods</b>
Parts and accessories of total station	2 periods
On board calculation	3 periods
Field operation	5 periods
Errors and rectification	8 periods
Precautions to be taken for using total station	4 periods
Advantages of total station	2 periods
Uses of total station	2 periods
Global Positioning System (GPS) - method of using handheld GPS	9 periods

**Practical - Advanced Surveying**

<b>Unit 1 Chain Surveying</b>	<b>25periods</b>
Familiarisation of chain survey instruments	
Preparation of site plan and computation of area of a given plot	
Preparation of site plan, computation of area, division into plots of suitable area with road access	
<b>Unit 2 Levelling</b>	<b>93periods</b>
Study of instruments	

Temporary adjustments of Dumpy Level

Taking reading from Staff

Simple levelling

Differential levelling

Contouring - preparation of contour plan

Longitudinal sectioning

Cross sectioning

**Unit 3 Total Station & GPS**

**120 periods**

Study of instruments

Setting up of total station

Measurement with total station

Preparation of computer drawing

Height and distance

Calculation of area

Verticality of a tower

Measurement with handheld GPS

**TOTAL- 340 periods**

**Module II**

**Civil Construction & Draughtsmanship**

**Theory - Building materials & Construction**

**Unit 1 Building Materials**

**35 periods**

Stones:- qualities - uses - dressing

3 periods

Bricks:- qualities, field tests, substitutes for brick (concrete block & interlocking bricks only)

10 periods

Sand:- Sources - types - qualities - bulking

4 periods

Cement:- Ingredients- field tests - types - grade

5 periods

Timber:- seasoning, structure of tree - defects in timber - qualities

5 periods

Steel:- Market forms (angles, channels, Tee, I, square bar, ribbed bar, MS, HYSD & TMT) - sizes - properties of mild steel and HYSD.

8 periods

**Unit 2 Advanced Construction Materials**

**20 periods**

Plywood -laminated board - particle board - fibre board - gypsum board - rubber wood (treated)

8 periods

Aluminium:- advantages - uses	3 periods
Stainless steel	2 periods
Glass:- forms	3 periods
Wall putty	2 periods
Ferro-cement	2 periods
<b>Unit 3 Building Construction</b>	<b>47 periods</b>
Types of buildings (List the names as in KMBR & KPBR only)	1 period
Parts of a building	1 period
Selection of site	1 period
Setting out of building	1 period
Foundation:-bearing capacity of soils - bearing capacities of different soils - methods of improving bearing capacity - types of foundation - shallow & deep foundations - open trench foundation (wall footing) - isolated footing - continuous footing - raft foundation - pile foundation (description only) - causes of failure of foundation.	4 periods
Masonry:- Stone Masonry: types- Ashlar fine only - random rubble - coursed rubble - dry rubble - masonry in cage (Gabbion)	4 periods
Brick masonry:- technical terms - bond - stretcher - header - arrises - bed - course - lap - closer - bat	4 periods
Types - English bond and Flemish bond - sketches (1 brick and 1 ½ brick thick walls only) - comparison of English bond and Femish bond.	5 periods
Doors, Windows & Ventilators:-- Doors:- Technical terms - types - framed and panelled - glazed - collapsible - revolving - rolling shutter - sliding - automatic sliding only	3 periods
Windows & Ventilators:- types - panelled & glazed - skylight - Common sizes of doors, windows & Ventilators	3 periods
Lintels & sunshades:- functions and construction details	1 period
Concrete:- PCC - Ingredients - qualities (brief description only) - water cement ratio - concrete mixing - types of mixing - ready mix concrete (RMC) - proportioning of concrete ,their strength and uses of M10 to M25 mixes - admixtures - different methods of curing	4 periods
RCC:-Ingredients - Supervision of concrete works	1 period
Cement Mortar:- Ingredients - proportion for different uses - Preparation	1 period
Vertical Transportation:-Stair - technical terms - types based on shape only - requirements of a good stair -ramp - lift - escalator (brief descriptions).	3 periods

Roof & roof Covering:-Types and suitability of roof - Types and uses of roof covering materials 2 periods

Flooring :-Types- choice of flooring - cement concrete - tile - timber - marble - granite - glass 1 period

Finishing works:-plastering - white washing - colour washing - distempering - painting (brief description only - methods of providing DPC - termite proofing - water proofing 4 periods

Cost-effective & eco-friendly building materials 2 periods

Repair & Maintenance of buildings:- Common building defects and their symptoms - rectifications 2 periods

