

## Math-212 APPLIED MATHEMATICS-II

Total Contact Hours		T	P	C
Theory	64 hours	2	0	2

**Pre-requisite:-** Must have completed Mathematics I.

**AIMS:** After completing the course the students will be able to;

1. Solve problems of Calculus and Analytic Geometry.
2. Develop mathematical skill, attitudes and logical perception in the use of mathematical instruments.
3. Apply principles of Differential Calculus to work out rate measures, velocity, acceleration, maxima & minima values
4. Use Principles of Integral Calculus to compute areas and volumes.
5. Acquire proficiency in solving technological problems with mathematical clarity and insight.

### COURSE CONTENTS

- 1. Functions & Limits** **4 Hours**
  - 1.1 Constant & Variable Quantities
  - 1.2 Functions & their classification
  - 1.3 The concept of Limit
  - 1.4 Limit of a Function
  - 1.5 Fundamental Theorems on Limit
  - 1.6 Some important Limits
  - 1.7 Problems
- 2. Differentiation** **4 Hours**
  - 2.1 Increments
  - 2.2 Differential Coefficient or Derivative
  - 2.3 Differentiation ab-initio or by first Principle
  - 2.4 Geometrical Interpretation of Differential Coefficient
  - 2.5 Differential Coefficient of  $X^n$ ,  $(ax + b)^n$
  - 2.6 Three important rules
  - 2.7 Problems
- 3. Differentiation of Algebraic Functions** **4 Hours**
  - 3.1 Explicit Functions
  - 3.2 Implicit Functions
  - 3.3 Parametric forms
  - 3.4 Problems

<b>4. Differentiation of Trigonometric Functions</b>	<b>4 Hours</b>
4.1 Differential Coefficient of Sin x, Cos x, Tan x from first principle.	
4.2 Differential Coefficient of Cosec x, Sec x, Cot x	
4.3 Differentiation of inverse Trigonometric functions.	
4.4 Problems.	
<b>5. Differentiation of Logarithmic and Exponential Functions</b>	<b>4 Hours</b>
5.1 Differentiation of ln x	
5.2 Differentiation of Log a <sup>x</sup>	
5.3 Differentiation of a <sup>x</sup>	
5.4 Differentiation of e <sup>x</sup>	
5.5 Problems	
<b>6. Rate of Change of Variable</b>	<b>4 Hours</b>
6.1 Increasing and decreasing functions	
6.2 Maxima and Minima values	
6.3 Criteria for maximum & minimum values	
6.4 Methods of finding maxima & minima	
6.5 Problems	
<b>7. Integration</b>	<b>8 Hours</b>
7.1 Concept	
7.2 Fundamental Formulas	
7.3 Important Rules	
7.4 Problems	
<b>8. Methods of Integration</b>	<b>6 Hours</b>
8.1 Integration by substitution	
8.2 Integration by parts	
8.3 Problems	
<b>9. Definite Integrals</b>	<b>6 Hours</b>
9.1 Properties	
9.2 Application to area	
9.3 Problems	
<b>10. Plane Analytic Geometry and Straight Line</b>	<b>6 Hours</b>
10.1 Coordinate System	
10.2 Distance Formula	
10.3 The Ratio Formulas	
10.4 Inclination and slope of a line	
10.5 The slope Formula	
10.6 Problems	
<b>11. Equations of The Straight Line</b>	<b>6 Hours</b>
11.1 Some important Forms	
11.2 General Form	

- 11.3 Angle Formula
- 11.4 Parallelism & Perpendicularity
- 11.5 Problems

## **12. The Equations Of The Circle**

**8 Hours**

- 12.1 Standard form of Equation
- 12.2 Central form of Equation
- 12.3 General form of Equation
- 12.4 Radius & Coordinates of the centre
- 12.5 Problems

### **REFERENCE BOOKS**

1. Thomas Finny - Calculus and Analytic Geometry
2. Ghulam Yasin Minhas - Technical Mathematics Vol - II, Ilmi Kitab Khana, Lahore.
3. Prof. Riaz Ali Khan - Polytechnic Mathematic Series Vol I & II, Majeed Sons, Faisalabad
4. Prof. Sana Ullah Bhatti - Calculus and Analytic Geometry, Punjab Text Book Board, Lahore.

## Math-212 APPLIED MATHEMATICS-II

### INSTRUCTIONAL OBJECTIVES

- 1. Use The Concept Of Functions And Their Limits In Solving Simple Problems**
  - 1.1 Define a function.
  - 1.2 List all types of functions.
  - 1.3 Explain the concept of limit and limit of a function.
  - 1.4 Explain fundamental theorems on limits.
  - 1.5 Derive some important limits.
  - 1.6 Solve simple problems on limits.
  
- 2. Understand The Concept Of Differential Coefficient**
  - 2.1 Derive mathematical expression for a differential Coefficient.
  - 2.2 Explain geometrical interpretation of differential Coefficient.
  - 2.3 Differentiate a constant, a constant associated with a variable and the sum of finite number of functions.
  - 2.4 Solve related problems.
  
- 3. Use Rules Of Differentiation To Solve Problems Of Algebraic Functions**
  - 3.1 Differentiate ab-initio  $x^n$  and  $(ax+b)^n$ .
  - 3.2 Derive product, quotient and chain rules.
  - 3.3 Find derivatives of implicit functions & explicit functions
  - 3.4 Differentiate parametric forms, functions w.r.t another function and by rationalization.
  - 3.5 Solve problems using these formulas.
  
- 4. Use Rules Of Differentiation To Solve Problems Involving Trigonometric Functions**
  - 4.1 Differentiate from first principle  $\sin x$ ,  $\cos x$ ,  $\tan x$ .
  - 4.2 Derive formulas for derivation of  $\sec x$ ,  $\operatorname{cosec} x$ ,  $\cot x$ .
  - 4.3 Find differential coefficients of inverse trigonometric functions.
  
- 5. Use Rules Of Differentiation To Logarithmic And Exponential Functions**
  - 5.1 Derive formulas for differential coefficient of logarithmic and exponential functions.
  - 5.2 Solve problems using these formulas.
  
- 6. Understand Rate Of Change Of One Variable With Respect To Another**
  - 6.1 Write expression for velocity, acceleration and slope of a line.
  - 6.2 Define an increasing and a decreasing function, maxima and minima values, point of inflexion.
  - 6.3 Explain criteria for maxima and minima values of a function.
  - 6.4 Solve problems involving rate of change of variables.

## **7. Apply Concept Of Integration In Solving Technological Problems**

- 7.1 Explain the concept of integration.
- 7.2 Write basic theorems of integration.
- 7.3 List some important rules of integration.
- 7.4 Derive fundamental formulas of integration.
- 7.5 Solve problems based on these formulas/rules.

## **8. Understand Different Methods Of Integration**

- 8.1 List standard formulas.
- 8.2 Integrate a function by substitution method.
- 8.3 Find integrals by the method of integration by parts.
- 8.4 Solve problems using these methods.

## **9. Understand The Methods Of Solving Definite Integrals**

- 9.1 Define definite integral.
- 9.2 List properties of definite integrals using definite integrals.
- 9.3 Find areas under the curves.
- 9.4 Solve problems of definite integrals.

## **10. Understand The Concept Of Plane Analytic Geometry**

- 10.1 Explain the rectangular coordinate system.
- 10.2 Locate points in different quadrants.
- 10.3 Derive distance formula.
- 10.4 Prove section formulas.
- 10.5 Derive Slope formula.
- 10.6 Solve problem using the above formulas.

