Vocational Curriculum – 2012
(With effect from the academic year 2012-2013)

Curriculum of Intermediate Vocational Course
In
BUILDING CONSTRUCTION
&
MAINTENANCE TECHNICIAN

State Institute of Vocational Education
O/o the Commissioner of Intermediate Education,
Andhra Pradesh, Hyderabad
&
Board of Intermediate Education,
Andhra Pradesh, Hyderabad
RECOMMENDATION FOR UPDATING COURSE CONTENT AND COURSE TITLE

1. The existing course content in the all the subjects of water supply and sanitary engineering has been examined.
2. Syllabus review committee felt that there is an urgent need to update the syllabus to meet the needs of the today’s construction industry.
3. The WS & SE course name is not sounding for employment in government and in corporate sectors.
   Hence the syllabus revision committee has decided to change the course title water supply and sanitary engineering (WS & SE) as BUILDING CONSTRUCTION AND MAINTENANCE TECHNICIAN (BC & MT)

SYLLABUS REVIEW COMMITTEE

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   Karimnagar District

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   GJC New Malakpet,  
   Hyderabad.

5. B.GNANA SAGAR,  
   Professor [FAC] S.I.V.E.& Deputy Director,  
   O/o the Commissioner of Intermediate Education,  
   Andhra Pradesh,  
   Hyderabad
Contents

I. Introduction
II. Objectives of the Course
III. Skills to be provided
IV. Job Opportunities
   a. Wage Employment
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V. Scheme of Instruction & Examinations
VI. Syllabus
   a. Theory
   b. Practicals
VII. List of equipment
       b. On the Job Training centers
IX. Qualification for Lecturers
X. Vertical Mobility
   a. With Bridge Course
   b. Without Bridge Course.
XI. Reference Books
XII. Model Question papers.
XIII. List of subject Committee Members.
I. INTRODUCTION

To meet the needs of fast changes in the present days construction industry, it is essential to develop the skills and techniques to match the requirements in the ever growing industry. In view of the above, the curriculum on Building Construction & Maintenance Technician course has been designed and developed for a two year course at the plus two stage of Intermediate Education.

Among all building services to be provided in a building, be it a residential or a public building, water supply and sanitary arrangements are the most essential services and well trained member with necessary skill sets are in great demand to attend the minor to major jobs in the buildings. This course provides the student, the techniques and the knowledge of plumbing systems in the building in addition to latest technology developed in Rural water Supply and sanitation, solar heaters, in hot water supply and wind energy in pumping water. This course imparts knowledge in all other subjects related to civil engineering field. An application of Computer Software is also incorporated in drafting, estimating and documentation of civil works dealing in detail especially in water supply and sanitary works. The skills and techniques acquired during this course develop the required competency in performing job effectively whether one is placed in a waged employment or a self employment.

II. Objectives

1. To provide skills in handling the jobs in plumbing systems.
2. To provide skills in handling maintenance of building.
3. To train the students in various techniques in the building services with more emphasis on water supply and sanitary services to develop competencies in assisting supervision, engineers and contractors and prepare them for self /wage employment.
4. To train the students in various techniques in civil engineering field.

III. Skills to be provided.

1. Knowledge of plumbing tools, plumbing materials, fittings of water supply and sanitary items.
2. Knowledge of preparing layouts for hot water supply.
5. Knowledge of Solar Heaters, their installation and preparation of layout of plumbing system.
7. Preparation of building drawings.
8. Estimate the building works including water supply and sanitary works.
9. Acquire the skill in surveying of the field.
10. Apply the knowledge of computers in preparation of drawings, estimates, table reports etc. Using Computer software.
11. Estimation of different types of civil engineering works.
IV. Job Opportunities:

a) Wage Employment:
1. Plumber, Painter, Carpenter, Supervisor of Civil Engineering works.
2. Draughtsman Civil.
3. Quantity Surveyor of water supply and sanitary fittings and other related Civil Engineering works.
4. Store keeper in construction industries for inventory control of plumbing materials.
5. Work inspector in construction sites [water supply and sanitary works and all other Civil Engineering related works]

b) Self Employment:
1. Contractor in water supply and sanitary works or in civil engineering works.
2. As a licensed technician in plumbing works / Draughtsman/ in civil engineering works.
3. Dealer of a store in supplying the water supply and sanitary fittings to the market.
4. Dealer of a store in supplying Civil Engineering materials to the market.
V. SCHEME OF INSTRUCTION AND EXAMINATION

5.1 ANNUAL SCHEME OF INSTRUCTION AND EXAMINATION FOR 1ST YEAR BUILDING CONSTRUCTION & MAINTENANCE TECHNICIAN

<table>
<thead>
<tr>
<th>Part-A</th>
<th>Theory</th>
<th>Pricals</th>
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**Part-B**

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<td>Paper-II Surveying theory</td>
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6. OJT | - | - | 365 | 100 | 365 | 100 |

Total | 705 | 250 | 770 | 250 | 1475 | 500 |

On the Job Training: November & December

II YEAR BUILDING CONSTRUCTION & MAINTENANCE TECHNICIAN

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**Part-B**

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6. OJT | - | - | 450 | 100 | 450 | 100 |

Total | 630 | 250 | 795 | 250 | 1425 | 500 |

1000
**On the Job Training : August, September & October**

**EVALUATION OF ON THE JOB TRAINING:**

The “On the Job Training” shall carry 100 marks for each year and pass marks is 50. During on the job training the candidate shall put in a minimum of 90% of attendance.

The evaluation shall be done in the last week of January.

**Marks allotted for evaluation:**

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<th>Max. Marks allotted for each activity</th>
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<td>2</td>
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<td>3</td>
<td>Familiarity with tools and material</td>
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<td>4</td>
<td>Manual skills</td>
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<td>Application of knowledge</td>
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<td>6</td>
<td>Problem solving skills</td>
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<td>7</td>
<td>Comprehension and observation</td>
<td>10</td>
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<tr>
<td>8</td>
<td>Human relations</td>
<td>05</td>
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<tr>
<td>9</td>
<td>Ability to communicate</td>
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</tr>
<tr>
<td>10</td>
<td>Maintenance of dairy</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
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**NOTE:** The On the Job Training mentioned is tentative. The spirit of On the Job training is to be maintained. The colleges are at liberty to conduct on the job training according to their local feasibility of institutions & industries. They may conduct the entire on the job training periods of (363) I year and (450) II year either by conducting classes in morning session and send the students for OJT in afternoon session or two days in week or weekly or monthly or by any mode which is feasible for both the college and the institution. However, the total assigned periods for on the job training should be completed. The institutions are at liberty to conduct On the Job training during summer also, however there will not be any financial commitment to the department.
**SCHEME OF INSTRUCTION PER WEEK**

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# TIME SCHEDULE

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<td>68</td>
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</table>
Detailed Syllabus:

1.0. Introduction
  1. Importance and Necessity for planned water supplies
  2. Wholesome water
  3. Status of protected water supply in India
  4. Planning and Execution of Modern water supply schemes

2.0. Water Demands
  2.1. Various types of water demands
    2.1.1. Domestic Demand
    2.1.2. Industrial Demand
    2.1.3. Institutional and commercial water demand
    2.1.4. Demand for Public uses
    2.1.5. Fire demand
    2.1.6. Losses and wastes
  2.2. Per capita demand
  2.3. Factors affecting per capita demand
  2.4. Variations in demand
    2.4.1. Seasonal variations
    2.4.2. Daily variations
    2.4.3. Hourly variations
  2.5. Design Period
  2.6. Total requirement of water for a town or a city
  2.7. Population forecasting methods and problems
    2.7.1. Arithmetical increase method
    2.7.2. Geometrical increase method
    2.7.3. Incremental increase method, etc.