### **Practical- Building Drafting & Construction**

**Engineering Graphics 30 periods**

Drawing Standards

Lettering, Numbering and Dimensioning

Projection of Points

Projection of Lines

Projection of planes

Orthographic projection of objects

Sectional views

Auxiliary views

Isometric views

**Drawing of building parts 30 periods**

English bond and Flemish bond (1 brick and 1½ brick thick walls only) right angled corner to a height up to 1m, with elevation

Isolated footing

Panelled door

Lintel with sunshade

Dog legged stair-plan & section

**Building Drawing 70 periods**

Single roomed building (Hall)

Single bed roomed residential building

Two bed roomed building

Three bed roomed building

Two storeyed residential building with three bed rooms

Village office building

Commercial building	
<b>Computer Aided Drafting - 2D</b>	<b>70 periods</b>
Introduction - commands	
Preparation of drawings already specified in Building Drawing	
<b>Computer Aided Drafting - 3D</b>	<b>18 periods</b>
One simple exercise only	
<b>Setting out a building</b>	<b>20 periods</b>
Single bed roomed residential building	
Two bed roomed building	
Three bed roomed building	
	<b>Total 340 periods</b>

## LEARNING OUTCOMES (LOs)

### Module 1. Advanced surveying

The learner will be able to:

#### 1.1 CHAIN SURVEYING

- 1.1.1 explain chain surveying and use instruments for linear measurements in surveying
- 1.1.2 use aligning survey lines while measuring survey lines
- 1.1.3 prepare plan and compute area of a given plot
- 1.1.4 divide a field into plots providing road access to all plots
- 1.1.5 read and locate positions of plots from lithomap.

#### 1.2. LEVELLING

- 1.2.1 describe the instruments Dumpy level & Levelling staff in surveying
- 1.2.2 do appropriate temporary adjustments while using dumpy level
- 1.2.3 perform various levelling works using different methods in surveying
- 1.2.4 calculate reduced levels by doing field practice
- 1.2.5 prepare contour maps & do a complete topography study of plot
- 1.2.6 prepare LS & CS of proposed roads, canals and drainage lines

#### 1.3 TOTAL STATION & GPS

- 1.3.1 identify the parts of Total Station

- 1.3.2 perform operations of Total Station in field and use field observations for onboard calculation
- 1.3.2 identify the chances of errors crept into the instruments while taking readings & do proper rectifications
- 1.3.3 handle instrument with confidence & follow good instrumental practice
- 1.3.4 identify suitability of Total Station work in Surveying and list the uses
- 1.3.5 make aware the latest & precise method of surveying considering the suitability and economy.

## **MODULE 2. CIVIL CONSTRUCTION AND DRAGHTSMANSHIP**

### **2.1. BUILDING MATERIALS**

- 2.1.1 select good quality stones for a particular situation
- 2.1.2 select good quality bricks for appropriate situations
- 2.1.3 select good quality sand and create awareness on the concept of bulking
- 2.1.4 select good quality cement according to its grade
- 2.1.5 identify the defects in timber and select the best quality for construction.
- 2.1.6 identify the required section of steel with suitable size for various construction works.

### **2.2. ADVANCED CONSTRUCTION MATERIALS**

- 2.2.1 identify the appropriate advanced timber material for different construction works considering economy and time.
- 2.2.2 identify aluminium as an advanced material considering its economy and time for construction and explain its advantages & uses

### **2.3. BUILDING CONSTRUCTION**

- 2.3.1 classify buildings as per KMBR and KPBR according to different purpose of building.
- 2.3.2 analyse different parts of a building.
- 2.3.3 choose appropriate site through reasoning, analyzing & comparison
- 2.3.4 execute the given plan in the proposed site.
- 2.3.5 select appropriate foundation for different soil conditions
- 2.3.6 select appropriate foundation for the given structure on a given soil condition



- 2.3.7 select the appropriate stone masonry and brick masonry for different works and identify the situation and selects the appropriate masonry for different construction works
- 2.3.8 decide the required size, type and location of door, window and ventilator for different buildings
- 2.3.9 identify the functions and working of lintels and sunshades
- 2.3.10 select the appropriate concrete mixes & supervise the construction of concrete works
- 2.3.11 select suitable cement mortar for different works
- 2.3.12 select appropriate stair considering size of room & type of building, purpose & aesthetic value
- 2.3.13 select roof & roof covering for types of buildings based on different factors
- 2.3.14 select suitable flooring material based on needs, cost, and required speed of completion
- 2.3.15 supervise various protective and decorative works in buildings
- 2.3.16 supervise various methods of damp proofing works
- 2.3.17 detect defects for the maintenance of building & do appropriate repair works