## **11. Use Equations Of Straight Line In Solving Problems**

- 11.1 Define a straight line.
- 11.2 State general form of equation of a straight line.
- 11.3 Derive slope intercept and intercept forms of equations of a straight line.
- 11.4 Derive expression for angle between two straight lines.
- 11.5 Derive conditions of perpendicularity and parallelism of two straight lines.
- 11.6 Solve problems involving these equations/formulas.

## **12. Solve Technological Problems Using Equation Of Circle**

- 12.1 Define a circle.
- 12.2 Describe standard, central and general forms of the equation of a circle.
- 12.3 Convert general form to the central form of equation of a circle.
- 12.4 Deduce formulas for the radius and the coordinates of the center of a circle from the general form.
- 12.5 Derive equation of the circle passing through three given points.
- 12.6 Solve problems involving these equations.

## **Comp-122: INTRODUCTION TO COMPUTER APPLICATIONS**

### **Total contact hours**

Theory	32 Hours
Practicals	96 Hours

<b>T P C</b>
<b>1 3 2</b>

**AIMS:** This subject will enable the student to be familiar with the operation of a Micro-computer. He will also learn DOS, BASIC language and word processing to elementary level.

### **COURSE CONTENTS**

- 1. Electronic Data Processing (EDP) 6 Hours**
  - 1.1 Basics of computers
  - 1.2 Classification of computers
  - 1.3 Block diagram of a computer system
  - 1.4 Binary number system
  - 1.5 BIT, BYTE, RAM, ROM, EROM, EPROM
  - 1.6 Input and output devices
  - 1.7 Secondary storage media details
  - 1.8 Processors and types
  - 1.9 Using computer for system software
  - 1.10 Using computers for application software.
  - 1.11 Common types of software and their application.
  
- 2. Disk Operating System (DOS) 6 Hours**
  - 2.1 Internal commands
  - 2.2 External commands
  - 2.3 Batch files
  - 2.4 Advance features.
  
- 3. Basic Language 10 Hours**
  - 3.1 Introduction to high level languages
  - 3.2 Introduction to BASIC
  - 3.3 REM Statement
  - 3.4 Assignment statement
  - 3.5 Input statement
  - 3.6 Read-Data statement
  - 3.7 IF-THEN statement
  - 3.8 IF-THEN Else statement
  - 3.9 FOR-NEXT statement
  - 3.10 DIM statement
  - 3.11 L PRINT statement
  - 3.12 STOP statement
  - 3.13 END statement

- 3.14 Logic of a BASIC Programme
- 3.15 Running a BASIC Programme
- 3.16 Saving and Retrieving a Programme
- 3.17 Advance features

**4. Word Processing**

**7 Hours**

- 4.1 Starting word processor session
- 4.2 Opening a document
- 4.3 Saving a document
- 4.4 Ending word processor session (Temporarily)
- 4.5 Retrieving a document
- 4.6 Spell check
- 4.7 Margins and tab setting
- 4.8 Aligning Paragraph
- 4.9 Printing a document
- 4.10 Advance features

**5. Computer Graphic in Basic**

**3 hours**

- 5.1 Graphic fundamentals
- 5.2 Points and lines
- 5.3 Dots in space
- 5.4 A lightening blot
- 5.5 Shapes
- 5.6 Expanding circles and rectangles

**RECOMMENDED BOOKS**

1. Ron S. Gottfrid, Programming with BASIC,
2. Any Word Processor Latest Release (e.g., Word, Word-Perfect etc).
3. ABC'S of DOS (latest release).
4. Judd Robbins, Mastering DOS 6.0 and 6.2

## **Comp-122 COMPUTER APPLICATIONS**

### **INSTRUCTIONAL OBJECTIVES**

#### **1. Understand Electronic Data Processing (EDP)**

- 1.1 Describe basics of computers.
- 1.2 Enlist different classification of computers.
- 1.3 Explain block diagram of a computer system.
- 1.4 Describe binary number system.
- 1.5 State the terms used in computers such as BIT, BYTE, RAM, ROM, EROM, EPROM.
- 1.6 Identify input and output devices.
- 1.7 Describe secondary storage media.
- 1.8 Explain processor.
- 1.9 Name different types of processors.
- 1.10 Explain the use of computer for system software.
- 1.11 Explain the use of computer for application software.
- 1.12 Enlist common types of software and their application.
- 1.13 Explain various application of above softwares mentioned in 1.12

#### **2. Understand Disk Operating System (DOS)**

- 2.1 Explain the use of various internal command of DOS.
- 2.2 Explain the use of various external command of DOS.
- 2.3 Describe batch files.
- 2.4 Identify advanced features

#### **3. Understand Basic Language**

- 3.1 Explain high level languages.
- 3.2 Explain Basic language.
- 3.3 Describe Rem statement
- 3.4 Describe assignment statement
- 3.5 Explain Input statement
- 3.6 Explain Read-Data statement
- 3.7 Explain If-Then Statement
- 3.8 Explain If-then-Else Statement
- 3.9 Explain For-Next Statement
- 3.10 Explain DIM Statement
- 3.11 Explain LPRINT statement
- 3.12 Explain stop statement
- 3.13 Explain end Statement
- 3.14 Describe Logic of Basic program
- 3.15 Describe running a Basic Program
- 3.16 Describe saving & retrieving Basic Program
- 3.17 Describe some Advance features of Basic program



#### **4. Understand Word Processing Session**

- 4.1. Describe word-processing
- 4.2. Name command to be entered on Dos-prompt to load word-processor
- 4.3. Identify initial screen
- 4.4. Describe the command to open a document
- 4.5. Describe the procedure for naming the document
- 4.6. Explain importance of giving extension to a document
- 4.7. Describe saving and retrieving a document
- 4.8. Explain importance of saving the work at regular intervals
- 4.9. State temporarily ending word-processing session & document retrieval
- 4.10. State procedure to re-enter word processor
- 4.11. State procedure to re-open the document and editing
- 4.12. Describe spell-check facility
- 4.13. Describe Margins & Tab Setting
- 4.14. Describe to align paragraph
- 4.15. Describe Re-editing techniques
- 4.16. Describe procedure to set-up printer
- 4.17. Describe command for printouts
- 4.18. Explain multiple-copy printout procedure
- 4.19. Explain some advance features
- 4.20. Describe procedure of condensed printing
- 4.21. Describe procedure for change of fonts

#### **5. Understand Programming Instructions For Computer Graphic In Basic Language**

- 5.1. Identify graphic fundamentals in basic language
- 5.2. Explain to draw points and lines
- 5.3. Explain to draw dot in space
- 5.4. Explain to draw lighting blot
- 5.5. Explain to draw shapes
- 5.6. Explain to draw expanding circles and rectangles

## **Comp-122 INTRODUCTION TO COMPUTER APPLICATIONS**

### **LIST OF PRACTICALS**

**96 hours**

#### **Disk Operating System**

1. Identify key board, mouse, CPU, disk drives, disks, monitor & printer
2. Practice for booting up of a computer system with DOS system disk and power off system at DOS prompt
3. Practice for CLS, VER, VOL, DATE & TIME commands
4. Practice for COPY, REN commands
5. Practice for DEL, TYPE, PATH, PROMPT, COPY CON, MD, CD, RD commands
6. Practice of the practicals at S. No. 3, 4, 5
7. Practice for FORMAT command with /s, /4, /u switches
8. Practice for DISKCOPY, DISKCOMP commands
9. Practice for SCANDISK, XCOPY, DELTREE, TREE, LABEL commands
10. Practice for PRINT, UNDELETE commands
11. Practice for the practicals at S. No. 8, 9, 10, 11
12. Practice for creating a batch file

