

I. Introduction :

The construction industry is playing a vital role in development, skilled people like Engineers, Architects, are available at designing and supervisory level. In general the construction workers does not have knowledge and skills. To improve quality in the work, to minimise the wastage of material and also to control the cost of construction. It become necessary to train the workers.

The course "Construction Technology" will be more useful to students to develop their carrier in construction industry. The course is designed to suit the construction industry requirement. The course in divided into two parts. Part one is core syllabus in which the students are given basic acadamic knowledge, part two is specialization in which the students are trained in particular areas of construction technology.

II. Objectives of the Course :

To train the students in various techniques in the construction of buildings, especially cost efficient techniques to develop competencies in assisting supervisors, engineer,s and contractors and prepare themself for self employment.

III. Skills to be provided :

1. Skills to prepare plans and estimate the cost of project.
2. Skills in testing and choosing good quality building materials
3. Skills is constructions of different items like, foundations, masonry works, columns beams slabs and finishing works.
4. Skills to provide water supply and sanitary, electrical installations and fittings in the buildings.
5. Skills in maintenance of buildings and constructions repairs.

IV. Job Opportunities :

a) Wage employment :

1. Work as mason, carpenter, painter etc in construction industry.
2. Assistants under engineers and architects.
3. Contract jobs under contractors.

b) Self employment :

1. As a contractor for supplying of building materials
2. Execution of specialization works like painting, barbending etc.
3. As contractors, execution of small works in Govt. Organisations.

V. SCHEME OF INSTRUCTION & EXAMINATION

Annual Scheme of Instruction and Examination for Vocational Courses 1st & 2nd Year

Part - A	Theory		Practicals		Total	
	Periods	Marks	Periods	Marks	Periods	Marks
1. English	185	75	-	-	185	75
2. G.F.C.	185	75	-	-	185	75
Part - B						
3. Vocational Subjects						
Paper - I	160	50	160	50	320	100
Paper - II	160	50	160	50	320	100
Paper - III	160	50	160	50	320	100
Part - C						
4. On the Job Training -	-	-	210	50	210	50
Total	850	300	690	200	1540	500

Scheme of Instruction per week for Vocational Courses

Part - A	Theory	Practicals	Total
1. English	6	-	6
2. G.F.C.	6	-	6
Part - B			
3. Vocational subjects			
Paper - I	5	5	10
Paper - II	5	5	10
Paper - III	5	5	10

VI. SYLLABUS

Sl.No.	Paper	Subject	Periods	Marks
		Theory		
1.	I	Construction Materials	160	50
2.	II	Surveying Theory	160	50
3.	III	Engineering Mechanics	160	50
		Practicals		
4.	I	Construction Material Laboratory	160	50
5.	II	Surveying Practice	160	50
6.	III	Engineering Drawing	160	50
		On the Job Training	210	50
		II Year		
		Theory		
1.	I	Building Construction	160	50
2.	II	Estimating and Costing	160	50
3.	III	Construction Management and Accounts	160	50
		Practicals		
4.	I	Building construction Laboratory	160	50
5.	II	Civil Engineering Drawing	160	50
6.	III	Computer Lab	160	50
		On the Job Training	210	50

CONSTRUCTION TECHNOLOGY
CONSTRUCTION MATERIALS
THEORY - PAPER - I FIRST YEAR

TIME SCHEDULE :

Sl.No.	Topics	No.of Periods
1.	Introduction	2
2.	Stones	12
3.	Bricks	14
4.	Clay Products	16
5.	Lime	5
6.	Cement	20
7.	Sand	6
8.	Mortar	5
9.	Concrete	25
10.	Timber	10
11.	Metals	20
12.	Paints and Varnishes	15
13.	Miscellaneous Material	10
	Total	160

Detailed Syllabus :

1. Introduction

- 1.1. General
- 1.2. Scope and purpose of the subject

2. Stones

- 2.1. Introduction
- 2.2. Classification of Rocks
 - 2.2.1 Geological classification
 - 2.2.2. Physical classification
- 2.3. Common varieties of stones - their uses
- 2.4. Availability of important stones
- 2.5. Dressing of stones
- 2.6. Different types of surface finishes
- 2.7. Introduction of aggregates - grading of aggregates

3. Bricks

- 3.1. Composition of good brick earth
- 3.2. Requirements of good brick earth
- 3.3. Manufacture of Bricks
 - 3.3.1. Preparation of brick earth
 - 3.3.2. Moulding
 - 3.3.3. Drying
 - 3.3.4. Burning
- 3.4. Field tests of good bricks
- 3.5. Characteristics of good bricks
- 3.6. Classification of Bricks as per I.S
- 3.7. I.S.I. Specification for bricks
- 3.8. Special Forms of bricks
- 3.9. Special purpose bricks

4. Clay Products

- 4.1. Tiles - types of tiles
- 4.2. Roofing Tiles
- 4.3. Flooring Tiles
- 4.4. Stone ware pipes
- 4.5. Glazing
- 4.6. Porcelain
- 4.7. Terra-cotta

5. Lime

- 5.1. Introduction
- 5.2. Lime - properties and uses
- 5.3. Sources of lime
- 5.4. Calcination of lime
- 5.5. Slaking of lime
- 5.6. Quick lime
- 5.7. Classification of lime

6. Cement

- 6.1. Introduction
- 6.2. Chemical composition of portland cement
- 6.3. Manufacture of ordinary portland cement
 - 6.3.1. Dry Process
 - 6.3.2. Wet Process
- 6.4. Field tests of cement
- 6.5. Tests for cement as per I.S.I.
 - 6.5.1. Fineness test by sieving
 - 6.5.2. Consistency test
 - 6.5.3. Initial and Final setting times test
 - 6.5.4. Compressive strength test
- 6.6. Types of cement