## COURSE STRUCTURE

This course will consist of 4 modules such as:-

Sl.No	Name of Module
1	Advanced surveying
2	Civil construction & draughtsmanship
3	Quantity surveying
4	Water supply & sanitary systems

## CLASS ROOM ACTIVITIES

- Demonstrations
- Exhibitions
- Charts
- Diagrams
- Animated CDs
- Discussions
- Interactive multimedia tools ([www.sietkerala.gov.in](http://www.sietkerala.gov.in))
- Debate
- Seminar
- Project

- Viva
- Peer group learning
- Quiz
- Brainstorming
- Role play

## **PRACTICAL ACTIVITIES**

### **Survey practice**

Preparation of site plan

Computation of area of a given plot

Finding level difference by Simple Levelling

Finding level difference by Differential Levelling

Preparation of contour plan of a given plot

Preparation of Longitudinal Section & Cross Section of a proposed road

Measurement of horizontal angle, vertical angle & distance between two points.

Preparation of site plan with total station

Finding the verticality of a tower

Locating points with handheld GPS

### **Drawing**

Projection of points

Projection of line

Projection of plane

Orthographic projection of objects

Sections of solids

Auxiliary view

Isometric view

English bond 1 & 1½ wall thicknesses

Flemish bond 1 & 1½ wall thicknesses

Isolated footings

Panelled view

Lintel with sunshade

Dog-legged stair. Plan & Section

Building Drawing (Single roomed building-Hall, Single bed-roomed residential building, 2-bedroomed residential building, 3-bedroomed residential building, 2-storeyed residential building with 3 bedrooms, Commercial building)

CAD - 2D (Drawings specified for Building Drawing)

CAD - 3D Simple exercise(s)

**Setting out of buildings**

Single roomed building

Single roomed residential building

Two-bed roomed residential building

- Interaction with Field Experts
- Field Visit
- Lab Work
- Working Model
- OJT
- Plumbing practice
- Valuation practice

**ON THE JOB TRAINING**

Each module of the course deals specific skill. OJT is conducted for 7½ days in the specific skill after each module. OJT can be arranged with various public and private organizations undertaking civil engineering works.

<b>PUBLIC SECTOR</b>	<b>PRIVATE SECTOR</b>
Public Works Department	Civil Construction companies
Water Resources Department	Civil Construction Consultants
KSEB Civil Wing	Construction Contractors
Kerala Water Authority	Plumbing Consultants
Railways	Plumbing Contractors
Airport Authority	Quantity Surveyors / Valuators
Survey Department	Survey Institutes
Harbour Engineering Department	Material production centres
Kerala State Housing Board	Nirmithi kendras

**CERTIFICATION OF SKILLS IN EACH MODULE**

- A) ADVANCED SURVEYING
- B) CIVIL CONSTRUCTION & DRAUGHTSMANSHIP
- C) QUANTITY SURVEYING
- D) WATER SUPPLY & SANITARY SYSTEMS

## OVERVIEW OF MODULE - 1

The module Advanced Surveying includes land surveying, total station and GPS methods. As the cost of land is highly significant today, it is relevant to perform survey with utmost care & accuracy. An intensive training is proposed in the curriculum that moulds an advanced Surveyor

Vocational skills expected from this module are

- Prepare site plan & compute area of a given plot
- Finding level difference by Levelling practice
- Preparation of contour plan of a given plot
- Preparation of Longitudinal Section & Cross Section of a proposed road
- Measurement of horizontal angle, vertical angle & find out the distance between two points
- Preparation of site plan with Total Station & finding the verticality of a tower
- Locating points with Handheld GPS & becomes able to use Total Station & GPS to perform Survey
- Prepare topographical maps of lands and draw longitudinal and cross sections for civil engineering projects.