#### **Basic**

1. Practice for loading & unloading BASIC software and identify role of function keys in Basic
2. Identify role of various keys in continuation with ALT key in BASIC programming
3. Practice for CLS, LOAD, SAVE, FILE, RENUM command by loading any existing BASIC Program
4. Practice for editing any existing BASIC Program
5. Prepare BASIC Program to display sum of two numbers using INPUTS
6. Prepare BASIC Program to display sum of two numbers using READ-DATA
7. Prepare BASIC Program to multiply two numbers
8. Prepare BASIC Program to calculate Area of Rectangle, when length and width are given
9. Prepare BASIC Program to calculate area of a circle when radius/diameter is given
10. Prepare very simple BASIC Programs using IF-THEN-ELSE and FOR-NEXT statement
11. Identify DIM statement
12. Practice for LPRINT statement for various Programs hard-copy output

#### **Word Processing**

1. Practice for loading & unloading a word processor
2. Practice for creating document & saving it
3. Practice for spell-check facility of the word-processor
4. Practice for editing an existing document
5. Practice for various word-processing Menu Options

6. Practice for printing a document
7. Practice for margin and TAB setting and document alignment
8. Practice for some advance features

<b>T</b>	<b>P</b>	<b>C</b>
<b>1</b>	<b>3</b>	<b>2</b>

**Total Contact Hours**

Theory: 32

Practical: 96

**AIMS:** Understand the fundamentals of Water Supply installation and maintenance of Plumbing system.

**COURSE CONTENTS**

- |  |                |
|--|----------------|
| <b>1. Pipes Used in Water Supply and Plumbing</b>  | <b>1 hours</b> |
| 1.1 Types.   |                |
| 1.2 Comparison of pipes with reference to material.  |                |
| 1.3 Specification of pipes.  |                |
| <b>2. Appurtenances</b>  | <b>2 hours</b> |
| 2.1 Taps and their types.  |                |
| 2.2 Valves and their types.  |                |
| 2.3 Mixer of different types.  |                |
| 2.4 G.I. Specials use and specifications.  |                |
| 2.5 Cocks, types and uses.   |                |
| <b>3. Plumbing Fixtures</b>  | <b>2 hours</b> |
| 3.1 Flushing cistern, water closets, urinals.  |                |
| 3.2 Traps-functions.   |                |
| <b>4. Introduction Of Water Supply</b>   | <b>2 hours</b> |
| 4.1 General importance of water supply.  |                |
| 4.2 Development of water supply.   |                |
| 4.3 Need for protected water supply.   |                |
| <b>5. Sources Of Water</b>   | <b>2 hours</b> |
| 5.1 Surface source-Lakes, streams, rivers, rain-fall, intensity of rain fall, run off, catchment area, yield from surface sources. |                |
| 5.2 Underground sources. Springs, wells its kind (i/c Tube-well) infiltration galleries.   |                |
| 5.3 Yield from wells-Quantity of underground water, water table, aquiter, cone of depression.                                      |                |
| <b>6. Intakes And Conveyance Of Water</b>  | <b>5 hours</b> |
| 6.1 Intakes and its types-Reservoir intakes, River intakes, lake intake, canal intake,   |                |

- factor governing the selection of site for an intake.  
6.2 Pipe laying and testing.

**7. Quantity Of Water** **2 hours**

- 7.1 Total quantity of water for a town, per capita demand and factors affecting demand.  
7.2 Water requirement for domestic, industrial, fire fighting & commercial purposes.  
7.3 Variation in demand.

**8. Quality Of Water** **2 hours**

- 8.1 Meaning of pure water.  
8.2 Impurities in Water.  
8.3 Tests of water-physical chemical tests and PH Value of water.

**9. Treatment Of Water** **8 hours**

- 9.1 Sedimentation-purpose of sedimentation, plain sedimentation Types of settling tanks based on functions and shapes.  
9.2 Coagulation-purpose, use of coagulants and kinds. Method of feeding and mixing.  
9.3 Filtration.  
Theory of filtration, construction and operation of slow sand, rapid sand and pressured filters, comparison between slow sand and rapid sand filters.  
9.4 Disinfection of Water.  
Necessity and methods of disinfection, chlorination, forms of chlorination, test for chlorine.  
9.5 Water softening.  
Purposes, types of hardness, methods of softening.  
9.6 Miscellaneous methods of water treatment, aeration, fluoridation, colour, odour and taste removal.

**10. Distribution System Of Water** **4 hours**

- 10.1 Methods of distribution Gravity, combine, direct pumping.  
10.2 Methods of supply of water Intermittent and continuous.  
10.3 Methods of layout of distribution pipes Dead end, grid, radial and ring system.  
10.4 Storage-Underground and overhead service reservoirs, necessity and accessories.  
10.5 Appurtenance in distribution system use of sluice valves, air valves, drain valves, fire hydrants, water meter, reflux valve, scour valves.  
10.6 Contamination of purified water.

**11. Pumps** **2 hours**

- 11.1 Necessity, kinds of pumps, fundamental principle of pumping.  
11.2 Selection of site for tube-well.

**INSTRUCTIONAL OBJECTIVES**

- 1. Understand the Types And Specification Of Pipes**
  - 1.1 State the types of pipe.
  - 1.2 Compare pipes with reference to material.
  - 1.3 Describe specification of pipes.
  
- 2. Understand the Appurtenances and Their Use**
  - 2.1 Explain taps and their types.
  - 2.2 Explain valves and their types.
  - 2.3 Explain Mixer and their types
  - 2.4 Explain G-I specials- and their uses and specifications.
  - 2.5 Explain cocks their types and uses.
  
- 3. Understand Plumbing Fixtures, Their Functions and Installation Procedure**
  - 3.1 Identify flushing cistern, water closets, urinals, wash hand basin Bath tub & traps.
  - 3.2 Describe use & function of flushing cistern, water closets, urinals, wash hand basin, bath tub & traps.
  - 3.3. Explain the procedure for installation of water closet, flushing cistern, soil pipe, urinal part with flushing cistern and wash hand basin (complete).
  
- 4. Understand the Importance, Development & Necessity of Water Supply**
  - 4.1 Explain the importance of water supply.
  - 4.2 Explain the development of water supply.
  - 4.3 Describe the need of protected water supply.
  
- 5. Understand Total Quantity of Water for a Town**
  - 5.1 5.1 Explain per capitate water consumption & factors affecting demand.
  - 5.2 Describe the water requirement for domestic, industrial fire-fighting and commercial purposes.
  - 5.3 Describe variation in demand.
  
- 6. Understand the Surface and Underground Sources of Water and Their Yields**
  - 6.1 Enlist different sources of water & compare their merits and demerits.
  - 6.2 Define rain fall intensity, run off, catchment area, hydraulic gradient yield from surface sources.
  - 6.3 Calculate yield from surface source
  - 6.4 Describe springs, wells, kinds of well, Tube well and infiltration Galleries
  - 6.5 Explain the construction and function of well, Tube well
  - 6.6 Define Aquifer, static water level Peizomateric head, pumping water, Draw Down, Area of influence, well yield and cone of depression
  - 6.7 Describe quality of underground water acceptable for human life.