6.6.1. Ordinary portland cement (O.P.C)

6.6.2. Quick Setting Cement

6.6.3. Rapid hardening cement

6.6.4. White cement

7. Sand

7.1. Sources of sand

7.2. Characteristics of good sand

7.3. Grading of sand

7.4. Bulking of sand

8. Mortars

8.1. General

8.2. Classification of Mortars

8.3. Different proportions of mortars for various construction works

8.4. Precautions in use of Mortars.

9. Concrete

9.1. Definition, purpose of concrete

9.2. Types of concrete

9.3. Ingredients of plain concrete

9.4. Proportions and uses of different grades of concrete.

9.5. Re-inforced cement concrete

9.6. Pre-cast concrete

9.7. Water - cement ratio

9.8. Mixing of concrete - methods

9.9. Batching of concrete

9.10. Transporting of concrete - methods

9.11. Placing of concrete

9.12. Compaction of concrete - usage of vibrators

9.12.1. Types of vibrators

9.13. Curing of Concrete - methods

9.14. Workability of concrete - slump cone test

10. Timber

- 10.1. Introduction
- 10.2. Defects in timber
- 10.3. Common varieties of timber
- 10.4. Wood Products
- 10.5. Characteristics of good timber

11. Metals

- 11.1. Types of metals
- 11.2. Properties and uses of cast iron
- 11.3. Properties and uses of wrought iron
- 11.4. Properties and uses of steel.
- 11.5. Commonly used structural steel sections
- 11.6. Re-inforcing steel - types
- 11.7. Weights of tor steel per meter length of rods of various dia

12. Paints and Varnishes

- 12.1. Introduction
- 12.2. Paints and Types of paints
- 12.3. Functions of paints
- 12.4. Ingredients of paint
- 12.5. Characteristics of good paint
- 12.6. Varnishes
 - 12.6.1. Ingredients of varnish
 - 12.6.2. Types of varnishes
- 12.7. French Polish

13. Miscellaneous Material

- 13.1. Glass
- 13.2. Adhesives
- 13.3. Asbestos
- 13.4. Thermocole

- 13.5. Plaster of paris
- 13.6. Fibre Reinforced concrete
- 13.7. Wall Paper
- 13.8. P.V.C.
- 13.9. Bitumen and Tar
- 13.10. Aluminium
- 13.11. Plastic crete
- 13.12. Fal-G Concrete

Note : Latest developments on this subject should be followed from time to time

**CONSTRUCTION TECHNOLOGY
SURVEYING THEORY
THEORY - PAPER - II FIRST YEAR
(COMMON TO P.H.E.T & C.T.)**

TIME SCHEDULE :

Sl.No.	Major Topics	No.of Periods
1.	Introduction	15
2.	Chain Surveying	40
3.	Compass Surveying	35
4.	Plane Table Surveying	20
5.	Levelling	30
6.	Theodolite Surveying	20
	Total	160

1. Introduction :

Concept of surveying - purpose of surveying - linear and angular measurements - classification of surveying. Plane and geodetic surveying classification based on instruments, engineering surveys - Reconnaissance, preliminary location survey, final location survey.

2. Chain Surveying

- Purpose and principle of chain survey - equipments used and their function - chains, arrows, tapes - ranging rods pegs - plumb bob - cross staff - Conventional signs.
- Errors in chaining - corrections due to incorrect length of chain or tape.
- Types of survey lines - base line - tie line - check line-fixing of survey stations - types of survey stations
- Different operations in chain surveying - chaining - ranging setting out right angles - chaining on sloped ground. Principles used in chain Triangulation.
- Recording field notes - field book - conventional signs
- Obstacles in chain surveying.
- Calculation of Areas - Average Ordinate, Simpson, Trapezoidal methods.
- Measurement of Volume from cross sections, Spot Levels and Contours.

3. Compass Surveying

- Purpose and Principle of compass survey - description, use and working of prismatic compass.
- Concept of true meridian - magnetic meridian - Arbitrary meridian.
- Bearing - Representation of Bearing - WCB - Quadrantal Bearing. Conversion of whole circle bearing to quadrantal bearing.
- Compass traversing in field.
- Local attraction - detecting and correcting bearings

- Calculation of included angles in compass traverse.
- Errors in compass surveying - natural and instrumental.

4. Plane Table Surveying

- Principle and purpose of plane table surveying, accessories used in plane table surveying - their uses.
- Methods of plane table - Radiation, Traversing, Intersection.

5. Levelling

- Purpose of Levelling - definition of terms, level surface, datum bench marks, types of bench marks
- Types of levelling instruments - dumpy level - component parts - relationship between fundamental lines of instrument.
- Types of Levelling staves - description.
- Temporary adjustments of dumpy level
- Field work - field book - reduction of levels by height of collimation method. Rise and fall method.
- Errors due to curvature and refraction - corrections
- Classification of levelling - differential levelling, profile levelling, fly levelling, check levelling, cross sectioning, reciprocal levelling.

6. Theodolite Surveying

- Principles of Theodolite Surveying - component parts, technical terms - temporary adjustments
- Measurement of Horizontal angles, vertical angles
- Determination of heights and distances.

Note : Latest developments and modern techniques on this subject should be followed from time to time.

**CONSTRUCTION TECHNOLOGY
ENGINEERING MECHANICS
THEORY - PAPER-III FIRST YEAR
(COMMON TO P.H.E.T & C.T.)**

TIME SCHEDULE :

Sl.No.	Topics	No.of Periods	Weightage
1.	Systems of Measurements	8	4
2.	Forces and Moments	28	12
3.	Centroid and Moment of Inertia	32	14
4.	Simple Stresses and Strains	35	18
5.	Shear force and bending moment	42	20
6.	Graphic Statics	15	-
	Total	160	68

Detailed Syllabus :

1.0. Systems of Measurements and Units

- 1.1. S.I. and M.K.S. System
- 1.2. Fundamental and Derived units
- 1.3. Units of Physical quantities used in Civil Engineering like length, area, volume, mass, force etc.

2.0. Forces and Moments

- 2.1. Definition of Force, Moment, Resultant, Equilibrant and Moment of a couple
- 2.2. Resultant of forces at a point, parallelogram law, Triangle law of forces, polygon law of forces
- 2.3. Distinguish between scalar and vector quantities, co-planar and non-co-planar forces, parallel and non-parallel forces, like and unlike forces
- 2.4. Conditions of Equilibrium of rigid bodies

3.0. Centroid and Moment of Inertia

- 3.1. Definition - Centroid, First moment of area, moment of inertia, Radius of gyration
- 3.2. Position of centroid of Rectangle, triangle, circle, semi circle.
- 3.3. Determine position of centroids of simple built up sections made of rectangle, triangle, circle, semi-circle.
- 3.4. Determine M.I. of simple and built-up sections by applying perpendicular axes theorem
- 3.5. Radius of gyration, polar M.I. of solid and hollow circular sections

4.0. Simple stresses and strains

- 4.1. Stress and strain - tensile, compressive and shear
- 4.2. Mechanical properties of materials - elasticity, plasticity, ductility, brittleness, malleability, stiffness, hardness, fatigue
- 4.3. Stress-strain curves for ductile materials - Mild steel, elastic limit, yield point, ultimate stress, breaking stress, working stress, factor of safety.