## MODULE 1

Periods: 340

Unit No.	Name of units	Periods
1.1	Chain Surveying	65
1.2	Levelling	115
1.3	Total Station	160
	<b>Total Periods</b>	<b>340</b>
	30% of Total periods for theory and 70% for practicals	

Module 1 : ADVANCED SURVEYING			
Unit : Chain surveying (25 periods)			
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<ul style="list-style-type: none"> <li>• Definition, objects, Instruments used in chain surveying &amp; linear measurements</li> <li>Skills: Identification, Measuring</li> </ul>	<ul style="list-style-type: none"> <li>• Explain chain surveying and use instruments for linear measurements in surveying</li> </ul>	<ul style="list-style-type: none"> <li>• Discussion of concept of surveying &amp; objects of surveying. Demonstration with actual instruments in classroom measurement. Discussion and demonstration with instruments used and their functions</li> </ul>	<ul style="list-style-type: none"> <li>• Oral test of the concept, Practical activity</li> </ul>
<ul style="list-style-type: none"> <li>• Ranging out survey lines (direct method)</li> <li>Skills: Alignment skill</li> <li>• Calculation of area (Triangulation)</li> <li>Skills: Computation, Drafting</li> <li>• Divide an area into plots</li> </ul>	<ul style="list-style-type: none"> <li>• Use aligning survey lines while measuring survey lines</li> <li>• Prepare plan and computes area of a given plot</li> <li>• Divides a field into plots providing road access to all plots</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstration &amp; discussion with instruments. Discuss the method of ranging.</li> <li>• Filed book measurements are given and practices calculation of area</li> </ul>	<ul style="list-style-type: none"> <li>• Participation in discussion</li> <li>• Activity log</li> </ul>

**Skill: Learners becomes able to perform chain survey to compute the area of any plot.**

Module 1 : ADVANCED SURVEYING		Unit : Levelling (25 periods)	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<ul style="list-style-type: none"> <li>Instruments used - Dumpy level and levelling staff</li> <li>Skill: Identification skills</li> <li>Temporary adjustments of a level</li> <li>Skill: Handling instruments</li> <li>Methods of levelling (simple and differential levelling) skill: operation</li> <li>Reduction of levels (HI/HC method only)</li> <li>Skill: Computation skill</li> <li>Contouring-contour interval-horizontal equivalent -characteristics of contour lines-uses of contour-locating contour</li> <li>Skill: constructive, Locating, Manipulate, Sketch, Record, Classify, Imagine</li> <li>Longitudinal section &amp; cross section/profile leveling</li> <li>Skill :Locating, Constructive choosing,</li> </ul>	<ul style="list-style-type: none"> <li>Describes the instruments Dumpy level &amp; Levelling staff in surveying</li> <li>Doing appropriate temporary adjustments while using dumpy level</li> <li>Performs various leveling works using different methods in surveying</li> <li>Calculates reduced levels by doing field practice</li> <li>Prepares contour maps &amp; doing a complete topography study of plot</li> <li>Prepares LS &amp; CS of proposed roads, canals and drainage lines</li> </ul>	<ul style="list-style-type: none"> <li>Interactive multimedia Demonstration</li> <li>Demonstration</li> <li>Discussion with sketches</li> <li>Discussion - problem solving</li> <li>Discussion - demonstration with existing contour maps - practical works</li> <li>Discussion, demonstration with existing contour maps, practical works</li> </ul>	<ul style="list-style-type: none"> <li>Activity log</li> <li>Practical work</li> <li>Class test</li> <li>Activity log</li> <li>Class test - seminar</li> <li>Activity log</li> </ul>

Module 1 : ADVANCED SURVEYING		Unit : Total station & GPS (25 periods)	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<ul style="list-style-type: none"> <li>Parts &amp; accessories of Total station</li> <li>Skill :Familiarisation of instrument</li> <li>Field operation, On board calculation</li> <li>Skill : Operation skill, Digital computation</li> <li>Errors and rectification</li> <li>Skill: Precision in handling</li> <li>Precautions to be taken for total station</li> <li>Skill: Handling skill</li> <li>Advantages of Total station</li> <li>Uses of Total station</li> <li>Skill: Selection, Technology updation Execution, Analyzing, Reasoning</li> <li>Global positioning system (GPS)</li> <li>Skill: technology updation, Knowledge updation, Precise surveying</li> </ul>	<ul style="list-style-type: none"> <li>Familiarise the parts of Total Station</li> <li>Perform operations of Total Station in field and uses field observations for onboard calculation</li> <li>Identify the chances of errors crept into the instruments while taking readings &amp; their rectifications</li> <li>Handle instrument with confidence &amp; follow good instrumental practice</li> <li>Identify suitability of Total Station work in Surveying and list the uses</li> <li>Aware the latest &amp; precise method of surveying</li> </ul>	<ul style="list-style-type: none"> <li>Demonstration with total station</li> <li>Demonstration with total station Multi media presentation</li> <li>General discussion</li> <li>Seminar</li> <li>Discussion Multimedia Demo with instrument</li> <li>Field visit Discussion Consultation with expert OJT</li> </ul>	<ul style="list-style-type: none"> <li>Activity log</li> <li>Assignment - class test</li> <li>Activity log</li> <li>Participation - Report</li> <li>Class Test, Activity log</li> <li>OJT report Class test Quiz</li> </ul>

### Sample Questions

- List the temporary adjustments to be performed at a level set up.
- Explain the method of, using field observations for onboard calculation in a Total Station.