- 6.8 Calculate yield from wells (Confined & Unconfined)
- 6.9 Appreciate the need for better quality of water for human life.

**7. Understand Intakes and Pipe Laying and Test**

- 7.1 Explain Intakes and its types Reservoir Intake River intakes, lake intakes canal intakes.
- 7.2 State the factors governing the selection of site for an intake.
- 7.3 Explain the pipe laying and testing procedure

**8. Understand The Quality & Tests For Quality Of Water**

- 8.1 Define pure water (Potable water)
- 8.2 Explain impurities in water
- 8.3 Explain the procedure for physical chemical & PH value, biological tests of water

**9. Understand The Methods And Process For Treatment Of Water**

- 9.1 Sketch the overall layout of water treatment plant indicating different stages
- 9.2 Explain sedimentation & plain sedimentation
- 9.3 State the objects of plain sedimentation
- 9.4 Describe types of settling tanks based on function & Shapes
- 9.5 Define coagulation
- 9.6 Describe types, purpose and use of coagulants
- 9.7 State the method of feeding and mixing of co-angulation
- 9.8 Explain the process of sedimentation by co-angulation
- 9.9 State Flocculation and types of Flocculator
- 9.10 Explain the working of Baffled and mechanical flocculator
- 9.11 Explain filtration and types of filters
- 9.12 Describe the construction and operation of slow sand-rapid sand of pressure filters
- 9.13 Compare slow sand and rapid
- 9.14 Describe the process of filter washing
- 9.15 Explain Disinfection & its necessity
- 9.16 State methods of Disinfection
- 9.17 Explain chlorination, its forms and points of chlorination & chlorine Demand
- 9.18 Describe the test for chlorine
- 9.19 State hardness & its types
- 9.20 Explain methods of softening
- 9.21 Explain aeration fluoridation, colour, odour, and taste

**10. Understand The Systems Of Distribution, Its Components And Layouts**

- 10.1 Explain the Gravity, combine & direct pumping system of distribution
- 10.2 Explain Intermittent and continuous methods of suffly of water
- 10.3 Explain with sketches the different pipe lay out methods (Dead End System) Grid iron system, radial & ring system
- 10.4 State the necessity of underground, overhead and service reservoir
- 10.5 Draw sketches of rectangular overhead service reservoir showing all accessories
- 10.6 Explain with sketches the functions of various appurtenances in a distribution system

## **11. Understand The Types & Principal Of Pumping**

- 11.1 Explain necessity and types of pump
- 11.2 State the fundamental principle of pumping
- 11.3 State factors for selection of site of tube well



## **CT-212 PUBLIC HEALTH ENGINEERING I.**

### **LIST OF PRACTICALS**

**96 hours**

1. Layout drawing of institution plumbing lab.
2. Demonstration of various tools and pipe appurtenances.
3. Cutting and threading of G.I. Pipes.
4. Taking out water connection from main pipe.
5. Fitting/replacement of water taps.
6. Installation of water closet, Flushing cistern and pipe.
7. Installation of urinal with flushing cistern and waste pipe.
8. Installation of wash hand basin (complete).
9. Jointing of pipes (cast iron and concrete).
10. Making model of grid system, radial and ring system with G.I. Pipe.
11. Repair of single acting reciprocating pumps and replacement of non-return valve.
12. Demonstration on boring of tube-well/hand pump.
13. Drawing of intakes for water supply.
14. Turbidity and hardness test of water.
15. Drawings of setting tank, slow sand filter.
16. General layout of water supply and sanitary fitting in a house and Calculation of all fixtures.
17. Visit of water treatment plant, and water works.

### **REFERENCE BOOKS**

1. Plumbing by Babbitt.
2. Fundamental of water supply and sanitary Engg. by Rangwala S.C.
3. Water supply and sewerage by Steel.
4. Water supply and sanitary Engg. by Kulkarni.
5. A text book of sanitary Engineering by Deshpande R.S.
6. Public health engineering by Sharma.

## CT-224 SURVEYING-II

<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>6</b>	<b>4</b>

**Total contact hours 256**

Theory 64

Practical 192

- AIMS**
1. Understand the fundamental principles of traversing, curves, Triangulation, hydrography and photo-grammetry,
  2. Develop the skill in carrying out the traverse survey, setting out curves, triangulation and photo-grammetry.

### COURSE CONTENTS

- 1. Verniers 4 hours**
  - 1.1 Introduction principles of verniers
  - 1.2 Types and terms used
  - 1.3 Numerical problems.
  
- 2. Theodolite 12 hours**
  - 2.1 Introduction, parts and types
  - 2.2 Definition of terms
  - 2.3 Temporary adjustment of theodolite
  - 2.4 Functions of theodolite-measuring angles, prolonging a line, lining in, measuring heights & distances
  
- 3. Permanent Adjustment Of Theodolite 4 hours**
  - 3.1 Fundamental lines of theodolite
  - 3.2 Adjustment of the plate level, line of collimation
  - 3.3 Horizontal axis, level tube on telescope, & vertical Index frame
  
- 4. Theodolite Traversing 12 hours**
  - 4.1 Introduction, traverse & its types, methods of traversing
  - 4.2 Objects and standard of accuracy of traversing
  - 4.3 Check of open & closed traverse
  - 4.4 Plotting & graphical adjustment of closing error
  - 4.5 Calculation of angles from given bearings and vice versa
  - 4.6 Computation of co-ordinates
  
- 5. Curves 16 hours**
  - 5.1 Definition, types and necessity of curves
  - 5.2 Classification of curves
  - 5.3 Designation of curves
  - 5.4 Elements and notation of curves & their relationship

- 5.5 Calculation of data & methods of setting out simple circular curves
- 5.6 Setting out simple curve beyond obstacles
- 5.7 Introduction to vertical curves, elements, term and their inter relations.
- 5.8 Calculation of data and Setting out vertical curves
- 5.9 Description, types and necessity of transition curves
- 5.10 Characteristics, elements & notation of transition curve and their inter relationship
- 5.11 Super elevation and length of transition curve with numerical problems
- 5.12 Calculation of data and methods of setting out of transition curve
  
- 6. Triangulation** **4 hours**
  - 6.1 Introduction, types of triangulation
  - 6.2 Selection of station points
  - 6.3 Measurement of base line
  - 6.4 Correction of base line measurement
  
- 7. Photo-Grammetry** **4 hours**
  - 7.1 Definition, purpose and type
  - 7.2 Fundamental principles
  - 7.3 Merits, demerits over other types
  - 7.4 Numerical problems on scale of photograph, and height of objects
  
- 8. Distance Meter** **4 hours**
  - 8.1 Introduction, measuring range, read-out display, power source and other parts
  - 8.2 Prisms for a distance meter, single, triple and nine prism's set
  - 8.3 Advantages of each set of prisms
  
- 9. Total Station (Computerized Theodolite)** **4 hours**
  - 9.1 Introduction, types, main parts and accessories.
  - 9.2 Functions and modes of a total station.
  - 9.3 Setting of parameters.
  - 9.4 Preparation for observations and operations