- 4.4. Hooke's Law - Young's modulus of elasticity, deformation under axial load
- 4.5. Composite sections - effect of axial loads and due to change of temperature
- 4.6. Longitudinal and lateral strain - Poisson's ratio - Bulk modulus, relationship between elastic constants. (proof not required)
- 4.7. Composite sections - effect of axial loads and due to change of temperature

5.0. Shear Force and Bending Moment

- 5.1. Types of beams - cantilevers, simply supported, overhanging - fixed and continuous beams
- 5.2. Calculation of S.F. and B.M. values at different sections for cantilevers, simply supported beams, overhanging beams under point loads and uniformly distributed loads - position and significance of points of contraflexure
- 5.3. Relation between rate of loading, S.F. and B.M. - drawing S.F. and B.M. diagrams - Location of points of contraflexure

6.0. Graphic Statics

- 6.1. Representation of forces graphically, Bow's notation
- 6.2. Parallelogram law of vector addition, resultant and equilibrants
- 6.3. Graphical Method of determination of centre of gravity for I, L, T Sections
- 6.4. Drawing SFD and BMD by graphical method for SSB and cantilever beams

Note : Latest developments on this subject should be noted from time to time

**CONSTRUCTION TECHNOLOGY
CONSTRUCTION MATERIALS LABORATORY
PRACTICAL - PAPER I FIRST YEAR**

TIME SCHEDULE :

Sl.No.	Major Topics	No.of Periods
1.	Identification of Construction Materials and their application	15
2.	Tests on Bricks	20
3.	Tests on Cement	20
4.	Tests on aggregate	25
5.	Tests on Metals	20
6.	Test on Concrete	20
7.	Study of Manufacturing/ Preparation of Construction material at Site/Factory	40
	Total	160

Detailed Syllabus :

1.0. Identification of various construction materials and their applications

1.1. Identification of various types of stones and their application in construction works

- a) Granite
- b) Sand Stone
- c) Marble
- d) Lime Stone
- e) Slate
- f) Basalt

1.2. Identification of various types of Bricks and Clay products and their application in construction works

- a) Country Bricks
- b) Special purpose bricks
- c) Earthen ware
- d) Stone ware
- e) Tiles

1.3. Identification of various types of Metals and their application in construction works

- a) Cast Iron
- b) Wrought Iron
- c) Steel
- d) Aluminium
- e) Copper
- f) Lead

1.4. Identification of various types of Timber and Wood Products and their application

- a) Teak
- b) Sal wood
- c) Neem
- d) Babul

- e) Veneers
 - f) Plywood
 - g) Laminate and other boards
- 1.5. Identification of Other Miscellaneous Material and their application
- a) Glass
 - b) Bitumen
 - c) Asbestos
 - d) Plastics
 - e) Thermocol
 - f) Rubber
 - g) Lenoleum

2.0. Test on Bricks

- 2.1. Field tests on bricks
- 2.2. Water absorption test on bricks
- 2.3. Crushing strength of bricks

3.0. Tests on Cement

- 3.1. Field tests of Cement
- 3.2. Fine ness of Cement
- 3.3. Normal Consistency test
- 3.4. Initial and Final setting times of cement

4.0. Tests on Aggregate

- 4.1. Bulking of sand
- 4.2. Standard proctor Compaction test on soils
- 4.3. Percentage of voids in coarse aggregate
- 4.4. Percentage of voids in fine aggregate
- 4.5. Fineness Modulus of coarse aggregate by sieve analysis
- 4.6. Fineness Modulus of fine aggregate by sieve analysis

5.0. Tests on Metals

- 5.1. Tension test on mild steel
- 5.2. Double Shear test on mild steel rod

- 5.3. Rockwell and brinell hardness tests on steel/brass
- 5.4. Izod and charpy impact tests on steel/brass

6.0. Tests on Concrete

- 6.1. Preparation of cement mortar for given proportion
- 6.2. Workability test on concrete - slump test
- 6.3. Casting of cement concrete cubes and testing for compressive strength

7.0. Study of Manufacturing/Preparation of construction Materials.

- 7.1. Observation of manufacturing of different types of bricks in factory
- 7.2. Observation of manufacturing of different types of Tiles and Clay products in Factory
- 7.3. Observation of manufacturing of cement in factory
- 7.4. Observation of manufacturing of pre-cast concrete members in factory
- 7.5. Observation of concrete mixing methods - Hand mixing and machine mixing at site
- 7.6. Observation of compaction methods of concrete by tamping and by using vibrators at site

Note : Latest developments on this subject should be followed from time to time

**CONSTRUCTION TECHNOLOGY
SURVEYING PRACTICE
PRACTICAL - PAPER-II FIRST YEAR
(COMMON TO P.H.E.T & C.T.)**

TIME SCHEDULE :

Sl.No.	Major Topics	No.of Periods
1.	Chain Surveying	30
2.	Compass surveying	20
3.	Plane table surveying	20
4.	Levelling	40
5.	Theodolite surveying	20
6.	Plotting	30
	Total	160

Detailed Syllabus :

1.0. Chain Surveying

- 1.1. Familiarity with instruments used in chain surveying
- 1.2. Practicing unfolding and folding of chain
- 1.3. Ranging and chaining of lines with offsets to objects and recording in field book
- 1.4. Chaining a line involving indirect ranging.
- 1.5. Measure of land area / chain triangulation and cross staff methods
- 1.6. Chain triangulation around a building covering a small area with other details, taking offsets and recording in the field book.
- 1.7. To prepare a layout of the given area covering buildings roads etc