3.0. Sources of water supply
  3.1. Hydrological concepts
    3.1.1. Definition
    3.1.2. Precipitation, Infiltration, Run off, Evaporation, Transpiration
  3.2. Surface sources
    3.2.1. Natural ponds and lakes
    3.2.2. Streams and rivers
    3.2.3. Impounding reservoirs
  3.3. Sub surface sources
    3.3.1. Infiltration galleries
    3.3.2. Infiltration wells
    3.3.3. Springs
    3.3.4. Wells
      (a) Shallow wells
      (b) Deep wells
  3.4. Intakes for collecting surface water, definitions and general introduction

4.0. Quality of water
  4.1. General Introduction
  4.2. Characteristics of Water
    4.2.1. Physical Characteristics
      4.2.1.1. Turbidity
      4.2.1.2. Colour and Temperature
      4.2.1.3. Taste and Odour
    4.2.2. Chemical Characteristics
      4.2.2.1. Total Solids and suspended solids
      4.2.2.2. PH value of water
4.2.2.3. Hardness of water
4.2.2.4. Chloride content
4.2.2.5. Nitrogen content
4.2.2.6. Metals and other Chemical substances
4.2.2.7. Dissolved Gases
4.2.2.8. Bio-chemical Oxygen Demand
4.2.3. Bacterial and Microscopical characteristics
4.3. Water Borne Diseases
4.4. Drinking water standards

5.0. Treatment of Water
5.1. General Introduction
5.2. Treatment unit flow diagram
5.3. Screening
5.4. Sedmentation
  5.4.1. Plain Sedimentation
  5.4.2. Sedimentation aided with Coagulation
5.5. Filtration
  5.5.1. Theory of filtration
  5.5.2. Slow sand filters construction and operation
  5.5.3. Rapid sand filters
  5.5.4. Pressure filters
5.6. Disinfection
  5.6.1. Methods of Disinfection
  5.6.2. Chlorination, pre, post, Break-point Chlorination and Dechlorination
5.7. Defluoridation - by Nalgonda technique

6.0. Distribution System
6.1. General Introduction
6.2. Requirements of a good distribution system
6.3. Layouts of Distribution Networks
  6.3.1. Dead end system
  6.3.2. Grid iron system
  6.3.3. Ring system
  6.3.4. Radial system
6.4. Systems of Distribution
  6.4.1. Gravitational system
  6.4.2. Pumping system
  6.4.3. Combined system
6.5. Pumps
  6.5.1. Types of pumps and their suitability
  6.5.2. Centrifugal pumps - Components
  6.5.3. Selection of pump horse power
  6.5.4. Operation and maintenance
  6.5.5. Trouble Shooting
6.6. Requirement of pipe materials
  6.6.1. Different types of pipes
  6.6.2. Laying and Testing
  6.6.3. Maintenance
  6.6.4. Pipe Corrosion - Causes and Prevention

7.0. Appurtenances in the distribution system
7.1. Understand the various appurtenances in a distribution system
7.2. Use of
  7.2.1. Sluice valves
  7.2.2. Check valves or reflux valves
7.2.3. Air valves  
7.2.4. Drain valves or Blow off valves  
7.2.5. Scour valve  
7.2.6. Water meter  
7.2.7. Fire Hydrants

### 8.0. Water supply plumbing systems in buildings and Houses

8.1. Plumbing System in Water Supplies  
8.2. The House Water Connection  
8.3. Stop Cocks  
8.4. Water taps and Bib cocks  
8.5. Pipe fittings  
8.6. Storage of water in buildings  
8.6.1. Estimating Storage Capacity  
8.6.2. Overhead Storage, Underground Storage tanks  
8.6.3. Types of tanks, RCC, GI and HDPE tanks  
8.6.4. General requirements of domestic water storage  
8.7. Water piping systems in building  
8.7.1. Piping system using direct supply  
8.7.2. Piping system using over head tanks  
8.7.3. Piping system using underground - overhead tank supply  
8.7.4. Pumped systems

### 9.0. Rainwater Harvesting

9.1. Rain water Harvesting structures into the ground  
9.1.1. Collection of rain water  
9.1.2. Separation of first rain flush  
9.1.3. Filtration of rain water  
9.1.4. Storage of rain water  
9.1.5. Distribution of water  
9.2. Rain water directed to Service wells  
9.3. Rain water harvesting by percolation pit method

### 10.0 Liquids and Their Properties

10.1. Mass Density – Specific Weight – Specific Gravity  
10.2. Adhesion – Cohesion – Surface Tension – Capillarity – Compressibility  
10.3. Dynamic Viscosity – Vapour Pressure

### 11.0. Pressure Head and Measurement

11.1. Atmospheric Pressure – Gauge Pressure – Absolute Pressure  
11.2. Pressure Measuring Instruments - Piezometer – Manometer and Differential Manometer  
11.3. Pressure Head – Datum Head and Kinetic Head  
11.4. Bernoulli Theorm  
11.5. Water Hammer
### BUILDING CONSTRUCTION & MAINTENANCE TECHNICIAN
### SURVEYING THEORY
### 1 YEAR
### THEORY PAPER - II
### (COMMON TO C.T., BC& MT)

**Periods/ Week:** 4  
**Periods/ Year:** 135

**TIME SCHEDULE**

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**OBJECTIVES:**

The Student understands all the terminology in Civil Engineering branches i.e. Chain / Tape Surveying, Compass Surveying, Leveling, Theodolite, Total Station and Distomat. The application of different instruments and advantages one over the other.

**Note:** Calculators are permitted for Examinations.
Detailed Syllabus:

1. Introduction:
   1.1. Concept of surveying
   1.2. Purpose of surveying
   1.3. Linear and angular measurements
   1.4. Classification of surveying.
      1.4.1. Plane and geodetic surveying
      1.4.2. Classification based on instruments
      1.4.3. Engineering surveys
   1.5. Reconnaissance, preliminary location survey, final location survey.

2. Chain Surveying
   2.1. Purpose and principle of chain survey
   2.2. Equipments used and their function - chains, arrows, tapes - ranging rods pegs - plumb bob - cross staff
   2.3. Conventional signs.
   2.4. Errors in chaining –
   2.5. Corrections due to incorrect length of chain or tape.
   2.6. Types of survey lines
      2.6.1. Base line
      2.6.2. Tie line
      2.6.3. Check line
   2.7. Fixing of survey stations
   2.8. Types of survey stations.
   2.9. Different operations in chain surveying - chaining – ranging setting out right angles chaining on sloped ground.
   2.10. Principles used in chain triangulation.
   2.11. Recording field notes - field book - conventional signs.
   2.13. Calculation of Areas - Average Ordinate, Simpson, Trapezoidal methods.

3. Compass Surveying
   3.1. Purpose and Principle of compass survey - description, use and working of prismatic compass.
   3.2. Concept of true meridian - magnetic meridian – Arbitrary meridian.
   3.3. Bearing - Representation of Bearing WCB, Quadrantal Bearing. Conversion of whole circle bearing to quadrantal bearing.
   3.4. Compass traversing in field.
   3.5. Local attraction - detecting and correcting bearings.
   3.6. Calculation of included angles in compass traverse.
   3.7. Errors in compass surveying - natural and instrumental.

4. Levelling
   4.1. Purpose of Levelling - Definition of terms, level surface, datum bench marks, types of bench marks.
   4.2. Types of levelling instruments - dumpy level - component parts. - Relationship between fundamental lines of instrument.
   4.3. Types of Levelling staves - description.
   4.4. Temporary adjustments of dumpy level.
5. Theodolite Surveying

5.1. Principles of Theodolite Surveying - component parts, technical terms - temporary adjustments
5.2. Measurement of Horizontal angles by repetition method and reiteration method, vertical angle.
5.3. Determination of heights and distances.

6. Total Station & Dastomate

6.1. Total Station - Parts and the functions - Adjustments of total station for taking observations.
6.2. Measurement of Horizontal Distance, Slope distance, Difference in Height between two points.
6.3. Elevation of a Point.
6.4. Horizontal angle and distance between two stations.
6.5. Setting out right angles at different points on a base line.
6.6. Setting out plan of a building on the ground.
6.7. Prolonging a straight line.
6.9. Earth work calculation.
6.10. Distomats
    6.10.1. Distomat DI 1000.