## **CT-224 SURVEYING-II**

### **INSTRUCTIONAL OBJECTIVES**

#### **1. Understand the Principles of Vernier for Reading and Construction**

- 1.1 Define vernier.
- 1.2 Explain the principle of vernier with sketch
- 1.3 Identify the parts & types with the help of sketch
- 1.4 Describe the terms; direct vernier, retrograde vernier, double vernier, extended vernier double folded vernier
- 1.5 Compute least count using principles of vernier

#### **2. Understand The Construction Of Theodolite And Its Basic Function**

- 2.1 List the types of theodolites
- 2.2 Label main components of a theodolite on a given sketch
- 2.3 Describe the terms; centring, transiting, face left, Face right, swinging the telescope, axis of level tube, horizontal & vertical axis
- 2.4 Explain the procedure of temporary adjustment of a theodolite
- 2.5 Explain the procedure of measuring vertical angle
- 2.6 Explain the procedure of measuring horizontal angle
- 2.7 Explain the procedure of setting out an angle
- 2.8 Explain the procedure of prolonging a line
- 2.9 Explain the procedure of fixing inter-mediate points between two given points

#### **3. Understand The Method Of Permanent Adjustment Of A Theodolite**

- 3.1 Describe the fundamental lines of theodolite i.e. vertical axis, axis of plate bubble, line of collimation, line of sight, horizontal axis/trunion axis, bubble line of the altitude
- 3.2 Explain the procedure for adjustment of plate level, line of collimation, horizontal axis level, tube on telescope, vertical index frame

#### **4. Understand The Principles Of Traversing For Preparation Of Plan Using The Theodolite**

- 4.1 Define traverse & traversing
- 4.2 Describe various types of traverse
- 4.3 Explain various methods of traversing
- 4.4 Lists the steps involved in traversing
- 4.5 State the standard of accuracy of linear and angular measurements
- 4.6 Compute bearing from angles & vice versa
- 4.7 Explain co-ordinates and its types
- 4.8 Compute the latitudes & departures of lines
- 4.9 Compute co-ordinates from given field notes
- 4.10 Explain the methods of plotting
- 4.11 Explain the errors and mistakes in theodolite traversing and their rectification

## **5. Understand The Principles Of Curves And Type Of Curve Used**

- 5.1 Define curve and its type with sketch
- 5.2 Explain the necessity of curves in surveying
- 5.3 Explain the definition & notation of circular curve
- 5.4 Compute the inter-relationship
- 5.5 Explain the designation of curve
- 5.6 Compute the data for setting out simple circular curves, curve with various methods.
- 5.7 List the steps for setting out of simple circular curves
- 5.8 List the steps for ranging a curve beyond obstacle
- 5.9 States the types of vertical curve
- 5.10 Explain the necessity of vertical curves
- 5.11 Explain the elements, notation of ver. curves & their inter-relationship
- 5.12 Compute the data for setting out ver. curves
- 5.13 Enlist the steps for setting out ver. curves
- 5.14 Describe the transition curve and its type
- 5.15 Explain the necessity of transition curves
- 5.16 Explain the elements & notations of transition curve
- 5.17 Compute the inter-relationship
- 5.18 Explain super elevation
- 5.19 Compute formula for super elevation
- 5.20 Compute the length of transition curve on different basis
- 5.21 Compute data for selecting out a combined curve
- 5.22 Enlist steps the setting out combined curve

## **6. Understand Techniques Of Triangulation**

- 6.1 Describes the triangulation and its types
- 6.2 Explain the factors governing the selection of stations & base line
- 6.3 Enlist the steps in measurement of base line
- 6.4 Compute correction of base line measurement

## **7. Understand The Principles Of Photogrammetry**

- 7.1 Define photogrammetry
- 7.2 Describe the types of photogrammetry
- 7.3 State the principles of photogrammetry
- 7.4 Describe merits & demerits of photogrammetry
- 7.5 Compute the numerical problem on scale of photograph and height of objects

## **8. Understand The Distance-Meter And Its Use**

- 8.1 Identify the parts of distance meter
- 8.2 Describe the function of various parts of distance meter
- 8.3 Differentiate various prisms and their compare them

## **9. Understand The Total Station And Its Use**

- 9.1 Identify the parts of a total station
- 9.2 Describe the functions and modes of total station.
- 9.3 Describe the parameters of total station.
- 9.5 Explain the methods of observations and operations of a total station.

## CT-224 SURVEYING-II

### LIST OF PRACTICALS

1. Vernier theodolite and its parts and use
2. Microptic theodolite and its parts and use
3. Practice in setting of theodolite on a station point
4. Measurement of Horizontal & vertical angles.
5. Setting out angles in the field
6. Practice in setting an electronic digital theodolite & measuring/setting angles with it
7. Permanent adjustment of theodolite
8. Theodolite traversing
9. Setting horizontal curves in the field
10. Setting vertical curves in the field
11. Setting transition curve in the field
12. Finding height of inaccessible point with a theodolite
13. Practice in setting a distance-meter and finding distances under
14. various atmosphere conditions
15. Horizontal and vertical angle measurements
16. Measurement of slope distance, horizontal distance and vertical distance.
17. Demonstration of advance functions of a total station

### REFERENCE BOOKS

1. Surveying & Levelling by TP Kanatkar
2. Surveying Levelling by S.K Hussain
3. Russul Mannul (I&II) on surveying
4. Surveying by David Clark
5. Surveying by Hakim Ali
6. Surveying by S. Ahmed
7. Advanced Surveying by P. Son Chosh
8. Surveying theory and practice by Raymond E Devis
9. A text book of Advanced Surveying bu A Gor.
10. Surveying and levelling by R. Agor
11. Solving problems in surveying by Banister

## CT-233 CONSTRUCTION-II

<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>3</b>	<b>3</b>

### Total Contact Hours 160

Theory	64
Practical	96

- AIMS**
1. Understand the fundamentals of building construction and machinery used for the purpose
  2. Understand the modern method of construction

### COURSE CONTENTS

- 1. Site Works For A Building Project** **4 hours**
  - 1.1 Job/site layouts-site activities, space allocation for material storage, plants positions, working area, accommodation for staff(site office).
  - 1.2 Ground water control-permanent exclusion of ground water, temporary exclusion (well point system, deep-bored well)
  - 1.3 Construction procedure of a multistorey building
- 2. Deep Foundation** **6 hours**
  - 2.1 Introduction-necessity, types and uses
  - 2.2 Pile foundation-types, uses, parts and construction details, load test on piles, pile driving (by hammering, boring)etc pile caps
  - 2.3 Well foundation types, uses, parts and construction, skin friction, well sinking and plugging.
  - 2.4 Cofferdams-uses, types and construction.
  - 2.5 Caissons-classification, uses, construction
- 3. Water Proofing Of Structures** **4 hours**
  - 3.1 Water proofing materials and products.
  - 3.2 Water proofing of basement (Horizontal vertical)
  - 3.3 Water proofing of floors and roofs
- 4. Floors** **4 hours**
  - 4.1 Definition
  - 4.2 Parts of floor-requirements of good floor.
  - 4.3 Types of floors.
  - 4.4 Method of construction-tile floor, cement conglomerate floor, mosaic and terrazzo floor, timber floor, rubber floor, glass floor, cork floor.
- 5. Stair and Stair Case** **6 hours**
  - 5.1 Important technical terms.
  - 5.2 Types of different stairs with brief specifications and parts

- 5.3 Planning and design of a stair-relation between going and rise, width of stair, length of flight, landing and location of stair etc.