## OVERVIEW OF MODULE - 2

The module Civil Construction & Draughtsmanship includes the study of Building Materials and Construction, Engineering Graphics, Building Drawing, Computer Aided Drafting both 2D and 3D and setting out of buildings. The module aims the moulding of a building consultant & draughtsman with supervisory skills.

Vocational skills expected from this module are

- Application of Engineering Graphics
- Drawing and supervision of brick masonry
- Drawing and construction of foundation footings
- Drawing plan & section of stairs
- Building Drawing (Single roomed building (Hall) - Single bed-roomed, Two bed-roomed and three bed-roomed residential buildings - Two-storeyed residential building with 3 bed-rooms - Commercial buildings
- Computer aided drafting 2D and 3D
- Setting out of buildings

### MODULE 2

#### MANUAL ACCOUNTING PRACTICES

Periods: 340

Unit No.	Name of units	Periods
2.1	Building Materials	35
2.2	Advanced Construction Materials	20
2.3	Building Construction	47
2.4	Engineering Graphics	30
2.5	Drawing of building parts	30
2.6	Building Drawing	88
2.7	Computer Aided Drafting (2D & Introduction to 3D)	70
2.8	Setting out of building	20
	<b>TOTAL PERIODS</b>	<b>340</b>
	30% of Total periods for theory and 70% for practicals	



Module 2 : Civil Construction & Draughtsmanship		Unit : BUILDING MATERIALS (35 periods)	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<ul style="list-style-type: none"> <li>Stone Qualities, dressing, Skill: selection</li> <li>Bricks Qualities, field test substitute for bricks (concrete blocks and interlocking bricks) Skill: Selection</li> <li>Sand Sources, types, qualities, bulking. Skill: selection - conception.</li> <li>Cement Content, field test, types, grade Skill: Comparison, Selection</li> <li>Timber Seasoning, structure of tree, defects in timber, qualities. Skill: Analysing, Observation, selection skill</li> <li>Steel Market forms, (angles, channels, Tee, I, Square Bar, M.S, HYSD&amp;TMT) Sizes, Properties of .M.S and. HYSD Skill: selection, identification</li> </ul>	<ul style="list-style-type: none"> <li>Select good quality stones for a particular situation</li> <li>Select good quality bricks for a appropriate situations</li> <li>Selects good quality sand, identifies the concept of bulking</li> <li>Select good quality cement according to its grade</li> <li>Identify the defects in timber and selects the best quality timber for construction.</li> <li>Identify the required section of steel with suitable size for various construction works.</li> </ul>	<ul style="list-style-type: none"> <li>Field visit- Quarry visit - Discussion - Chart - presentation</li> <li>Visit to manufacturing units - Seminar - demonstration</li> <li>Field visit, Discussion, Sample collection, Classroom .experiment</li> <li>Market study Industrial visit Seminar</li> <li>Field visit Sketch/chart Discussion</li> <li>Brain storming and general discussion. Demonstration with steel sections, industrial visit</li> </ul>	<ul style="list-style-type: none"> <li>sample collection - chart - picture album - reports</li> <li>Reports Report - class test - verification of collection</li> <li>Reports Report - Class test - Quiz</li> <li>Assignment - sample collection - report</li> </ul>