2.0. Compass Surveying

- 2.1. Familiarity with Instruments used in compass surveying - prismatic compass
- 2.2. Setting up the compass - observation of bearings
- 2.3. Traversing with prismatic compass and chain - calculation of included angles and check.
- 2.4. Traversing with prismatic compass and chain - closed traverse covering the given area and recording
- 2.5. Traversing with prismatic compass and chain - open traverse and recording

3.0. Plane Table Surveying

- 3.1. Introduction to plane table equipments and accessories
- 3.2. Setting of the plane table and plotting a few objects (points) by radiation method
- 3.3. Plotting buildings and other features of the campus by Intersection method
- 3.4. Traversing an area by plane table

- 3.5. Calculating the area for the given land and marking plots by using plane table

4.0. Levelling

- 4.1. Study of dumpy level, levelling staff
- 4.2. Temporary adjustments of dumpy level
- 4.3. Taking out levels of various points and booking in a level field book
- 4.4. Differential or fly levelling - reduce levels by H.I. method and rise and fall method
- 4.5. Differential levelling involving invert levels - Reduction by H.I. and Rise and fall methods

5.0. Theodolite Surveying

- 5.1. Study of Theodolite
- 5.2. Measure of Horizontal angle between given lines
- 5.3. Measurement of vertical angle
- 5.4. Determining distance between two inaccessible points by measuring horizontal angle
- 5.5. Determining height of an object by measuring vertical angle

6.0. Plotting

- 6.1. Conventional signs in surveying
- 6.2. Perpendicular and oblique offsets
- 6.3. Plotting of land survey - chain and cross staff surveying - calculation of areas
- 6.4. Plotting of chain triangulation of small areas around building
- 6.5. Plotting of closed traverse by compass surveying - location of details
- 6.6. Plotting of open traverse by compass surveys - location of details

Note : Latest developments and modern techniques on this subject should be noted from time to time.

**CONSTRUCTION TECHNOLOGY
ENGINEERING DRAWING
PRACTICAL - PAPER - III FIRST YEAR
(COMMON TO P.H.E.T. & C.T.)**

Sl.No.	Major Topics	No.of Periods
1.	Introduction	6
2.	Lettering and Dimensioning	10
3.	Geometrical Construction	24
4.	Orthographic Projection	45
5.	Isometric Projection	35
6.	Sections of Solids	20
7.	Development of Surfaces	20
	Total	160

Detailed Syllabus

1.0. Introduction

- 1.1. Scope and objective of the subject
- 1.2. Importance of engineering drawing as a communication medium
- 1.3. Drawing instruments and their uses
- 1.4. Scales : Recommended scales, reduced & enlarged
- 1.5. Construction of Plain, Diagonal, Vernier Scales, Scale of Chords and Proportional Scales.
- 1.6. Sheet sizes : A0, A1, A2, A3, A4, A5. Layout of drawing sheet sizes of title block and its contents
- 1.7. Simple exercises on the use of drawing instruments.

2.0. Lettering and Dimensioning

- 2.1. Types of Lettering
- 2.2. Guide Lines for lettering
- 2.3. Recommended sizes of letters and numbers
- 2.4. Single stroke letters.
- 2.5. Dimensioning - rules and systems of dimensioning - dimensioning a given drawing

3.0 Geometric Construction

- 3.1. Bisecting a line - perpendiculars - parallel lines - division of a line
- 3.2. Angles - bisection, trisection
- 3.3. Tangent lines touching circles internally and externally
- 3.4. Polygons - Regular polygons - circumscribed and inscribed in circles.
- 3.5. Conic sections - Definitions of focus, directrix, eccentricity
 - (i) Construction of Ellipse by Concentric circles method.
 - (ii) Construction of parabola by rectangular method.
 - (iii) Construction of Hyperbola when given the position of point from X-axis and Y-axis.

4.0 Orthographic Projection

- 4.1. Definition - Planes of Projection- Four quadrants - Reference line.
- 4.2. First angle projection - Third angle projection
- 4.3. Projections of points
- 4.4. Projections of straight lines
- 4.5. Projections of planes
- 4.6. Projections of solids
- 4.7. Conversion of pictorial views into orthographic views

5.0. Isometric Projection

- 5.1. Definition - Isometric axes, lines and planes
- 5.2. Isometric Scale - Isometric view
- 5.3. Drawing of isometric views of plane figures
- 5.4. Drawing of isometric views of prisms and pyramids
- 5.5. Drawing of isometric view of cylinders and cones

6.0. Sections of Solids

- 6.1. Need for drawing sectional views - section planes - sections - true shape of a section
- 6.2. Sections of prisms and pyramids
- 6.3. Sections of cones and cylinders.

7.0. Development of Surfaces

- 7.1. Need for preparing development of surface
- 7.2. Concept of true length - Principal methods of development
- 7.3. Development of simple solids like cubes, prisms, cylinders, pyramids, cones.

Note : Latest developments and modern techniques on this subject should be followed from time to time.

**CONSTRUCTION TECHNOLOGY
BUILDING CONSTRUCTION
THEORY - PAPER I SECOND YEAR**

Sl.No.	Major Topics	No.of Periods
1.	Introduction	5
2.	Foundations	15
3.	Masonry work	
	(a) Stone Masonry	14
	(b) Brick Masonry	15
4.	Openings	
	(a) Doors & Windows	8
	(b) Ventilators	4
5.	Lintels and sunshades	4
6.	Floors	12
7.	Roofs	15
8.	Stairs and Stair Cases	8
9.	Form work	10
10.	Scaffolding, shoring and under pinning	6
11.	Carpentry and Joinry	6
12.	Surface Finishing	8
13.	Basic knowledge of equipment and construction machinery	10
14.	Building services	20
	Total	160

Detailed Syllabus :

1. Introduction :

Classification of Buildings as per NBC - Component parts of a building

2. Foundations :

Definition - Functions of Foundations - classification of soil - shallow and deep foundations - bearing capacity of soil - plate load test - essential requirements of good foundation - classification of foundations - special foundations - raft and grillage foundations - causes of failure of foundations and remedial measures

3. Masonry

a) Stone masonry

Definition - Material required for stone masonry - classification of stone masonry - rubble and ashlar masonry. Tools required for stone masonry - types of joints in stone masonry - supervising points to be observed in stone masonry.

b) Brick masonry

Definition - Types of brick masonry - English Bond - Flemish bond 1,1 $\frac{1}{2}$ 2 Brick walls - Defects in brick masonry - structures in brick masonry - tools required. - supervising points to be observed in brick masonry.