## **6. Form Work**

**6 hours**

- 6.1 Introduction-Definition, necessity
- 6.2 Components of form work-sheathing, supporting member, braces, form hard wares
- 6.3 Characteristics of a good form work quality, safety, economy
- 6.4 Materials for form work-wood, steel, plywood, plastic, fiber glass etc.
- 6.5 Types of form work collapsible, progressive, solidity and non-removable
- 6.6 Useful life of form work
- 6.7 Preparation of form work for placing concrete- assembly, cleaning, oiling.
- 6.8 Loads on form work
- 6.9 Form work for column and column base, walls, slab, and beam , removal and maintenance.

## **7. Fire Protection Of Buildings**

**6 hours**

- 7.1 Causes and effects of fire
- 7.2 Fire resisting materials-characteristics, fire resisting properties of construction materials
- 7.3 Arrangements for fire-protection of building-alarm system, protection of openings, stairs and floors, smoke detectors, fire extinguishing wishing arrangement
- 7.4 Fire-resisting construction-classification of building for fire resistance, fire protection of concrete, wooden and steel structures
- 7.5 Means of escape in case of fire Basic principles of means of escape means of escape required for flat, office building, public building.

## **8. Air Conditioning Of Building**

**6 hours**

- 8.1 Introduction-Definition, conditioned air, purity of air, humidity, cooling, heating, ventilation.
- 8.2 Thermal insulations-Transmission of heat, Insulating materials
- 8.3 Ventilation of building-functional requirements of ventilation system, factors effecting ventilation, methods of ventilation
- 8.4 Heating of building-Heating load, methods of heating-warm air furnace, steam heating, hot water heating system, panel heater, unit heaters
- 8.5 Cooling of building-methods of cooling-chilled water cooling, ice cooling, spray cooling, mechanical refrigeration (Air conditioning plants)
- 8.6 Air conditioning plants-system of air conditioning, air circulation filters.

## **9. Acoustics Of Buildings**

**6 hours**

- 9.1 Definition
- 9.2 Technical terms-sound, pitch, loudness, intensity of sound, reflection, transmission and absorption of sound, optimum time of reverberation
- 9.3 Factors to be considered in a acoustics of buildings.
- 9.4 Sound absorbing materials-characteristics
- 9.5 Acoustic design of an auditorium
- 9.6 Sound insulation-methods of sound insulation.



**10. Maintenance Of Buildings** **4 hours**

- 10.1 Classification of building maintenance-routine/annual repair, special repairs etc.
- 10.2 Repair to damage surface finishing such as plaster, pointing, white wash, distemper and painting.
- 10.3 Repair to damage parts of floors such as concrete floor, terrazzo floor, mosaic floor, timber floors.
- 10.4 Exposure of reinforcement-spalling, causes and repairs.
- 10.5 Protection against leakage through roofs-causes and repairs
- 10.6 Replacement of glass panes, decayed timber, easing of door and windows.
- 10.7 Repair to cracks in masonry wall.

**11. Construction Plants** **6 hours**

- 11.1 Introduction-selection of construction plant, economical life, cost of owning and operating
- 11.2 Concrete equipments-working and use of concrete mixers, batching plants, vibrators, compactors, concrete pumps, transit mixer, concrete power,, concrete power floats, tip wagon, compressors, Hydraulic jack.
- 11.3 Lifting cranes-definition, basic function of crane, classification of cranes, use and working.
- 11.4 Earth moving and excavation plants-working and use of dozers, scrapers, graders dumper, power shovels, drag line, trenchers.
- 11.5 Road making machinery-use and working of sheep foot rollers, vibratory rollers, tandem rollers, tar boilers, asphalt paver, rooter.
- 11.6 Pile driving equipments-use and working of pile hammer and its types, pile helmets, water jet method, boring rigs and other arrangements.
- 11.7 Belt conveyer-types and working

**12. Precast Concrete Construction (Prefabricated Construction)** **4 hours**

- 12.1 Definition, necessity
- 12.2 Advantages of precast construction.
- 12.3 Types of precast concrete components and structures.
- 12.4 System of precast construction-plant prefabrication on-site prefabrication.
- 12.5 Manufacturing methods-stationary production, flow line method.
- 12.6 Production procedure/steps-preparation of materials, preparation of forms preparation of reinforcement, laying concrete, compaction, curing, storage.
- 12.7 Joints/connections in precast construction

**13. Low Cost Houses** **2 hours**

- 13.1 Introductions, necessity
- 13.2 Methods and materials of construction
- 13.3 Advantages for low cost construction

**14. Retaining Walls And Breast Walls** **2 hours**

- 14.1 Types and general description.
- 14.2 Wall joints and drainage.
- 14.3 Causes of failure.
- 14.4 Conditions of stability.

## CT-233 CONSTRUCTION-II

### INSTRUCTIONAL OBJECTIVES

#### **1. Understand The General Planning For Job/Site Lay Out Of Building Project And Construction Procedure Of Multistorey Building**

- 1.1 State the site activities involved in planning a site lay out of a project
- 1.2 Plan and draw site/job layout of a building project which shows space allocation for, storage of materials, plants positions, working area and site offices
- 1.3 Explain the methods of controlling ground water at a construction site
- 1.4 Discuss the general constructional steps involved in the construction of a multistorey building

#### **2. Understand The Suitability And Construction Of Different Type Of Deep Foundation**

- 2.1 State the necessity of deep foundations with respect to common type of shallow foundations
- 2.2 State the types and suitability of pile foundations
- 2.3 Explain the construction details of precast and cast in situ pile foundation
- 2.4 Explain the load test on piles
- 2.5 State the types and uses of well foundation
- 2.6 Explain the method of construction of well foundation
- 2.7 State the types and uses of caissons and cofferdam
- 2.8 Explain with sketches common types of caissons and cofferdam
- 2.9 Select the suitable type of foundation for a given situation

#### **3. Understand The Principles And Techniques Of Water Proofing Of Different Components Of A Structures**

- 3.1 State the common types and uses of water proofing materials and product
- 3.2 Explain the method of water proofing of basement and floors etc

#### **4. Understand The Construction Of Floors And Floor Finishes**

- 4.1 State the function of the components of a floor.
- 4.2 State the types of floors and their suitability.
- 4.3 State the characteristics of a good floor.
- 4.4 Explain the method of constructing, tile, cement, concrete, conglomerate, mosaic, terrazzo, timber, rubber, glass and cork floors.

#### **5. Understand The Principles Involved In Planning And Construction Of Stair Cases**

- 5.1 Explain terms, riser tread, landings, flight, going, nosing, hand rail, soffit, head room, newel post, balusters, pitch and stringer etc
- 5.2 Explain with sketches different types of stairs.
- 5.3 Explain principles to be observed while planning and designing of a stair.

#### **6. Understand Principles Of Constructing Formwork For Reinforced Concrete**

## **Structural Components**

- 6.1 State the general components of ordinary formwork i.e. sheathing, supporting members, braces and form hardware.
- 6.2 Describe the desirable characteristics of formwork
- 6.3 State the types and materials for form work.
- 6.4 Explain with sketches form work for structural components.
- 6.5 Explain the procedure of formwork for slab, column, beam, wall and footings with safety measures to be adopted.
- 6.6 State the stripping of formwork.