Module 2 : Civil Construction & Draughtsmanship			
Unit : ADVANCED CONSTRUCTION MATERIALS (20 periods)			
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<ul style="list-style-type: none"> <li>• Ply wood, laminated board, particle board, fibre board, gypsum board, rubber wood(treated),</li> <li>Skill: identification, selection</li> <li>• Aluminium</li> <li>Advantages-uses</li> <li>Skill: Selection skill</li> <li>Eco friendly and Low cost techniques</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the appropriate advanced timber material for different construction works. Considering economy and speed in construction.</li> <li>• Identify aluminium as an advanced construction material considering its economy and speed of construction and describes its advantages &amp; uses</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstration with sample sketches, Multimedia</li> <li>Field visit</li> <li>Market Study</li> <li>• Sketch and Sample demonstration with discussion - field visit</li> </ul>	<ul style="list-style-type: none"> <li>• Field report, Market study report, Sample Collection, Photo Album</li> <li>• Sample collection - assignment report</li> </ul>
Module 2 : Civil Construction & Draughtsmanship			
Unit : BUILDING CONSTRUCTION (47 periods)			
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<ul style="list-style-type: none"> <li>• Types of building (list names as KMBR and KPBR only)</li> <li>Skill: classification</li> <li>• Parts of a building</li> <li>Skill: analyse</li> <li>• Selection Site</li> <li>Skill: Reasoning, Analyzing, Comparison</li> <li>• Setting out of building</li> <li>Skill: Locate - Execution</li> <li>• Foundation</li> <li>Bearing capacity of soils, Bearing Capacity of different soils, Methods of improving bearing capacity.</li> <li>Skills: Selection, Comparison, Apply knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>• Classify buildings as per KMBR and KPBR according to different purpose of building.</li> <li>• Analyses different parts of a building.</li> <li>• Choose appropriate site through reasoning, analyzing &amp; comparison</li> <li>• Execute the given plan in the proposed site.</li> <li>• Select appropriate foundation for different soil conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Group discussion and general discussion.</li> <li>Familiarisation with KMBR and KPBR.</li> <li>• Sketch/multimedia.</li> <li>Model presentation.</li> <li>Library references</li> <li>• Field visit/Group Discussion debate</li> <li>• Practical exercise</li> <li>Interactive multimedia.</li> <li>• Field visit/ multimedia, discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Picture Album</li> <li>• Portfolio (building) - report</li> <li>• Field Report, Oral test</li> <li>• Verification of prepared set out plan of the given building plan.</li> <li>• Class test - report</li> </ul>

Module 2 : Civil Construction & Draughtsmanship		Unit : BUILDING CONSTRUCTION (47 periods)	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<ul style="list-style-type: none"> <li>Types of foundation, deep and shallow foundation, open trench foundation (wall footing), raft foundation, continuous footing, pile foundation(description only), causes and failure of foundation.</li> <li>Skill: Identification, Analysing, Reasoning, Apply knowledge</li> <li>Stone masonry &amp; Brick masonry</li> <li>Types of stone masonry</li> <li>Ashlar(fine only), Random rubble, Coursed rubble, Dry rubble, Masonry in cage(gabbions)</li> <li>Technical Terms: Board stretcher, header, arrises-bed-course-lap-closer-bat</li> <li>Types of brick masonry: (English bond and Flemish Bond), Sketches(1 and ½ thick walls), comparison of English bond and Flemish bond. Comparison of stone masonry and brick masonry</li> <li>Skill: Identification - Selection - Match</li> <li>Doors, Windows, Ventilators.</li> <li>Doors: Technical terms, Types(framed, panelled, Glazed, collapsible, revolving, rolling shutters, sliding door and automatic sliding doors)</li> </ul>	<ul style="list-style-type: none"> <li>Select appropriate foundation for the given structure on a given soil condition</li> <li>Select the appropriate stone masonry and brick masonry for different works and identify the situation and selects the appropriate masonry for different construction works</li> </ul>	<ul style="list-style-type: none"> <li>Demonstration of foundations through multimedia</li> <li>Discussion,</li> <li>Field Visit,</li> <li>O.J.T</li> <li>Sketch/ Chart</li> <li>Multimedia,</li> <li>Discussion,</li> <li>Seminar.</li> <li>Discussion,</li> <li>Debate</li> </ul>	<ul style="list-style-type: none"> <li>Evaluation of prepared sketches, field report, class test</li> <li>Participation, Seminar report, Activity log, Oral test</li> <li>Labelling the given sketches - albums - collection and class test - report</li> </ul>