Note: Latest developments and modern techniques on this subject should be followed from time to time.
BUILDING CONSTRUCTION AND MAINTENANCE TECHNICIAN
ENGINEERING MECHANICS
I YEAR
THEORY PAPER-III
(COMMON TO C.T. , BC & MT )

Periods/ Week: 4

PERIODS/ YEAR: 135

TIME SCHEDULE

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<td>Forces and Moments</td>
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Note: Calculators are permitted for Examinations.
Detailed Syllabus:

1.0. Systems of Measurements and Units
   1.1. S.I. and M.K.S. System
   1.2. F.P.S. System
   1.3. Fundamental and Derived units
   1.4. 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
   4.4. Hooke's Law - Young's modulus of elasticity, deformation under axial load
   4.5. Longitudinal and lateral strain - poisson's ratio - Bulk modulus, relationship between elastic constants. (proof not required)

5.0. Columns
   5.1. Effective Lengths for different end conditions.
   5.2. Columns – Long and Short Columns – Comparison.
   5.3. Slenderness ratio of a column – Rectangular, Square, I, Circular Sections.
   5.4. Load carrying capacity by Euler’s and Rankines Formula.- Simple Problems.

6.0. Shear Force and Bending Moment
   6.1. Types of beams - cantilevers, simply supported, over hanging - fixed and continuous beams
   6.2. Calculation of S.F. and B.M. values at different sections for cantilevers, simply supported beams, over hanging beams under point loads and uniformly distributed loads - position and significance of points of contraflexure
   6.3. Relation between rate of loading, S.F. and B.M. - drawing S.F. and B.M. diagrams - Location of points of contraflexure

7.0. Graphic Statics
   7.1. Representation of forces graphically, bows notation
   7.2. Parallelogram law of forces, resultant and equilibrants
   7.3. Graphical Method of determination of centre of gravity for I.L.T Sections
   7.4. 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
## Practical Paper - I

### Time Schedule

<table>
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<td>Solutions</td>
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<td>Titrations</td>
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<td>Instrumental determinations</td>
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<td>Solids</td>
<td>8</td>
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<tr>
<td>6</td>
<td>Study of pipe specials</td>
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<td>7</td>
<td>Layout of typical pipe system in a building</td>
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<tr>
<td>8</td>
<td>Assembling</td>
<td>7</td>
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<tr>
<td>9</td>
<td>Preparation of line sketch of pipe system</td>
<td>5</td>
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<tr>
<td>10</td>
<td>Pipe connections to pumps</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>Tracing leakages of water supply and their repairing</td>
<td>6</td>
</tr>
<tr>
<td>12</td>
<td>Installation of Geysors</td>
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<tr>
<td>13</td>
<td>Pipe connections to handpump in a borewell</td>
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<td>14.</td>
<td>Carpentry</td>
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<td>15.</td>
<td>Fitters</td>
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<td>16.</td>
<td>Smithy</td>
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<td>17.</td>
<td>Electrical Wiring</td>
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<td>18.</td>
<td>Tests on Metals</td>
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<tr>
<td>19.</td>
<td>Field Visits</td>
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Total: 135 periods

### Scheme of Valuation:

- Experiment: 20 Marks
- Presentation: 10 Marks
- Viva: 10 Marks
- Record: 10 Marks

Total: 50 Marks
Detailed Syllabus

1.0. Samples
   1.1. Collection of samples, grab sample, composite sample, sample preservation

2.0. Solution
   2.1. Preparation of normal solutions and standardization

3.0. Titrations

4.0. Instrumental determination
   4.1. Determination of hardness of water surface and ground water
   4.2. Determination of Residual chlorine of water
   4.3. Determination of PH, conductivity, dissolved oxygen using instruments

5.0. Solids
   5.1. Determination of total, total dissolved solids, settle able solids, suspended solids in water
   5.2. Determination of B.O.D. of water

6.0. Pipe specials (study)
   6.1. Coupling, reducer, Elbow, Tee, Union, Cross, plug, ripple bend

7.0. Layout of typical pipe system in a building

8.0. Assembling
   8.1. Pipe cutting, threading with die set
   8.2. Assembling of a length of line with two joints
   8.3. Assembling of a length with one turn and two turns

9.0. Preparation of line sketch of a pipe system
   9.1. Single storeyed building
   9.2. Multi storeyed building

10.0. Pipe connections to pumps
    10.1. Centrifugal pump
    10.2. Jet pumps
    10.3. Submersible Pumps

11.0. Tracing leakages in water supply connections and their repairing
    11.1. Removal of air lock

12.0. Installation of Geysers

13.0. Pipe connections to hand pump in a bore well

14. Carpentry:
    14.1. Use and setting of different tools
    14.2. Surface planning and finishing
    14.3. Making simple joints - Mortise, Tenon, Dovetail etc.
    14.4. Demonstration of wood working machine

15.0. Fitters
    15.1. Use and setting of different tools
    15.2. Marking, chiseling, hack sawing, filing, drilling

16.0. Smithy
    16.1. Use and setting of different hand tools
    16.2. Preparation of jobs involving bending, swaging, use of power hammers
    16.3. Demonstration of Arc and Gas welding, cutting, brazing, soldering

17.0. Electrical Wiring
    17.1. Introduction to Wiring Tools
    17.2. Types of Wires
    17.3. Switches and Switch Boards
    17.4. Lamp Holders
WS&SE Renamed BC&MT

17.5. Ceiling Roses
17.6. Main Switches
17.7. Fuses
17.8. Accessories needed in Conduit Wiring
17.9. Ear thing

**18.0. Tests on Metals**

18.1. Tension test on mild steel
18.2. Tension test on HYSD Bars
18.3. Compression test on Wood

**19.0. Local Field Visits**
**BUILDING CONSTRUCTION AND MAINTENANCE TECHNICIAN**  
**SURVEYING PRACTICE**  
**I YEAR**  
**PRACTICALS PAPER-II**  
**(COMMON TO C.T., BC & MT )**

**TIME SCHEDULE**

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<td>Chain Surveying</td>
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<td>2.</td>
<td>Compass surveying</td>
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<tr>
<td>3.</td>
<td>Levelling</td>
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<td>Theodolite surveying</td>
<td>23</td>
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<td>Total Station and Distomat</td>
<td>25</td>
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<td>6.</td>
<td>Plotting</td>
<td>25</td>
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</tbody>
</table>

**Scheme of Valuation:**

- Experiment: 20 Marks
- Presentation: 10 Marks
- Viva: 10 Marks
- Record: 10 Marks

**Total**: 50 Marks

*Note: Calculators are Permitted for Examinations.*
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. Setting out right angles, by 3,4,5 method
   1.5. Chaining a line involving indirect ranging.
   1.6. Measure of land area / chain triangulation and cross staff methods
   1.7. Chain triangulation around a building covering a small area with other details, taking offsets and recording in the field book.
   1.8. 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. Levelling
   3.1. Study of dumpy level, levelling staff
   3.2. Temporary adjustments of dumpy level
   3.3. Taking out levels of various points and booking in a level field book
   3.4. Differential or fly levelling - reduce levels by H.I. method and rise and fall method
   3.5. Differential levelling involving invert levels - Reduction by H.I. and Rise and fall methods

4.0. Theodolite Surveying
   4.1. Study of Theodolite
   4.2. Measure of Horizontal angle between given lines
   4.3. Measurement of vertical angle
   4.4. Determining distance between two inaccessible points by measuring horizontal angle
   4.5. Determining height of an object by measuring vertical angle

5.0. Total Station & Distomate.
   5.1 Total Station- Parts and the functions – Adjustments of total station for taking observations
   5.2. Measurement of Horizontal Distance, slope distance, difference in Height between two points.
   5.3. Elevation of a point.
   5.4. Horizontal angle and distance between two stations.
   5.5. Setting out right angles at different points on a base line.
   5.6. Setting out plan of a building on the ground.
   5.7. Prolonging a straight line.
   5.8. Area of a closed Traverse.
   5.9. Earth work calculation.
   5.10. Distomats.
   5.10.1. Distomate DI 1000

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.
# BUILDING CONSTRUCTION AND MAINTENANCE TECHNICIAN
## ENGINEERING DRAWING
## I YEAR
### PRACTICAL PAPER - III

**Periods/ Week:** 4  
**Periods/ Year:** 135

## TIME SCHEDULE

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**Scheme of Valuation:**

**Part A:** 5 Questions. Each question carries 2 Marks  
5 x 2 = 10 Marks

**Part B:** 5 Questions. Answer any Three questions.  
Each question carries 10 Marks  
3 x 10 = 30 Marks

**Part C:** Submission of Drawing Sheets and Record  
10 Marks

**Total** = 50 Marks
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, 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

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.
   (iv) Involute, Cycloid and Helix

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. Neat Sketches of only 3 views for describing object
4.8. Concept of Front view, Top view, and Side view, sketching of these views for a number of engineering objects.