4. Openings

a) Doors and Windows

General Terms - Types of Doors - Types of windows - Fixtures and fastenings for doors and windows.

b) Ventilators

Types of ventilators - fixed, swing, Loured

5. Lintels and sun shades

Types of Lintels - Definition of sun shade

6. Floors

General terms - Types of floors - Method of construction of Cement Concrete, Mosaic and Terrazo floors.

7. Roofs

Definition - Classification of Roofs - Pitched roofs - Types : King post, Queen Post and Steel Strusses - Roof Covering Material for pitched roofs - Flat Roof - R.C.C. roof - General requirements - weather proof course on R.C.C. roof.

8. Stairs and stair cases

Technical terms - Types of Stairs - Straight, Quarter turn, half turn, doglegged, open well, Bifurcated and spiral stairs.

9. Form Work

Requirement of Form work - Material used for Form work - Removal of Form work - Failure of Form work - Form work for - Column, Footing, columns and stairs

10. Scaffolding, shoring and under pinning

Definition and types of scaffolding, shoring and under pinning

11. Carpentry and Joinery

Technical terms - Classification of Joints - Tools used in carpentry

12. Surface Finishing

Plastering - purpose - Types of Plastering - Procedure of plastering - Pointing - purpose - Types of Pointing - Painting - Method of Painting new and old surfaces - wood and metal surfaces

13. Basic Knowledge of Equipment and Construction Machinery

Bull dozers, Concrete Mixers, Cranes, Pully Blocks, Pumps, Winches, Excavators etc.

14. Building Services

Basic Concepts of electrical wiring, house wiring various types of wires and fittings, various types of electrical switches, power plugs, destination boards, circuit boards and earthing concepts

Basic Concepts of Sanitation and plumbing - Types of drainage pipes, pipes used in Sewage and water lines - Types of fittings used in sanitary and water line.

Note : Latest Developments on this subject should be noted from time to time

**CONSTRUCTION TECHNOLOGY
ESTIMATING & COSTING
THEORY PAPER-II SECOND YEAR**

TIME SCHEDULE :

Sl.No.	Major Topics	No.of Periods
1.	Introduction to the subject	5
2.	Measurement of materials and works	5
3.	Types of Estimates	10
4.	Detailed and abstract estimate of buildings by using centre line method/ long wall and short walls methods	45
5.	Analysis of Rates	40
6.	Estimation of quantities of steel & RC.C. elements	15
7.	Earthwork Calculations	20
8.	Detailed estimates of	20
	1. Gravel Road	
	2. Cement Concrete Roads	
	3. Septic tank with soakpit	
	Total	160

Note : Calculators are permitted for Examination

Detailed Syllabus :

1. Introduction to the Subject

Definition of Estimation and costing Need for Estimation and costing

2. Measurement of materials and works

- a) Units of measurement for various items of civil engineering works
- b) Rules for measurement
- c) Different methods of taking out quantities - Centre line method - Long and short walls method

3. Types of Estimates

- a) Detailed Estimate - Definition - Stages of preparation - details of measurement and calculation of quantities and abstract of estimated cost
- b) Preliminary or approximate estimate - plinth area estimate - cubic rate estimate - estimate per unit base
- c) Problems in preliminary estimate

4. Detailed and abstract estimate of buildings by using centre line method/long and short walls method

- a) Single roomed building (Load bearing type structure)
- b) Two roomed building (Load bearing type structure)
- c) Single storeyed Residential building with number of rooms (Load bearing type structure)
- d) Single storeyed Residential building (Framed Structure type)
- e) Primary School building with sloped roof
- f) RCC Dog legged - Open well stairs
- g) Two storeyed residential building (Framed Structure type)
- h) Detailed estimate of compound wall and steps.

5. Analysis of Rates

- a) Specifications for different items of work
- b) Cost of materials at source and at site
- c) Cost of Labour - Types of labour - Standard Schedule of rates
- d) Lead and Lift - Leads Statement
- e) Preparation of Unit rates for finished items of works
 - Cement Concrete in foundation
 - R.C.C. Works
 - Brick masonry in cement mortar
 - C.R.S. masonry in cement mortar
 - Plastering in cement mortar
 - Pointing in cement mortar
 - Cement concrete flooring
 - Doors and windows - panelled and glazed

6. Estimation of quantities of steel of R.C.C. elements

- a) R.C.C. beam
- b) R.C.C. Lintel
- c) R.C.C. Slab

7. Earthwork Calculations

- a) Trapezoidal - prismoidal - Mid Ordinate - Mean sectional area rules for computing volumes in level sections for roads
- b) Taking out quantities from L.S. and C.S. in cutting and embankment

8. Detailed estimates

- a) Gravel Road
- b) Cement Concrete Road
- c) Septic tank with Soakpit

Note : Latest development on this subject should be followed from time to time

CONSTRUCTION TECHNOLOGY
CONSTRUCTION MANAGEMENT & ACCOUNTS
THEORY PAPER-III SECOND YEAR

TIME SCHEDULE :

Sl.No.	Topics	No.of Periods	Weightage of marks
1.	Introduction	10	2
2.	Construction Planning	35	10
3.	Organization	15	6
4.	Construction Labour	20	8
5.	Inspection and Quality Control	10	4
6.	Contracts	15	10
7.	Tender and Tender notice	20	10
8.	Accounts	15	8
9.	Stores	20	10
	Total	160	68

Detailed Syllabus :

1. Introduction

Construction in India, Classification of construction work, stages in construction work, Construction team, Resource of Construction, Functions of Construction management, Scientific methods of construction management.

2. Construction Planning

Job planning, Technical Planning, Tender and Construction planning - scheduling - procurement of Labour, material and equipment - program of work - Bar chart - Critical path method - preparation of network diagram critical path method - Calculation of float times.

3. Organization

Types of organization principles of organization
Job layout - principles of storing materials

4. Construction Labour

Types of Labour, Labour welfare, Human relation, Labour Insurance Payment of wages, Minimum wages Act, Workmen Compensation Act, Contract Labour Act.