## **7. Understand The Principles For Fire Protection Of Buildings**

- 7.1 Discuss the causes and effects of fire
- 7.2 Explain the fire resisting properties of construction materials.
- 7.3 Describe the arrangement for fire protection of building i.e. alarm system, fire extinguishing arrangement.
- 7.4 Explain principles to be observed for fire protections of concrete, wooden and steel structures.
- 7.5 Discuss the means of escape from a building in case of fire.

## **8. Understand The Principles And Technique Of Air Conditioning And Ventilation Of Building**

- 8.1 Explain terms, conditioned air, purity of air, humidity, cooling, heating and ventilation.
- 8.2 State the importance of thermal insulation of building.
- 8.3 List the names and uses of ventilating materials
- 8.4 State the standards for ventilation of building
- 8.5 Explain the methods of ventilation i.e. natural and mechanical ventilation.
- 8.6 Explain the methods of heating a building
- 8.7 Explain the methods of cooling building.
- 8.8 State the systems of mechanical air conditioning of building.
- 8.9 State the air distribution and air cleaning method.
- 8.10 Explain the working principles of mechanical air conditioning plant/system.

## **9. Understand The Principles And Techniques Of Acoustic Control Of A Building**

- 9.1 Define terms, sound, pitch, loudness, tone, intensity of sound, reflection of sound, reverberation, and time of reverberation, transmission of sound and absorption of sound.
- 9.2 Explain the factors to be considered in acoustics of building.
- 9.3 Describe the characteristics of various types of sound absorbing materials.
- 9.4 Explain principles to be observed in the acoustic design of an auditorium.
- 9.5 Explain the methods of sound insulation of a building.

## **10. Understand The Maintenance Required For Buildings**

- 10.1 Explain the annual and special repairs required for buildings.
- 10.2 Explain the methods of repair of damaged plastered surface, white wash, distemper and painting.
- 10.3 Explain the procedure of repair of various damaged floors such as, concrete

floor, terrazzo floor, mosaic and timber floors.

- 10.4 Explain causes of spalling in R.C.C members and protections against it.
- 10.5 Explain causes, method of repair for leakage through roofs.
- 10.6 Explain causes and symptoms of cracks in masonry and their repairs.

### **11. Understand The Uses And Working Of Construction Equipments**

- 11.1 State necessity of construction equipments.
- 11.2 List the plants and machinery used in a multistorey building project.
- 11.3 Explain economical life, cost of owning and operating construction equipment.
- 11.4 Explain the working and uses of concreting equipments i.e. concrete pumps transit mixer, concrete paver, hydraulic jack etc.
- 11.5 Explain the types and working of crane.
- 11.6 Explain the working and uses of earth moving and excavation plants such as, dozers, scrapers, grader, damper, power shovels, dragline, trencher etc.
- 11.7 Explain the working and use of road making machinery such as, roller, sheet foot roller, vibratory roller, tandem roller, asphalt paver, etc.
- 11.8 Explain the functions of pile driving equipments such as pile hammer and its types, boring rigs and other arrangements.
- 11.9 Explain types and working of belt conveyors.

### **12. Understand Precast Concrete/Prefabricated Construction**

- 12.1 State advantages of precast construction over monolithic construction.
- 12.2 State the types of precast concrete components and structures.
- 12.3 Describe the system of precast construction i.e. plant prefabrication and on site prefabrication.
- 12.4 Explain the steps involved in the manufacture of precast concrete components.
- 12.5 Explain the joints/connections in precast construction.

### **13. Understand The Principles Of Building Low Cost Houses**

- 13.1 State the necessity of lowcost houses.
- 13.2 Explain the materials used in lowcost houses.
- 13.3 Explain the methods of construction of low cost houses.
- 13.4 State the advantages of low cost construction.

### **14. Understand The Principles Of Construction Of Retaining Wall**

- 14.1 State the types of retaining and breast wall
- 14.2 Explain the positions of wall joints
- 14.3 Explain the drainage requirements for retaining/ breast wall
- 14.4 Describe the conditions of stability and causes of failure of retaining/ breast wall

## **CT-233      CONSTRUCTION-II**

### **LIST OF PRACTICALS**

**96 hours**

1. Draw a job layout plan for a building project showing, material, plant and accommodations on site.
2. Visit for demonstration of pile boring site and draw lay out plan (showing machinery location and other details)
3. Draw sketches of various shapes of well foundation.
4. Draw plan and section of coffer dam and caissons.
5. Sketch basement of a building and show the water proofing treatments.
6. Practice in laying brick floor, conglomerate floor, mosaic floor.
7. Draw sketches of various types of stairs.
8. Demonstration of laying-out of typical stair.
9. Draw sketches of various types of retaining wall.
10. Demonstration in fabrication and erection of various form work.
11. Demonstration of removal of form work, completed during previous week.
12. Visit to under construction building project and presentation of visit report.
13. Visit to air conditioning plant
14. Visit to a building equipped with central air conditioning system.
15. Draw sketches of various methods of ventilation.
16. Draw the cross section of a typical acoustically treated hall.
17. Treatment of a damaged expansion/construction joints.
18. Demonstration and working of construction plants as given in course contents.
19. Construction of a small dry brick retaining and breast walls.
20. Sketches of various types of retaining wall.
21. Visit to a precast concrete factory and preparation of its layout and report

### **REFERENCE BOOKS**

1. Building Construction by Arrora and Gupta.
2. Building Constructions by M.Rangwala
3. Construction Technology by Chudly Volume I, II, III, IV
4. Building Constructions by Mackay Volume I, II, III, IV
5. Building Construction by S.K. Sharma
6. Building Construction and Foundation Engineering by Dr. Jha
7. Constructions Planning Equipment Materials by RL. Purify
8. Dampness in Building by Oliver.

## CT-243 CIVIL DRAFTING (II)

T	P	C
1	6	3

**Total Contact Hours 224**

Theory:	32
Practical:	192

**AIMS:** 1.Understand the techniques of drawing buildings, roads, irrigation structures and methods of inking and ferro printing.

### COURSE CONTENTS

- 1. Drawing Of Building Components 6 hours**
  - 1.1 Instruction for detailed Drawing of Foundations, Lintels arches, stairs, floors. Roofs (flat and sloping), doors, windows, C-Windows, Calculations of spread footing.
  - 1.2 Instructions on drawing plan and X-section of R.C.C. column.
  - 1.3 Instructions on drawing plan and X-section of R.C.C. slab roof with main and secondary beams.
  - 1.4 Use of Auto-Cad.
  
- 2. Frame Structure Buildings 6 hours**
  - 2.1 Definition of frame structure.
  - 2.2 Instruction on drawing of Raft foundation with steel reinforcement.
  - 2.3 Instruction for detailed drawing of frame structure showing all components.
  - 2.4 Use of Auto-Cad.
  
- 3. Drawing of Road Structures 6 hours**
  - 3.1 Instructions for drawing of x-section of Roads.
  - 3.2 Instructions for drawings of R.C.C. Road culvert 5 ft span
  - 3.3 Instructions for detailed drawing of high level two span R.C.C. deck bridge with 25' span-each.
  
- 4. Drawing of Irrigation Structures 5 hours**
  - 4.1 Instructions for drawing typical section of Irrigation Channel in cutting and filling.
  - 4.2 Instruction for drawings of A.P.M. out-let, masonry flume.
  
- 5. Inking and Ferro Printing 3 hours**
  - 5.1 Introduction to inking and ferro printing.
  - 5.2 Introduction for ink tracing including materials and apparatus used.
  - 5.3 Sensitizing paper, taking out prints.