5.0. Conversion of Pictorial Views into Orthographic Views
5.1. Meaning of Orthographic projection
5.2. Neat Sketches of three views ( First Angle and Third Angle)

6.0. Isometric Projection
6.1. Definition - Isometric axes, lines and planes
6.2. Isometric Scale - Isometric view
6.3. Drawing of isometric views of plane figures
6.4. Drawing of isometric views of prisms and pyramids
6.5. Drawing of isometric view of cylinders and cones

7.0. Fundamentals of Computer
7.1. Introduction
7.2. Study of Computer Systems
7.3. Identify the various components of a Computer
7.4. Differentiate between Hardware and Software
7.5. State the Configuration of a computer system.
7.6. Open Note pad, Paint and Word pad Programs.
7.7. Practice switching between Windows using the three opened programs.

8.0. MS-OFFICE
   8.1. Introduction to MS-Office and applications.
   8.2. Create a soft copy of the given statistical data using MS-Word / MS-Excel Software.

Note: Latest developments and modern techniques on this subject should be followed from time to time.
## BUILDING CONSTRUCTION AND MAINTENANCE TECHNICIAN
### ENVIRONMENTAL ENGINEERING
#### II YEAR
##### THEORY PAPER - I

**Periods/ Week: 4**

**Periods/ Year: 110**

**TIME SCHEDULE**

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Detailed Syllabus:

1.0. Introduction
1.1. Objects of providing sewerage works
1.2. Definition of terms - Sullage, Sewage, sewer and sewerage
1.3. Classification of sewage
1.4. Systems of sewage disposal
1.5. Types of sewerage systems and their suitability separate, combined and partially separate systems

2.0. Quantity of Sewage
2.1. Quantity of discharge in sewers, dry weather flow, variability flow
2.2. Determination of storm water flow
2.3. Surface drainage - requirements, shapes, laying and construction

3.0. Sewerage systems
3.1. Different shapes of cross section for sewers, circular and noncircular, merits and demerits
3.2. Brief description and choice of types of sewers - stoneware, cast Iron, cement concrete and A.C. pipes
3.3. Laying of Sewers - setting out alignment of a sewer, excavation, checking the gradient, preparation of bedding, handling, lowering, laying and jointing, testing and back filling

4.0. Sewer Appurtenances
4.1. Brief description, location, function and construction of
   4.1.1. Manholes
   4.1.2. Drop Manholes
   4.1.3. Street inlets
   4.1.4. Catch basins
   4.1.5. Flushing tanks
   4.1.6. Regulators
   4.1.7. Inverted siphon
4.2. Necessity of pumping sewage - location and component parts of pumping station

5.0. Sewage Characteristics
5.1. Strength of sewage, sampling of sewage, characteristics of sewage, physical, chemical and biological
5.3. Characteristics of industrial waste water - principles of treatment, reduction of volume, and strength of waste water

6.0. Sewage treatment and disposal
6.1. Preliminary treatment - Brief description and functions of the following units 1. Screens, 2. Skimming tanks and 3. Grit chambers
6.2. Primary treatment - Brief description and functions of plain sedimentation
6.4. Septic tank
6.5. Sewage disposal - dilution, disposal on to lands, groundwater recharge, reuse etc

7.0. Solid Waste Management
7.1. Municipal, Industrial, Hazardous solid wastes, their characteristics, study of solid waste treatment systems - Sources - collection methods - transportation - disposal methods - dumping, sanitary land fill, incineration - composting - preparation

8.0. Drainage and sanitation in Buildings
8.1. Aims of building drainage and its requirements - General layout of Sanitary fittings to a house, drainage arrangements for a single and multi storeyed buildings as per IS code of practice
8.2. Sanitary fittings - traps, water closets, flushing cisterns, urinals, inspection chambers, antisiphonage inspection, testing and maintenance of sanitary fittings
9.0. Rural water supply and sanitation
   9.1. Disinfection of wells
   9.2. Rural Sanitation and sanitary latrines, brief description and operational details of bio-gas plant using cow dung, night soil and agricultural waste

10.0. Air pollution and Ecology
   10.1. Definition - sources of air pollution - effects of air pollution
   10.2. Control of air pollution - methods - air pollution control at source - zoning - installation of control devices and equipment
   10.3. Air pollution control by stacks and vegetation
   10.4. Environment - Biosphere - Atmosphere - Acid rains, Greenhouse effect - Ozone layer depletion
   10.5. Ecology and Ecosystem - Components of Ecosystem flow of matter in an ecosystem

Journals:
1. All leading Journals on Environmental Engineering
2. All leading Journals on Air Pollution
3. All leading Journals on Solid Waste Management
### BUILDING CONSTRUCTION AND MAINTENANCE TECHNICIAN

**BUILDING MATERIALS AND MAINTENANCE**

**II YEAR**

**THEORY PAPER – II**

**Periods/ Week: 4**

**Periods/ Year: 110**

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<td>10</td>
<td>Foundations</td>
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<td>12</td>
<td>Maintenance Problems in Building and their solutions</td>
<td>25</td>
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<td><strong>Total</strong></td>
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<th>New Name</th>
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<tbody>
<tr>
<td>Building Material and Construction</td>
<td>Building Material and Maintenance.</td>
</tr>
</tbody>
</table>
Detailed Syllabus:

1. Stones
   1.1. Classification of rocks
       1.1.1 Geological Classification
       1.1.2 Physical Classification
   1.2. Uses of Stones
   1.3 Requirements of good building stones
   1.4. Characteristics of stones - Granite, Sand Stone, lime Stone and marble
   1.5. Selection of Stones and marble
   1.6. Artificial Stones
   1.7. Introduction of aggregate - grading of aggregates

2. Bricks
   2.1. Definition - Composition of good brick earth – Manufacturing process
   2.2. Classification of bricks
   2.3. Properties of bricks
   2.4. Special types of bricks and their uses
   2.5. Grade of bricks as per B.I.S.

3. Cement
   3.1. Definition - Composition of ordinary portland cement – Functions of cement, ingredients
   3.2. Different types of cements
   3.3. Grades of cement (33, 43 and 53)
   3.4. General Uses of Cement
   3.5. Admixtures - uses
   3.6. Lime as basic ingredient of cement - importance of lime in construction - classification of lime - Fat, Hydraulic and poor lime - modern usage of lime as cement

4. Sand
   4.1. Sources of sand
   4.2. Characteristics of good sand
   4.3. Grading of sand
   4.4. Bulking of sand

5. Mortar
   5.1. Definition - Properties and uses of mortar
   5.2. Types of mortar - Cement, Lime mortar
   5.3. Preparation of cement mortar

6. Concrete
   6.1. Definition - Constituents of concrete and their requirements
   6.2. Uses of Concrete - Types of Concrete
   6.3. Preparation of cement concrete - Hand mixing, Machine mixing and Ready mix concrete
   6.4. Compaction of concrete - Methods
   6.5. Curing of concrete - Methods

7. Timber
   7.1. Common Varieties of Timber
   7.2. Defects in timber - Seasoning of timber
   7.3. Wood based products
   7.4. Characteristics of good timber

8. Miscellaneous building Materials
   8.1. Metals
       8.1.1. Types of metals used in construction - cast iron - steel - Mild steel - Galvanised iron - Aluminium - Copper and Alloys.
       8.1.2. Uses of different types of metals
   8.2. Plastics
8.3. Asbestos - Uses of asbestos
8.4. Adhesives - Uses of Adhesives
8.5. Glass
8.6. Thermocole
8.7. Plaster of Paris
8.9. Wall paper
8.10. P.V.C
8.11. Bitumen and tar
8.12. Fal-G Concrete