5. Inspection and Quality Control

Introduction - Functions of Inspection Department - Major items of controls

6. Contracts

Legality of Contracts - Types of Contracts - Piece work contracts item rate contract - percentage contract - merits and demerits of each contract system

7. Tender and Tender Notice

Necessity of Tenders - Tender notice - EMD - opening of tenders - Scrutiny of Tenders - Acceptance of tenders - Work Order - contract agreement - Conditions of Contract

8. Accounts

Necessity of Accounts - Different Methods of Carrying out works
P.W.D system of Accounts - Heads of Accounts - Payment to
Labour - N.M.R - Measurement Books - Check measurement of
works

9. Stores

Stock - classification of stores - general stock items - issue of
stores material - receipts - materials at site account - indent -
invoice and bin card - stock register - issue rate - accounting of
shortages and surplus - write off

Note : All leading journals on Construction Management should be followed
from time to time

CONSTRUCTION TECHNOLOGY
BUILDING CONSTRUCTION LABORATORY
PRACTICAL - PAPER I SECOND YEAR

Sl.No.	Chapter	No.of Periods
1.	Familiarity with tools, hardware	10
2 .	Marking for earth work excavation for foundation as per plan	20
3.	Masonry works	20
4.	R.C.C. works	40
5.	Building Services	30
6.	Carpentry	10
7.	Site Visit for various activities of construction works	30
	Total	160

Detailed syllabus :

1. Familiarity with tools hardware and fixtures used in building construction.
2. Marking for earth work excavation for foundation as per plan for a small one roomed building.
 - a) for framed structure
 - b) for load bearing structure
3. Masonry works
 - 3.1. Arrangement of bricks in English bond for 1 and 1 $\frac{1}{2}$ brick wall.
 - 3.2 Arrangement of bricks in Flemishbond for 1 and 1 $\frac{1}{2}$ brick wall
- 4.0. R.C.C. works
 - 4.1. Preparation of reinforcement mesh for column footing as per specifications.
 - 4.2. Preparation of reinforcement cage for R.C.C. column monolittic wiht column footing as per specifications.
 - 4.3. Preparation of pre-cast lintel
 - a) preparation of reinforcement cage for lintel.
 - b) Preparation of M20 grade concrete and placing concrete in lintel form work
 - 4.4. Preparation of reinforcement cage for R.C.C. beam as per specifications.
5. Building Services
 - 5.1. Study and identification of plumbing material, tools for plumbing
 - 5.2. Pipe cutting-thread cutting-jointing of G.I.Pipes using pipe specials
 - 5.3. Pipe cutting-jointing of PVC pipes using specials
 - 5.4. Preparation of piping network for water supply using various pipes and specials.
 - 5.5. Preparation of piping network for sanitary works using various pipes and specials.
 - 5.6. Prevention of leakages, detection and arrest of leakages in pipe lines.
 - 5.7. Identification of different electrical accessories and their use.

- 6.0. Carpentry
- 6.1. Use and Setting of different tools
- 6.2. Surface Planing and Finishing
- 6.3. Making Simple Joints - Mortise, Tenon, dovetail, etc.
- 6.4. Demonstration of wood working machine.
- 7.0. Site visits for various activities of construction works.
- 7.1. Earth work excavations for foundation & column pits.
- 7.2. Erection of column footings and columns with concreting.
- 7.3. Laying of slab-form work, placing - Reinforcement and concreting.
- 7.4. Erection of scaffolding for different construction works like-brick masonry work, plastering etc.
- 7.5. Installation of water supply and sanitary fittings in a building.

Note : Latest Methods and Techniques on this subject should be followed from time to time.

**CONSTRUCTION TECHNOLOGY
CIVIL ENGINEERING DRAWING
PRACTICAL - PAPER II SECOND YEAR**

Sl.No.	Major Topics	No.of Periods
1.	Conventional signs	10
2.	Bonds in Brick work	6
3.	Doors and Windows	6
4.	Foundation details	6
5.	Residential building load bearing	18
6.	Residential building framed structure	18
7.	Stairs	8
8.	School building and Office building	8
9.	Industrial building	6
10.	Septic tank	4
11.	Working drawing showing	30
	a) Furniture details	
	b) Electrical layouts	
	c) Water supply layouts	
	d) Sainitary layouts	
12.	Structural drawings showing reinforcement details	30
	a) Column with footing	
	b) Lintel cum sunshade	
	c) Stair case	
	d) Beam	
	e) Slab	
13.	General	10
	a) Drawing plans as per MCH bye-laws	
	b) Appartment showing one floor plan	
	Total	160

Detailed Syllabus :

1. Conventional Signs

- 1.1. Sketch the conventional signs for materials like : Brick, Cement, Sand, Concrete, Wood, Glass, Earth, Steel, etc.
- 1.2. Sketch the conventional sign for electrical fixtures like : Switch, bell, bell push, ceiling- point, ceiling fan, bulb, main switch, AC-Motors, Buzzers etc.
- 1.3. Sketch the conventional sign for water supply and sanitation fixtures like : wash basin, tap, sink, WC pan (Indian and European) showers etc.

2. Bonds in Brick Masonry

- 2.1. Draw the plan of odd and even course of English bond of 1 brick wall and $1\frac{1}{2}$ brick wall that **meeting at a corner**
- 2.2. Draw the plan of odd and even course of Flemish bond of one brick wall and $1\frac{1}{2}$ brick wall thick meeting at a corner

3. Doors and windows

- 3.1. Draw the sectional plan and elevation of a fully pannelled door
- 3.2. Draw the sectional plan and elevation of a fully pannelled windows
4. Draw the cross section of the wall of a building and show the component parts and foundation details

5. Residential building load bearing type

Draw the plan, section and elevation of a single storied load bearing type residential building from the given line diagram and set of specifications for

- 5.1. One room with veranada
- 5.2. One bedroom house
- 5.3. Two bed room house

6. Residential building framed structure type

Draw the plan, section and elevation of a single storied framed structure type residential building from the given line diagram and set of specifications

- 6.1. One bed room house
- 6.2. Two bedroom house
- 6.3. Two storied residential buildings

7. Stairs

Draw the plan and section of stairs, with given specification for

- 7.1. dog-legged stair case
- 7.2. open well stair case
- 7.3. spiral stair case

8. School & Office Building

- 8.1. Draw the plan, section and elevation of school building from the given line diagram and set of specifications
- 8.2. Draw the plan, section and elevation of a office building from the give line diagram and set of specifications
9. Draw the plan, section and elevation of a industrial building from the line diagrams and set of specifications
10. Draw the plan and section of a septic tank for a set of specification with pipe connection details, foundations and masonry details.