**Module 2 : Civil Construction & Draughtsmanship** Unit : **BUILDING CONSTRUCTION (47 periods)**

Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<p>Windows &amp; Ventilators: Types (Panelled - glazed - skylight) Common sizes of doors, windows &amp; ventilators</p> <p>Skill: Classification, Selection, Categorise, Locate, Decision making</p> <ul style="list-style-type: none"> <li>• Lintels &amp; Sunshades: Functions &amp; construction details. Skill: apply knowledge</li> <li>• Concrete - PCC - ingredients - qualities (brief description only) - water cement ratio - concrete mixing - types of mixing - ready mix concrete (RMC) - proportioning of concrete and their strengths and uses of M10 to M25 mixes - admixtures - different methods of curing - RCC (ingredients &amp; supervision only)</li> <li>Skills: supervising - technology updation - selection - decision making</li> <li>• Cement mortar Ingredients - proportion for different uses &amp; mixing for different uses Skills: Supervision - comparison - selection - decision making</li> <li>• Vertical transportation Stair (Terms and types based on shape only) - brief descriptions of ramp, lift &amp; escalator Skill: Locating- aesthetic- technology updation</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the functions and working of lintels and sunshades</li> <li>• Select the appropriate concrete mixes &amp; supervises the construction of concrete works</li> </ul> <ul style="list-style-type: none"> <li>• Select suitable cement mortar mixes for different works</li> </ul> <ul style="list-style-type: none"> <li>• Select appropriate stair considering size of room &amp; type of building, purpose &amp; aesthetic value</li> </ul>	<ul style="list-style-type: none"> <li>• Discussion with sketches - OJT - Field visit</li> <li>• Field visit - interactive multimedia - general discussion - brainstorming</li> </ul> <ul style="list-style-type: none"> <li>• Field visit - PTC</li> </ul> <ul style="list-style-type: none"> <li>• Discussion with sketches - photographs - multimedia presentation - videos - seminar</li> </ul>	<ul style="list-style-type: none"> <li>• Field report - OJT report - Activity log - Oral test - Drawing test</li> <li>• Field report - Test</li> </ul> <ul style="list-style-type: none"> <li>• Field report - oral test</li> </ul> <ul style="list-style-type: none"> <li>• Album - presentation- participation</li> </ul>

Module 2 : Civil Construction & Draughtsmanship		Unit : BUILDING CONSTRUCTION (47 periods)	
Ideas/Concepts/Skill	Learning Outcomes	Suggested Activities	Assessment
<ul style="list-style-type: none"> <li>• Roof &amp; Roof covering Types &amp; suitability of roof - types &amp; uses of roof covering materials Skills: selection - classification</li> <li>• Flooring Types - choice of flooring - cement concrete - tiled - timber - marble - granite - glass Skill: Selection - classification - aesthetic skills - comparison</li> <li>• Finishing works Plastering - white washing - colour washing - distempering - painting (brief descriptions only) Skills: Supervision - comparison - selection - aesthetic skills</li> <li>• DPC Methods of providing DPC Skills: Supervision - analysis - selection</li> <li>• Repair &amp; Maintenance of Buildings Common defects and symptoms - rectification of defects Skills: Observation - Detection - Selection - Identification - Supervision</li> </ul>	<ul style="list-style-type: none"> <li>• Select roof &amp; roof covering for types of buildings based on different factors</li> <li>• Select suitable flooring material based on needs, cost, and required speed of completion</li> <li>• Supervise various protective and decorative works in buildings</li> <li>• Supervise various methods of damp proofing works</li> <li>• Detect defects for the maintenance of building &amp; doing appropriate repair works</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstration of photographs - market surveys - Field visit</li> <li>• Debate - sketch - field visit - OJT - Multimedia</li> <li>• Field visit - multimedia - videos - OJT - group discussion</li> <li>• Field visit - multimedia - discussion - presentation</li> <li>• Videos - multimedia - presentation - general discussion - consultation with field experts - interviews - seminars</li> </ul>	<ul style="list-style-type: none"> <li>• Survey report - photo presentation - class test - debate</li> <li>• Participation in debate - oral test - field report</li> <li>• Field report - discussion notes - class test</li> <li>• Field visit report - class test - survey report</li> <li>• Reports - notes - tests - assignments - questionnaire preparation for interview</li> </ul>

### Sample Questions

1. Explain the advantages of aluminium as a building material.
2. Suggest a suitable stair when the space available is limited and prepare sketch.