9. Types of Buildings
9.1. Classification of building as per NBC
9.2. Component parts of building

10. Foundations
10.1. Definition - Functions of Foundation
10.2. Classification of Soil
10.3. Types of foundations - Shallow and deep
10.4. Bearing capacity of soil
10.5. Requirements of good foundation
10.6. Causes of failures of foundations and remedial measures

11. Masonry
11.2. Brick masonry - Definition - Types of brick masonry – English and Flemish bonds

12. Maintenance Problems in Building and Their Solutions
12.1. Definition – Objectives of Maintenance – Annual and Special
12.2. Dampness in buildings at various locations - causes
12.3. Treatment with standard waterproofing chemicals
12.4. Cracks in walls – causes and preventions
12.5. Types of floors – construction of cement concrete floor, mosaic floor, and marble floor
   12.5.1. Maintenance of floors – Settlement of floors – repairs
   12.5.2. Removal of stains
12.6. Types of Roofs – Pitched roof - flat roof
   12.6.1. Roofs – Leaks of Roofs – causes and repairs
   12.6.2. Spalling of concrete
   12.6.3. Corrosion of Reinforcement – repairs

Note: Latest developments and modern techniques on this subject should be noted from time to time
# Building Construction and Maintenance Technician

## Estimating and Costing

### II Year

**Theory Paper III**

<table>
<thead>
<tr>
<th>Units</th>
<th>No. of Periods</th>
<th>Weightage of Marks</th>
<th>No. of Short Questions</th>
<th>No. of Essay Questions</th>
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<tr>
<td>Introduction</td>
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<tr>
<td>Methods of Building Estimates</td>
<td>30</td>
<td>14</td>
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<td>2</td>
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<tr>
<td>Analysis of Rates</td>
<td>30</td>
<td>18</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Estimation of Open drains and roads</td>
<td>15</td>
<td>12</td>
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<tr>
<td>Estimation of Public</td>
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<td><strong>68</strong></td>
<td><strong>10</strong></td>
<td><strong>8</strong></td>
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</tbody>
</table>

**NOTE:** Calculators are permitted for Examinations.
Detailed Syllabus:

1.0. Introduction
1.1. Definition – Purpose – Data required for estimation
1.2. Types of estimates
   1.2.1. Detailed Estimate - Abstract estimate - Definitions - formats for detailed and abstract estimates
   1.2.2. Preliminary estimate or Approximate estimate - plinth area estimate - cubic rate estimate
1.3. Units of measurement of various Items of work as per IS Code 1200

2.0. Methods of Building Estimates
2.1. Preparation of detailed estimates of building using centre line method/long wall - short wall method
   a) Single room building
   b) Single room with varandah
   c) Two rooms building
   d) Two rooms building with Varandah
   e) Single bedroom house including with RCC staircase
   f) Double bedroom house including with RCC staircase
   g) Compound wall and steps

3.0. Analysis of Rates
3.1. Definition – data required
3.2. Factors effecting Rate Analysis
3.3. Cost of material at source and at site
3.4. Standard Schedule of Rates (SSR) of different materials
3.5. Types of Labour - Wages as per SSR
3.6. Lead and lift - preparation of lead statement
3.7. Preparation of unit rates for finished items of works using standard data & SSR
3.8. Methods of calculating quantities of ingredients of various proportions of cement concrete

4.0. Estimation of Open Drains and Roads
4.1. Estimation of open drain in rural area
4.2. Estimation of earthwork by trapeziodal Rule
4.3. Estimation of earthwork by prismoidal method
4.4. Estimation of roads (abstract estimates) of
   a) Water bound Macadam Road
   b) Cement Concrete Road

5.0. Estimation of public health engineering works
5.1. Preparation of detailed estimates of
   a) Septic tank
   b) Estimation of quantity of sanitary pipes and pipe specials and fittings for a building from the plan of the building

Note: Latest developments on this subject should be followed from time to time
## BUILDING CONSTRUCTION AND MAINTENANCE TECHNICIAN

### CIVIL ENGINEERING LABORATORY 2

#### II YEAR

**PRACTICALS PAPER I**

**Periods/ Week:** 4  
**Periods/ Year:** 115

### TIME SCHEDULE

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Major Units</th>
<th>No. of Periods</th>
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<tbody>
<tr>
<td>1.</td>
<td>Construction of Brick Bonds</td>
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<tr>
<td>2.</td>
<td>Construction of Stone Masonry</td>
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<tr>
<td>3.</td>
<td>Water absorption test for bricks</td>
<td>4</td>
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<tr>
<td>4.</td>
<td>Fineness modulus of aggregates Sieve Analysis</td>
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<tr>
<td>5.</td>
<td>Bulking of sand</td>
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<tr>
<td>6.</td>
<td>Standard Proctor compaction test</td>
<td>4</td>
</tr>
<tr>
<td>7.</td>
<td>Initial setting of cement</td>
<td>4</td>
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<tr>
<td>8.</td>
<td>Slump Test</td>
<td>4</td>
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<tr>
<td>9.</td>
<td>Consistency of Cement</td>
<td>4</td>
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<tr>
<td>10.</td>
<td>Layout of stone ware pipes from water closet to septic tank</td>
<td>8</td>
</tr>
<tr>
<td>11.</td>
<td>Collecting of waste water samples</td>
<td>5</td>
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<tr>
<td>12.</td>
<td>Study of plumbing tools</td>
<td>8</td>
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<tr>
<td>13.</td>
<td>Layout of Cold Water Distribution</td>
<td>8</td>
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<tr>
<td>14.</td>
<td>Layout of Hot Water Supply in a residential building</td>
<td>8</td>
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<tr>
<td>15.</td>
<td>Layout of sanitation system in a building</td>
<td>8</td>
</tr>
<tr>
<td>16.</td>
<td>Preparation of Electrical diagrams for a building</td>
<td>15</td>
</tr>
<tr>
<td>17.</td>
<td>Rainwater harvesting plan, section</td>
<td>8</td>
</tr>
<tr>
<td>18.</td>
<td>Observation of solid waste schemes, sanitary land fills, Composting plants, by local visit</td>
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**Total** 115

### Scheme of Valuation:

<table>
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<tr>
<th>Description</th>
<th>Marks</th>
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<tbody>
<tr>
<td>Experiment</td>
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<tr>
<td>Presentation</td>
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<tr>
<td>Viva</td>
<td>10</td>
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<tr>
<td>Record</td>
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</table>

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Intermediate Education

WS&SE Renamed BC&MT
**Detailed Syllabus:**

1. Construction of Brick Bonds
2. Construction of Stone Masonry
3. Water absorption test for bricks
4. Fineness modulus of aggregates - Sieve Analysis
5. Bulking of sand
6. Standard Proctor compaction test
7. Initial setting of cement
8. Slump Test
9. Consistency of Cement
10. Layout of stone ware pipes from water closet to septic tank using pipe specials
11. Collecting of waste water samples - grab and composite
12. Study of plumbing materials and tools with sketches.
13. Preparing a layout showing the coldwater distribution for a high rate building indicating the components
14. Preparing a layout for hot water supply in a residential building indicating the appliances, their insulation by following systems
   a) Direct system b) Indirect system
   Using electric water heater, gas heater and solar water heater.
15. Preparing a layout of sanitation system in a building using the following systems
   a) fully vented one pipe system
   b) fully vented two pipe system
   c) single stack system
   d) partially ventilated single stack system
16. Prepare electrical distribution diagram for the following
   a) Schematic diagram main switch board
   b) layout drawing of main switch board panel
   c) Electrical Connections for centrifugal pump
17. Preparation of plans and sections of rain water harvesting structures by percolation pit method and connecting to service wells
18. Observation of solid waste schemes, sanitary land fills, composting plants, by local visit.