11. Working drawing

Draw the layout details for a two room building for

- 11.1. Furniture using different templates
- 11.2. Electrical layouts
- 11.3. Water supply layouts
- 11.4. Sanitary layouts

12. Structural drawings showing reinforcement details

Draw the structural details for R.C.C. elements showing reinforcement details

- 12.1. Column with footings with plan and section
- 12.2. lintel cum sunshade with plan and section

- 12.3. Stair case with plan and section
- 12.4. Beam with longitudinal and cross section
- 12.5. R.C.C. slab with plan and section diagram

13. General

- 13.1. Draw the plan of an Apartment of one floor with 4 to 6 flat units (85 - 200 Sq.m per flat/unit or 900 - 1500 Sq.ft per flat per unit)
- 13.2. Draw the site and location plan of a residential building as per municipal corporation laws as per line diagram
- 13.3. Draw the plan, section and elevation to suit the requirement to municipality/corporation as per zoning regulations and bye-laws for a set of specifications.

Note : Latest Techniques and Methods on this subject should be followed from time to time

**CONSTRUCTION TECHNOLOGY
COMPUTER LAB
PRACTICAL - PAPER III SECOND YEAR**

TIME SCHEDULE :

Sl.No.	Major Topics	No.of Periods
1.	Introduction to Computers	10
2.	MS - Dos	10
3.	MS - Windows	10
4.	MS - Word	20
5.	MS - Excel	15
6.	MS - Power Point	15
7.	MS - Access	10
8.	Internet	10
9.	Auto - CAD	60
	Total	160

Detailed Syllabus :

1.0. Introduction to Computers

- 1.1. History of Computers - Computer Generations - Classification of Computers
- 1.2. Basic Computer Architecture - Input and Output devices - different peripherals of computer
- 1.3. Memories - storage media
- 1.4. Types of Software - Types of Languages - Operating systems

2.0. MS-Dos

- 2.1. System files - Naming of files - Wild card characters
- 2.2. Practice on Internal commands
- 2.3. Practice on External commands

3.0. MS-Windows

- 3.1. Practice on elements of Windows-98 like My Computer, My Documents, Internet Explorer, Network Neighbourhood, Recycle Bin, My Briefcase, etc.
- 3.2. Practice on Starting a Program (Application) like Start Menu, Programs Menu, Documents Menu, Find and Help Menu.
- 3.3. Creating and Editing Text files - Deleting and Restoring files and folders.
- 3.4. Copying and Moving objects - Drag and Drop feature - using Keyboard - using Standard Tool bar - Right Dragging Method.
- 3.5. Printing from Windows

4.0. MS-Word

- 4.1. Creating, Opening and Modifying Documents
- 4.2. Practice on changing page layout, setting of tab stops, Text block operations
- 4.3. Practice on Formatting Text - Customizing paragraph formats - changing font styles and size - working with tables and printing documents

5.0. MS-Excel

- 5.1. Working with Excel Work Sheet - Formatting - entering Formulae
- Inserting Rows and Columns
- 5.2. Practice on Range and Series - Moving and copying cell contents
- creating summary reports
- 5.3. Formatting work sheets - Linking Work Sheets - Working with
Graphic Data.

6.0. Power Point

- 6.1. Practice on Power Point Slides
- 6.2. Creating a Presentation
- 6.3. Creating a Graph

7.0. MS-Access

- 7.1. Access concepts and Terms
- 7.2. Creating a simple Database and Tables
- 7.3. Familiarity with text fields, Memo fields, Number Fields, Date/
Time fields, currency fields, etc.

8.0. Internet

- 8.1. Concepts of Computer Networks - LAN, WAN
- 8.2. Connecting and working on Internet

9.0. Auto - CAD

- 9.1. Basic Concepts on Starting up Auto CAD - Command window -
Drop Down Menus - Tool bars
- 9.2. Practice on Basic Commands - Line command - Drawing the
Box - Drawing Units - Drawing Size
- 9.3. Laying out the walls - creating Doors & Windows
- 9.4. Drawing the steps and Thresholds - Balcony - Laying out the
Kitchen and Bathroom
- 9.5. Drawing the Roof - Develop the drawing depicting the
Reinforcement details of typical elements like column, footing,
beams and slabs
- 9.6. Generating elevations - Drawing the front elevation - Putting the
door, step, windows - Finishing touches - Hatching the front
elevation
- 9.7. Controlling text in a drawing - Setting up Text styles - Using
Single line Text - placing Room Labels in the floor plan - creating
a Title Block and Border

VII. List of Equipments :

1. Drawing table with drawing boards.
2. T.Square/Mini drafter
3. Drawing instruments set.
4. Set Square set,
5. Compass set
6. Plumb bob cross staff
7. Tapes
8. Spirit level
9. Bar bending bench
10. Bar bending tools (complete set with different diameters)
11. Survey chain (30 meters)
12. Dumpy level with stand
13. Cross staff
14. Theodolite with stand
15. Plane table with stand
16. Helmets
17. Gum boots
18. 1mt x 1 mt x 0.01 nt (Mixing tray)
19. Weighing balance
20. Trowels
21. Cement Concrete cube moulds
22. Slump cone apparatus.
23. Compressive testing Machine (100 tonnes capacity)
24. Set of sieves 80 mm, 40 mm, 20mm 10mm, 4.75 mm, 2.36 mm
1.18 mm 0.6 mm, 0.3 mm, 0.15 mm
25. Sieve Shaker for coarse aggregate. (30 cm Dia)
26. Vicat apparatus
27. I.S. Testsieve - sieve No. 90 Microns

28. Weighing Balance (wt. 50 gm - to 5 kgs)
29. Fractional weight Box
30. Table Vibrator
31. Needle vibrator
32. Drawing Models
33. Drawing Model with sections.
34. Computers
35. Electric Oven
36. Universal testing machine
37. Shear tool assembly
38. Rockwell hardness Testing Machine
39. Brinell Hardness Testing Machine (TKB - 3000 Model)
40. Brinell Microscope with light arrangement
41. Impact testing machine (Izod, Charpy)
42. Procter Mould with Metal Rammer