## LIST OF INSTRUMENTS &amp; TOOLS

Module 1	Module II
<p><b>Chain Surveying</b></p> <ol style="list-style-type: none"> <li>1. Metric Chain (20m) - 3 nos.</li> <li>2. Metric Chain (30m) - 1 no.</li> <li>3. Arrows - 10 nos.</li> <li>4. Cross Staff (Open) - 4 nos.</li> <li>5. Ranging Rod - 20 nos.</li> <li>6. Tape (PVC, 20m) - 4 nos.</li> </ol> <p><b>Levelling</b></p> <ol style="list-style-type: none"> <li>7. Dumpy Level with tripod - 4 nos.</li> <li>8. Levelling Staff (4m) - 4 nos</li> <li>9. Total Station with accessories - 2 nos.</li> <li>10. Global Positioning System (Hand operated) - 1 no.</li> <li>11. Personal Computer with MS-Windows installed - 1 no.</li> </ol>	<ol style="list-style-type: none"> <li>12. Drawing Board - 30 nos.</li> <li>13. Computer with MS-Windows &amp; Drafting program installed - 14 nos.</li> <li>14. Printer - 1 no.</li> <li>15. Wooden pegs (60m long) - 50 nos.</li> <li>16. Nylon thread - 3 rolls</li> </ol>

## DETAILED UNIT ANALYSIS

### Unit : Chain Surveying

#### Contents

- i. Chain Surveying
- ii. Linear measurements (Chain/ Tape)
- iii. Instruments used
- iv. Ranging out survey lines (Direct method)
- v. Calculation of area (Triangulation only)
- vi. Divide a given area into plots
- vii. Read and locate position of a plot from litho map

#### Learning Activities

- i. Chain Surveying: Definition, Objects
- ii. linear measurements
- iii. Instruments used

Suggested Activity : Discussion & Demonstration, Practical work

#### **Act.I. Demonstration by the Teacher**

Discussion of concept of surveying & Object of surveying.  
Demonstration with actual instruments in classroom measurements.

Discussion and Demonstration with instruments used and their functions

#### **Discussion Points**

- Need of land measurement
- Objects of surveying

#### **Act.II. Practical work by the students**

Measurement horizontal dimensions such as length, breadth and diagonal of classroom is measured by students.

#### iv. Ranging out survey lines

Suggested Activity : Demonstration & discussion with instruments

#### **Act.I. Demonstration by the Teacher**

Demonstrate the method of ranging in the classroom with the aid of ranging rods.

#### **Discussion Points**

Locate intermediate points

#### **Act.II. Practical work by the students**

Students practice the method of ranging.

#### v. Calculation of area

Suggested Activity : Problem solving exercises

##### **Act.I. Demonstration by the Teacher**

Preparation of sketches and exercises based on sample measurements.

##### **Discussion Points**

Formulae / tabular columns used

##### **Act.II. Practical work by the students**

Exercises

#### vi. Divide a given area into plots

##### **Act.I. Drawing exercises**

Drawing of a site plan is given. Students are asked to divide the given plot into specified number of plots with road access.

##### **Act.II. Practical work**

Setting out of the specified number of plots on the field which has been done in the Act (I).

#### vii. Read and locate position of a plot from litho map

##### **Act.I. Field visit**

Conduct field visits to the revenue offices where the litho maps are available to familiarize with the maps and location of positions.

### **BOOKS & INSTRUCTIONAL MATERIAL**

#### **Module - I**

1. Comprehensive Basic Civil Engineering  
Dr. B.C Punmia, Ashok Jain & Arun. K. Jain  
Laxmi Publications (P) Ltd.
2. Surveying & Levelling, 1994  
Basak, McGraw-Hill Education (India) Private Limited
3. Surveying  
MiniDas Saikia, Bhargah MohanDas & Madan MohanDas  
PHI Learning
4. Advanced Surveying - Total Statics, GIS and Remote Sensing  
Sathish Gopi, R. SathiKumar & N. Madhu  
Pearson Education
5. GPS for Land Surveyors, 3rd ed., 2008



## Module - II

1. Civil Engineering Materials  
Rangwala. S.C  
Tata McGraw-Hill Publishing Company Ltd.
2. Building construction, 2009  
Rangwala SC  
Charotar Publishing House Pvt. Ltd
3. Building Construction  
Dr. B. C. Punmia  
Laxmi Publications (P) Ltd.
4. Elements of Civil Engineering, 2003  
Anurag Kandya  
Charotar Publishing House Pvt. Ltd.
5. Engineering Graphics, 2nd ed.  
A.M. Chandra & Satish Chandra  
Alpha Science International Ltd
6. Engineering Graphics with Auto CAD  
D.M. Kulkarni, A.P. Rastogi & A.K. Saika
7. SIET, Kerala Website  
[www.sietkerala.gov.in](http://www.sietkerala.gov.in)  
Interactive multimedia tools for VHSE - CCM