**Journals:**

All leading Civil Engineering Journals should be followed with respect to concerned subjects.
BUILDING CONSTRUCTION AND MAINTENANCE TECHNICIAN
CIVIL ENGINEERING DRAWING
II YEAR
PRACTICALS PAPER – II

Periods/ Week: 4        Periods/ Year: 115

TIME SCHEDULE

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<th>No. of Periods</th>
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<tbody>
<tr>
<td>1.</td>
<td>Conventional Signs, Doors, windows, footings, single wall</td>
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<tr>
<td>2.</td>
<td>Building Drawing</td>
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<tr>
<td>3.</td>
<td>Detailed drawings of water supply and drainage connections to building</td>
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<td>4.</td>
<td>Layout of various water supply and sanitary fittings in bath and W.C</td>
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<tr>
<td>5.</td>
<td>Overhead tank</td>
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<tr>
<td>6.</td>
<td>Septic tank, manhole</td>
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<tr>
<td>7.</td>
<td>Reinforcement details of single room, double room building</td>
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Scheme of Valuation:

Part – A: 2 questions – each question carries 5 marks: 2X5 = 10

Part-B: 4 questions – Answer any two questions, each question carries 15 marks 2X15=30.

Part-C: Drawings & Submissions 10 marks.

Total Marks : 50
Detailed Syllabus

1. Conventional signs
   1.1. Conventional signs used in civil engineering
   1.2. Doors
      1.2.1. Panelled door
      1.2.2. Glass door
   1.3. Windows
      1.3.1. Panelled window
      1.3.2. Glazed window
   1.4. Footings
      1.4.1. Square footing
      1.4.2. Rectangular footing
   1.5. Plan and section of single wall

2. Building Drawing
   2.1. Preparation of plan, elevation and section of
      2.1.1. Single room house
      2.1.2. Two rooms house
      2.1.3. Single bedroom house
      2.1.4. Double bedroom house
      2.1.5. Two storied building
      2.1.6. Stair case

3. Detailed drawings of water supply and drainage connections to building
   3.1. Showing the position of various fittings like manhole, gully trap, etc.

4. Layout of various water supply and sanitary connections in
   4.1. Bathroom
   4.2. Water closet

5. Overhead tank
   5.1. Detailed drawing of overhead tank with complete pipe system

6. Pipe connections to
   6.1. Septic tank
   6.2. Manhole

7. Reinforcement Details of Single Room, Double Room Building

Note: Latest developments and modern techniques on this subject should be followed from time to time
**BUILDING CONSTRUCTION AND MAINTENANCE TECHNICIAN**  
**CAD LAB**  
**II YEAR**  
**PRACTICALS PAPER - III**

**TIME SCHEDULE**

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<td>Introduction to Computer Aided Drawing</td>
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<tr>
<td>2.</td>
<td>Practice on Auto Cad</td>
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<tr>
<td>3.</td>
<td>Preparation of Drawings using CAD Software</td>
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<tr>
<td>5.</td>
<td>Exercises on MS-Word, MS-Excel</td>
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**Total**  
115

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<table>
<thead>
<tr>
<th>Old Name</th>
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<tbody>
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<td>Computer Lab</td>
<td>CAD Lab.</td>
</tr>
</tbody>
</table>

WS&SE Renamed BC&MT

Intermediate Education

Periods/ Week: 4  
Periods/ Year: 115
Detailed Syllabus

1. **Introduction to Computer Aided Drafting**
   1.1 definition of CAD
   1.2 application of CAD
   1.3 advantages of CAD

2. **Practice on AutoCAD**
   2.1 Study of Drawing Editor Screen
   2.2 List out methods to access AutoCAD Commands
   2.3 Draw the given geometrical figures, using draw commands
   2.4 Practice on different commands like draw, dimensioning, modify, construct, edit, view, hatch, insert commands

3. **Preparation of drawing using CAD software**
   3.1 draw conventional signs as per I.S standards symbols used in civil engineering drawing
   3.2 draw the joinery components like, elevation of fully paneled door and window
   3.3 preparation of building drawings prepare plan, section and elevation of two bed roomed residential building with roof then given line diagram and specifications

4. **Prepare layout of electrical, water supply and sanitary lines, in a residential building on number of layers**
   4.1 preparation of approval drawing to be submitted to corporation or municipality showing required details in one sheet such as
   4.1.1 site plan with set backs
   4.1.2 key plan
   4.1.3 plan, section & elevation
   4.1.4 title block showing joinery details and typical foundation details

5. **Exercises on MS-Word, MS-Excel**
   5.1 Prepare a document Report using MS-Word properly formatted with tables for test reports of sieve analysis
   5.2 Prepare a comparative statement for purchase of materials and equipment using MS-Word/MS-Excel software
   5.3 Prepare a lead statement, data sheet of abstract estimation for RR masonry in foundation or beams

**Evaluation of Practical Examination**

1. Preparation of Electronic drawing sheet - 10 marks
2. Setting limits - 5 marks
3. Drawing - 10 marks
4. Dimensioning, text title block - 5 marks
5. Vivavoice - 10 marks
6. Submission of records - 10 marks

Total 50 marks
List of Equipment
1. Chemicals and glassware
2. Jar test apparatus
3. Chlorine comparator kit i.e. chloroscope
4. PH meter
5. Conductivity meter
6. D.O. meter
7. Muffle furnace 10 x 10 x 20 cm - up to 9000C
8. Desicator
9. Reflux assembly
10. Computer with peripherals
11. Software
   — MS Office [MS Excel, MS Word, Access, Power Point]
   — Auto CAD release 2002
12. Pipe specials
13. G.I. pipe 1/2" diameter — 5 lengths
14. Die set, Pipe wrench, Bench vice, spanner set etc
15. Centrifugal pump — 0.5 H.P.
16. Jet pump — 0.5 H.P.
17. Borewell hand pump
18. Theodolite
19. Plane Table
20. Carpentry tools
21. Fitter tools
22. Smithy tools
23. Foundry tools
24. Drawing table with drawing boards.
25. T.Square/Mini drafter
27. Set Square set,
28. Compass set
29. Plumb bob cross staff
30. Tapes
31. Spirit level
32. Bar bending bench
33. Bar bending tools (complete set with different diameters)
34. Survey chain (30 meters)
35. Dumpy level with stand
36. Cross staff
37. Theodolite with stand
38. Plane table with stand
39. Helmets
40. Gum boots
41. 1mt x 1 mt x 0.01 nt (Mixing tray)
42. Weighing balance
43. Trowels
44. Cement Concrete cube moulds
45. Slump cone apparatus.
46. Compressive testing Machine (100 tonnes capacity)
47. 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
48. Sieve Shaker for coarse aggregate. (30 cm Dia)
49. Vicat apparatus
50. I.S. Testsieve - sieve No. 90 Microns
51. Weighing Balance (wt. 50 gm - to 5 kgs)
52. Fractional weight Box
53. Table Vibrator
54. Needle vibrator
55. Drawing Models
56. Drawing Model with sections.
57. Electric Oven
58. Universal testing machine
59. Shear tool assembly
60. Rockwell hardness Testing Machine
61. Brinell Hardness Testing Machine (TKB - 3000 Model)
62. Brinell Microscope with light arrangement
63. Impact testing machine (Izod, Charpy)
64. 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. For all Practical subjects Field visits should be there as per the syllabus (according to Vocational Pattern)
6. Scientific Calculators are allowed for these course students in the public examinations.

a) Collaboration Institutions for Curriculum transaction
1. Panchayat Raj Department
2. Municipalities
3. Metro Water Works and Sewerage Board
4. Municipal Corporation
5. Public Health Department
6. Effluent treatment plants/industries
7. Roads and Buildings Department
8. Irrigation Department etc.,
9. Transportation Department etc.

b) On the Job Training Centers:
1. Local Water Supply (protected) authority
2. Sewage Board or local bodies managing sewage
3. Pollution Control Board, Pollution related activities etc.,
4. Sanitation – Municipal Corporation / Municipalities / Gram Panchayats
5. All activities/works, related to Transportation Engineering, etc., (Highways, Railways, Air ways, Water ways)
6. All activities / works related to Solid Waste Management
7. Concrete Materials Manufacturing Units like Tiles/ Bricks industries / precast units / cement industries
8. Survey of India and survey camps
9. Environment Pollution Training Research Institute (EPTRI, Gachibowli)
10. All works related to civil Engineering field
Evaluation:
1. Project work
2. Seminar on the Project
3. Viva – voce

IX. TEACHING STAFF & QUALIFICATIONS

Qualifications for Teaching staff:

Must possess a Second class Graduation in B.E. Civil or AMIE in Civil or an qualification of university of India established or incorporated by or under Central Act, State Act or provincial Act or Institution recognized by the University Grants Commission.