VIII. IMPORTANT SUGGESTIONS

1. Local visits to the buildings under construction such as residential buildings, multi-storey buildings, factory buildings and water supply treatment plants, etc. shall be arranged for practicals wherever necessary.
2. Local visits to sewage treatment plants, multi-storey buildings, study of water supply and sanitary fittings, etc. may be arranged.
3. Educational tour and visits to Engineering works may be arranged.
4. The On the Job Training program may be arranged in specific areas like masonry work, plumbing, carpentry, bar-bending, painting, etc.
5. Scientific Calculators are allowed for this course students in the Public Examinations

IX. COLLABORATION INSTITUTIONS FOR CURRICULAM TRANSACTION

a) Collaboration institutions for curriculum transaction

1. Technical training institutes (like Polytechnics, survey of India, Technical Teachers training institutes, Testing labs, (NAC) Nationald Academy of Construction

b) On the Job Training Sites :

Government Departments like R & B, MCH, Huda, MES, Concrete ready Mix plants, Private builders and contractors. Building Materials Manufacturing Units like Tiles/ Bricks industries / precast units / cement industries.

All activities / works related to transportation engineering etc. (highways, railways, airways, waterways).

All works related to Civil Engineering Field.

Evaluation :

1. Project work
2. Seminar on the Project
3. Viva - voce

X. Qualifications of Lecturers

- a) B.E./B.Tech in Civil Engineering (Structural)/AMIE (Civil)/Equivalence
- b) Diploma in Civil Engineering with 5 years teaching experience

Qualification of Lab Assistants

- a) Vocational passouts of R&B/CT/S&E/WS&SE/Public Health Engineering Technician
- b) NCVT/ITI passed or any equivalent

XI. Vertical Mobility :

Passouts of this course may continue education in the following courses

a) With Bridge Course :

For further studies, joining in polytechnics 2nd year, writing EAMCET Exams, admission into any graduation courses.

b) Without Bridge Course :

Self Employment and wage employment

B.A., B.Com., B.Com Computers, CA, ICWA, ACS, LLB etc.

XII. Reference Books :

1. Construction Materials

Construction Materials by G.J. Kulkarni

Building Materials by Rangawala

2. Surveying :

Survey I and II by B.C. Punmia

Surveying and levelling by T.P. Kanetkar

Surveying and levelling by S.K. Hussain and Nagaraj

Surveying and levelling by A. Kamala.

3. Engineering Mechanics :

Engineering Mechanics — R.S. Kurmi

Engineering Mechanics — N. Srinivasulu

Engineering Mechanics — A. Kamala & AVRT sharma

Engineering Mechanics — K.L. Narsimham

Engineering Mechanics — Prasad

Engineering Mechanics — Ramamrutham

Engineering Mechanics — G. Venkateswar Rao

Engineering Mechanics Statics — Dayarathnam

4. Engineering Drawing :

- Engineering drawing by — N.D. Bhatt
- Engineering drawing by — B.R. Gupta
- Engineering drawing by — Srinivasulu
- Engineering drawing by — Gurucharan Singh

5. Building Construction :

- A text book of Building Construction by — R.S. Desh Pande
- A text book of Building Construction by — Rangawala
- A text book of Building Construction by — Sushil Kumar
- A text book of Building Construction by — S.P. Arora

6. Estimating and Costing :

- Estimating and Costing by — B.N Dutta
- Estimating and Costing by — Birdie
- Quantity surveying by — A.K. Kamala

7. Civil Engineering Drawing :

- Civil Engineering Drawing I and II by — A. Kamala
- Civil Engineering Drawing 'A' Series — V.V.S. Murthy
- Civil Engineering Drawing by — B.P. Vermon

8. Construction Management and Accounts :

- Construction Management by — N. Srinivasulu
- Construction Management and Accounts by — V.N. Vazirani
- Construction Management and Planning by
— B. Sengupta, H. Guha.
- Construction Management and Accounts — Sharma

9. Computers :

- Computers Science — E. Balagurusamy and Sushila : Tata McGrau Hills
- Computers Methods of Structures by Dr. Mukherjee and Sans.
- MS.Office - Ron Mansfield - BPB Publisher inside Auto CAD - Raiker
- Auto CAD - David Frey - BPB Publisher

VOCATIONAL CURRICULUM-2005

(With effect from the Academic Year 2005-2006)

**CURRICULUM OF INTERMEDIATE VOCATIONAL
COURSE IN**

CONSTRUCTION TECHNOLOGY



**STATE INSTITUTE OF VOCATIONAL EDUCATION &
BOARD OF INTERMEDIATE EDUCATION A.P.
Nampally, Hyderabad**

FOREWORD

The National Policy on Education (1986) while proposing educational reorganization, placed high priority on the programme of vocationalisation of education. It emphasized that well planned, systematic and rigorously implemented vocational education will create a distinct stream to prepare students for identified occupations encompassing several areas of activity. The primary aim of vocational courses was to cut across several occupational fields and prepare students with employable skills in organized sectors and self employment. Vocationalisation through re-orientation of educational strategies focused on creating a talent pool of skilled youth who are trained in courses relevant to the market and emerging needs of the various sections of the economy.

Inspired by this vision of the National Policy, the Government of Andhra Pradesh introduced Vocational Education at +2 level with an aim to diversify a sizeable segment of students at the senior secondary stage to the world of work. The State Government aimed at reducing the pressures on higher education through empowering youth by harnessing their capabilities. The requirement of skilled manpower industry is being fulfilled by charting a student's career with right options based on aptitude and talent. An right alternative to medical and engineering courses is envisaged in vocationalisation of education in the State.

In view of the changing needs of the students and growing demand for a spectrum of skill competencies in the economy, the Board of Intermediate Education has reviewed the curriculum of Vocational Courses in order to re-orient them based on their viability and practicability. The revised curriculum for Vocational Courses at Intermediate Level will come into effect from the Academic Year 2005-06 1st Year and from Academic Year 2006-07 for 2nd Year students.

I am confident that the revised curriculum will attract more and more students into vocational stream and help them train in need-based, productive courses leading to gainful employment.



SHASHANK GOEL

Secretary, BIE

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