(GoMs.No.12, Higher Education (Intermediate Education.2) Department, dated 15.02.2001)

Equivalency:
In the new curriculum 2012 there is no equivalency paper to any paper. Hence the old syllabi students will be given two chances to clear their backlogs (i.e. March & ASE 2013) for I year and (March & ASE 2014) for II year.

X. Vertical Mobility
Passouts of this course may continue education in the following courses

a) On Completion of Bridge Course:
1. B.E. / B.Tech through EAMCET
2. Diploma in Civil Engineering
3. A.M.I.E.
4. B.Sc. (Mathematics) etc.,

b) Without Bridge Course
Reference Books:

1. Public Health Engineering Practice Volume I&II - L.B. Escrit

2. Environmental Engineering
   Water Supply & Sanitary Engineering — G.S.Birdie
   Water Supply & Sanitary Engineering — Rangwala
   Waste Water treatment & Disposal — Medcalf & Graw
   Water Supply Engineering — Santosh Kumar Garg
   Sewage Disposal and Air Pollution Engineering — S.K. Garg
   Plumbing Designes & Practice — S.G.Deolalikar
   Water Treatment & Sanitation — Simple Methods for Rural areas
      - H.P.Mann & D. Williamson
   Water supply & Sewarage — E.W.Steel
   Water Supply & Waste Water Disposal
      — W.A.Hardenbergh & E.R.Rodie
   Water Supply & Waste Water Disposal
      — G.M. Fair, J.C.Geyar & Oken
   Environmental Lab Manual — Shivaji Rao
   Solid Waste Management — Shivaji Rao
   Environmental Engineering — Balijeet Kapoor
   Environmental Engineering — Ramachandraiah
   Water Supply and Sanitary Engineering — V.N. Vazirani
   Water Supply and Sanitary Engineering — Duggal
   Hydraulicks BY --- Bansal

3. Building Materials
   Building Materials — Rangala
   Construction Materials — G.J. Kulkarni
   Building & Components — A. Komar, Mir Publication
   Engineering Materials — Punmia
   A text book of Building Construction — R.S. Desh Pande
   A text book of Building Construction — Rangwala
   A text book of Building Construction — Sushil Kumar

4. Surveying:
   Survey I and II — B.C. Punmia
   Surveying and levelling — T.P. Kanetkar
   Surveying and levelling — S.K. Hussain and Nagaraj
   Surveying and levelling — A. Kamala.
   Plane & Geodedic Surveying — David Clark
   Surveying — Norman Thomas
   Surveying — Higgins
   Course Material on Modern Survey By— NITTTR--Chennai

5. Engineering Mechanics:
   Engineering Mechanics — R.S. Kurmi
   Engineering Mechanics — N. Srinivasulu
   Engineering Mechanics — A. Kamala & AVRT Sharna
   Engineering Mechanics — Ramamrutham
   Engineering Mechanics — Prasad
   Engineering Mechanics — G. Venkateswar Rao
   Engineering Mechanics Statics — Dayarathnam
   Engineering Mechanics — Punmia

6. Engineering Drawing:
   Engineering drawing — N.D. Bhatt
Engineering drawing — B.R. Gupta
Engineering drawing — Srinivasulu
Engineering drawing — Gurucharan Singh
Engineering drawing — Gopala Krishna

7. Estimating and Costing :
Estimating and Costing — B.N Dutta
Estimating and Costing — Birdie
Quantity surveying — A.K. Kamala
Quantity Surveying (Estimating & Costing) — P.L. Bhasin
Estimating & Costing — Subramanyam

8. Civil Engineering Drawing :
Civil Engineering Drawing I and II — A. Kamala
Civil Engineering Drawing 'A' Series — V.V.S. Murthy
Civil Engineering Drawing — B.P. Vermon
Principles of Building Drawing — M.G. Shah & C.M. Kale
Design of Houses (Low, middle and upper income group)
— A Sahu Cement Service Publication
National Building Code

9. Computers:
Computer Science — E. Balaguru Swamy & B. Sushila
M.S. Office — Ron Mansfield, BPB Publisher
Inside Auto CAD — Raiter
Auto CAD — David Frey, BPB Publications
Deepak Bharihoke, Fundamentals of Information Technology,
Excel Books, New Delhi, 2000
Leon & Leon, Fundamentals of Information Technology, Vikas
Curtain, Dennis P, Foley, Kim. Sen. Kunal & Morin and Cthleen,
Information Technology, the Breaking Wave, Tata Mc. Graw Hill
Leon & Leon, Introduction to computers with MS-Office 2000,
Tata MC Graw Hills Publishing House, New Delhi, 2002
Sanjay Saxena, A First course in computers, Vikas Publishing
Computer Application in Civil Engineering By--- NITTTR -- Chennai

SOME IMPORTANT INDIAN STANDARD CODE OF PRACTICE
BOOKS ON CIVIL ENGINEERING:
SP35 (S & T) 1987; Hand book on Water Supply and Drainage
with special emphasis on Plumbing by Bureau of Indian
Standards
IS 2065 : 1983 code of practice for water supply in buildings by
BIS
IS 12183 (Part-I) : 1987 code of Practice for plumbing in Multi
storeyed buildings by BIS
IS 7558 : 1974 Code of practice for Domestic Hot Water
Installations by BIS
SP7 - 1983 National Building Code of India (Part IX - Plumbing
Services) by BIS
Solar Water Heater (Central Building Research Institute, Roorkee,
U.P. 1965) by M.L. Gupta and B.C Srivastava
BUILDING CONSTRUCTION AND MAINTENANCE TECHNICIAN
WATER SUPPLY ENGINEERING
1 YEAR
THEORY PAPER-I

TIME: 3 HOURS        MAX MARKS: 50

SECTION-A
NOTE: ANSWER ALL QUESTIONS
EACH QUESTION CARRIES 2 MARKS

01. What is meant by wholesome water?
02. What are the impurities present in water?
03. define sedimentation
04. define break point chlorination
05. Write different types of pipes used in water supply?
06. Name the types of pumps?
07. What is meant by scour valve?
08. What are the types of storage tanks?
09. What is meant by rain water harvesting?
10. Define specific weight and specific gravity of water?

SECTION - B
5X6=30

NOTE: ANSWER ANY 5 QUESTIONS
EACH QUESTION CARRIES 6 MARKS

11. What are the different methods of forecasting the population and explain them?
12. differentiate between infiltration gallery and infiltration wells
13. explain the following briefly
   A. BOD
   B. PH value of water
14. Draw treatment unit flow diagram and label the names?
15. What are the requirements of good distribution system?
16. draw sketches of the following
   A. fire hydrant
   B. reflex valve
17. Draw the typical layout of plumbing system in a residential building?
18. What are the pressure measuring instruments and draw sketches?
MODEL QUESTION PAPER

BUILDING CONSTRUCTION AND MAINTENANCE TECHNICIAN
SURVEYING(THEORY)COMMON TO CT, BC & MT
1ST YEAR
THEORY PAPER – II

TIME: 3 HOURS        MAX MARKS: 50

SECTION – A

10X2=20
NOTE: ANSWER ALL QUESTIONS
EACH QUESTION CARRIES 2 MARKS

1. Write purpose of surveying.
2. Write obstacles in chain surveying.
3. Define local attraction.
4. Convert the following W.C.B into R.B
   A. 135 degrees 30 minutes
   B. 210 degrees 15 minutes
5. Write the types of leveling instruments.
6. Define back sight and fore sight.
7. Define face left and face right observations.
8. Write the sketch showing 104 degrees 20 minutes 30 seconds in combination of main and verniear
   scale of theodolite
9. Write any four component parts of a total station.
10. Define distomat.

SECTION – B

5X6=30
NOTE: ANSWER ANY 5 QUESTIONS
EACH QUESTION CARRIES 6 MARKS

11. Explain the direct method of chaining on sloping ground.
12. The following offsets were taken from a chain line to a hedge
   Distance in mt 0 20 40 60 80 100 120
   12 10 8 6 4 5 7 calculate the area in sq.m enclosed by the
chain line, the hedge and the end offsets by Simpson’s rule
13. Draw a neat sketch of a prismatic compass and label the parts.
14. Determine the values of included angles in a closed compass traverse ABCD, conducted in the
   clockwise direction given the following fore bearing of the respective lines.
   Line fore bearing
   AB 40 degrees
   BC 70 degrees
   CD 210 degrees
   DA 280 degrees apply check
15. Write and explain about the temporary adjustments of a dumpy level.
16. The following consecutive readings were taken with a dumpy level
   1.895, 1.5, 1.856, 2.57, 2.99, 2.02, 2.41, 2.52 and 2.96 the level was shifted after fourth, and sixth
   readings. The RL of the first point was 100.00 m. Rule out a page of a level book and apply the
   usual checks.
17. Explain determination of horizontal angle by repetition method in theodolite
18. Explain the procedure measuring horizontal distance by using total station.
MODEL QUESTION PAPER
BUILDING CONSTRUCTION AND MAINTENANCE TECHNICIAN
ENGINEERING MECHNICS COMMON TO CT, BC & MT
1 YEAR
THEORY PAPER - III

TIME: 3 HOURS MAX MARKS:50

SECTION – A

10X2=20

NOTE: ANSWER ALL QUESTIONS
EACH QUESTION CARRIES 2 MARKS

01. Define derived units.
02. Define vector and give examples.
03. Write the characteristics of force.
04. Define triangular law of force.
05. Draw a position of a centroid for the following
   A. Triangle
   B. Trapezoidal
06. State the hooks law.
07. Define shear modulus.
08. Define long column
09. Write types beams.
10. Define bending moment and shear force.

SECTION – B

5X6=30

NOTE: ANSWER ANY 5 QUESTIONS
EACH QUESTION CARRIES 6 MARKS

11. A). EXPLAIN LAW OF PARALLELOGRAM OF FORCES WITH NEAT SKETCHES.
    B). Two forces 30 km and 20 km acting at 60 degrees to each other. Calculate the resultant of
    forces.
12. Determine the position of centroid of an “i” section of top flange 120mm x 20mm
    Web 20mm x 90mm
    bottom flange 110mm x 20mm
13. Find the moment of inertia of a given “t” section about xx axis passing through centroid. Flange
    110mm x 15mm
    Web20mm x 120mm
14. A circular bar 10mm diameter, 300mm long was tested in tension. The increase in its length was
    found to be 1.5mm while the decrease in its diameter was 0.03mm. Calculate the longitudinal
    strain, lateral strain, poission’s ratio.
15. A steel rod 20mm dia is subjected to a pull of 3kn, what are the longitudinal and transverse strains
    if e is 21x10 to the power of 4 n/mmsq. And poisson’s ratio is 0.3
17. A cantilever beam of span 5mt having point loads 10kn, 15kn at free end and 2mt from fixed end.
    And also udl of 2kn/m acting 2mt from free end. Draw shears force and bmd. The sketch is shown.
18. A simple supported beam 4mt-span is subjects to a point loads 10kn, 20kn and 30kn at 1mt, 2mt and 3mt from left hand support. Draw shear force bending moment. The sketch is shown.

ENVIRONMENTAL ENGINEERING
SECOND YEAR
THEORY PAPER – I

TIME:3 HOURS MAX MARKS: 50

SECTION – A 10X2=20

NOTE: ANSWER ALL QUESTIONS

EACH QUESTION CARRIES 2 MARKS

1. Define term sewage and sewerage.
2. Define storm water flow.
3. Draw a neat sketch of egg shaped sewer.
4. Define catch basin and inverted siphon.
5. What are the functions of skimming tank?
6. What is meant by incineration?
7. Draw a neat sketch of s-type trap.
8. Explain the term anti syphonage.
10. What are the uses of biogas plant?

SECTION – B 5X6=30

NOTE: ANSWER ANY 5 QUESTIONS

EACH QUESTION CARRIES 6 MARKS

11. Explain the combined system and separate system of sewage disposal.
12. What is necessity of plumbing of sewage?
13. What are the characteristics of industrial waste water?
14. Explain the working of trickling filter with neat sketch.
15. Explain the functions and working of sedimentation tank.
16. Explain the collection methods of municipal solid waste.
17. Write the short notes
   A. Sanitary landfill
   B. Composting of solid waste
18. What are the sources and effects of air pollution?
BUILDING MATERIALS AND MAINTENANCE
SECOND YEAR
THEORY PAPER – II

TIME : 3 HOURS       MAX MARKS: 50

SECTION – A

NOTE: ANSWER ALL QUESTIONS

EACH QUESTION CARRIES 2 MARKS 10X2=20

1. State the classification of bricks.
2. State the composition of brick earth.
3. What are basic ingredients of good cement?
4. Define bulking of sand.
5. What are properties of good cement mortar?
6. State the uses of cement concrete.
7. List out the metals used in building construction.
8. Write the component parts of building.
10. Write the parts of roofs.

SECTION – B

NOTE: ANSWER ANY 5 QUESTIONS

EACH QUESTION CARRIES 6 MARKS 5X6=30

11. State the characteristics of good building stones.
12. Explain the different types of cement and their uses.
13. What are the different methods of compaction of concrete and explain?
14. Write short notes on
    A. Defects in timber
    B. Seasoning of timber
15. Explain the following briefly
    A. Useses of asbestos
    B. Types of glass
16. Differentiate between shallow foundation and deep foundation.
17. Write short notes
    A. Dampness in building
    B. Spalling of concrete
18. Give the reasons for settlement of flows and the repairs, explain
ESTIMATING AND COSTING
SECOND YEAR
THEORY PAPER – III

TIME: 3 HOURS MAX MARKS: 50

SECTION - A
NOTE: ANSWER ALL QUESTIONS
EACH QUESTION CARRIES 2 MARKS 10X2=20

1. Write units for following
   A. Earth work excavation
   B. Plastering
2. What are methods preparing building estimate?
3. Define rate analysis.
4. Define lead and lift.
5. Calculate the weight of ms bar of length 8 meters and 13mm diameter?
6. List out the component parts of WBM road.
7. Name the types of roads.
8. Draw any two cross sections of surface drainage.
9. List out the items of works in water supply schemes?
10. Write the formula of earth work calculations?

SECTION – B
NOTE: ANSWER ANY 5 QUESTIONS 5X6=30
EACH QUESTION CARRIES 6 MARKS

11. Explain the following
    A. Revised estimate
    B. Plinth area estimate
12. Calculate the quantities of following figure shown – 1
    A. Earth work excavation
    B. Brick masonry
13. Calculate the quantities of following figure shown – 2
    A. Plastering
    B. RCC slab
14. Calculate the material required for 10 cum of 1:4:8 cement concrete
15. Calculate unit rate of brick masonry with first class bricks 20x10x10 cm in 1:6 cement mortar
    Note: assume suitable data
16. Calculate the following quantities of 100 mt length surface drain cross section shown in figure – 3
    A. C.C.bed
    B. Stone masonry
17. Draw neat sketch of septic tank and label parts.
18. List out the fittings and pipe specials required for a residential building
MODEL PRACTICAL EXAMINATION QUESTION PAPER
COMMON TO (CT, BC & MT COURSES)
1ST & 2ND YEAR EXCEPT DRAWING

TIME: 3 HOURS  MAX MARKS: 50

PART – A

Note: ONE QUESTION ALLOTTED BY LOT

Experiment  Marks: 20
Presentation  Marks: 10

Part – B

Viva – voice  Marks: 10

PART – C

Record  Marks: 10
List of Participants:

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4. K. Prasad,  
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   Andhra Pradesh,  
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