**6. Seismic Design And Construction**

**6 hours**

- 6.1 Earthquakes and Ground Shaking
- 6.2 How Buildings resist earthquakes.

## CT-243 CIVIL DRAFTING-II

### INSTRUCTIONAL OBJECTIVES

#### 1. Understand Techniques Of Drawing Building Components

- 1.1 Define and sketch the spread footing.
- 1.2 Define and sketch the Raft foundations.
- 1.3 Define and sketch the grillage foundation.
- 1.4 Define and sketch the well and pile foundation.
- 1.5 Define and sketch the cession foundations.
- 1.6 Label different parts of spread footing i.e. base concrete, Sub grade, steps offsets, plinth.
- 1.7 Calculate the depth and breadth required for spread footings.
- 1.8 Distribute the space of drawing sheets by parallel line method.
- 1.9 Draw the X-section of lintels and arches.
- 1.10 State the various parts of lintels and arches.
- 1.11 Define stair and stair case
- 1.12 Define the terms and parts used in different types of stairs.
- 1.13 Explain the stairs according to their layout.
- 1.14 State the suitability of each type of stair.
- 1.15 Sketch the plans and sections of different types of stairs according to their Layout.
- 1.16 Define different types of floors.
- 1.17 Draw the sketches of different parts of floors.
- 1.18 Explain the standard proportions for the different layers of floors.
- 1.19 State different types of roofs i.e. first class mud Roofing, 2nd. class mud roofing, R.C.C. and R.B.Roof.
- 1.20 State different types of sloping roof.
- 1.21 Draw the sketches of steel trusses upto 25' span from the given data.
- 1.22 Label the sketches of different parts of truss.
- 1.23 State need of doors and windows.
- 1.24 Define clerestory windows and ventilators.
- 1.25 State the different types of doors and windows.
- 1.26 Explain the various parts of doors and windows.
- 1.27 State the different materials used for doors, windows and ventilators.
- 1.28 Sketch the elevations, sectional plans and vertical sections of doors, windows and ventilators.

#### 2. Understand Techniques Of Drawing Building Frame Structure

- 2.1 Define frame structure buildings.
- 2.2 Sketch and label the Raft foundation with steel Reinforcement.
- 2.3 Distribute the space for different views evenly on drawing sheet.
- 2.4 State the definition of column.
- 2.5 Sketch & label steel Reinforcement at appropriate place in the column sections



- of different shapes.
- 2.6 State the position of over laps and its length.
- 2.7 Sketch different types of hooks with their standard dimensions.
- 2.8 Sketch the X-section and sectional elevation of a singly Reinforced beam.
- 2.9 Differentiate between the Primary and Secondary beam.
- 2.10 Sketch and label the details of Reinforcement of T-and L-Beam.
- 2.11 Sketch and label the details of Reinforcement of two way continuous slab over Tee-Beam.
- 2.12 State the purpose of stirrups and Bent up bars

### **3. Understand Techniques Of Drawing Road Structures**

- 3.1 Sketch the X-section & L-section of Road in plain area.
- 3.2 Sketch the Long section and X-section of Road in hilly area.
- 3.3 Sketch the X-section of metalled Bituminous Road in plain and hilly area.
- 3.4 Sketch the X-section of concrete Road.
- 3.5 State various parts of culverts i.e. abutment, wing wall, toe wall parapet, number plate.
- 3.6 Explain the function of various parts of culvert.
- 3.7 Sketch the Plan, Foundation Plan, Long Section and X-Section of Culvert.
- 3.8 Explain the various terms used in Bridge.
- 3.9 State the difference between culvert and Bridge.
- 3.10 Explain the various types of bridges.
- 3.11 Sketch the Plan, Foundation Plan, Long section and X-Section of two Span Bridge.

### **4. Understand Techniques Of Drawing Irrigation Structures**

- 4.1 State the different irrigation structures.
- 4.2 State the definition of irrigation channel.
- 4.3 Define the terms used in irrigation channel i.e. Bed Width, Side Slopes, F.S.L., H.F.L., Free Board, Gradient Spoil Bank, Service Bank, Dowel, Berm etc.
- 4.4 Sketch the different Sections of Irrigation channels i.e. Fully in cutting, Fully in banking, partially in cutting & partially in banking.
- 4.5 Select appropriate scale for horizontal and vertical section.
- 4.6 Define the A.P.M. Out lets.
- 4.7 Sketch and label the different parts of A.P.M. Out lets.
- 4.8 Define the Masonry Flume.
- 4.9 Sketch & Label the parts of masonry Flume.

### **5. Understand the Techniques of Inking and Ferro-Printing**

- 5.1 Explain the inking and Ferro Printing.
- 5.2 State the material used for inking process.
- 5.3 State the instruments required for inking and their use.
- 5.4 Explain the procedure of inking.
- 5.5 State the material used for Ferro Printing.
- 5.6 State precautionary measures adopted during printing.
- 5.7 Explain the structure of Dark Room and its requirements.
- 5.8 State different types of printing.
- 5.9 Explain the defects arising during the preparation of Prints.

- 5.10 Explain the Remedial measures taken to prevent defects in prints.
- 5.11 Prefer the method of printing from economy point of view.

## **6. Seismic Design and Construction**

Students should be able to explain:

- 6.1 How earthquakes are generated
- 6.2 The types of ground shaking generated
- 6.3 The influence of ground conditions and in particular soft soil conditions at the site.

## CT-243 CIVIL DRAFTING II

### LIST OF PRACTICALS

1. Detailed Drawings of building components as given in theory. (Atleast 8 sheets).
2. Detailed drawings of frame structure building with details of
3. reinforcement.(Atleast 8 sheets).
4. Detailed drawings of road structures.(Atleast 6 sheets).
5. Detailed drawings of Irrigation structures.(Atleast 6 sheets).
6. Ink tracing of a given drawing and taking its prints.(Atleast 4 sheets)
7. Application of Auto-Cad software in Civil drafting.
8. Site visit and report
9. Practical in class sessions and report.

### REFERENCE BOOKS

1. Building Drawing by Gur Charn Singh
2. Engineering Drawing by French and Vierick
3. How to plan a House by Townsend
4. Be your own Architect by Z.H. Syed.
5. Irrigation by Dr. Iqbal
6. Building construction by Michel.
7. Building construction, drafting and design by Molnar.
8. **Seismic Design for Architects: Outwitting the Earthquake by Andrew Charleson published by Elsevier**

## CT-253      MECHANICS OF STRUCTURES

<b>Total Contact Hours:</b>	<b>160</b>	<b>T</b>	<b>P</b>	<b>C</b>
Theory:	64	2	3	3
Practical:	96			

- AIMS**
1. Understand the strength and behavior of Engineering materials & Elementary structural members.
  2. Understand the analysis of Elementary structural members.

### COURSE CONTENTS

- 1. Center Of Gravity (Centered) 4 hours**
  - 1.1 Introduction-definition terms used.
  - 1.2 Methods of determining C.G
  - 1.3 Calculation of C.G. of various structural section i.e. I-Section, H-Section, T-section, Channel Section, Angle Section and built up Section.
  - 1.4 Graphical Method for locating center of simple and built up section.
  
- 2. Moment Of Inertia 4 hours**
  - 2.1 Introduction definition and terms used.
  - 2.2 Moment of Inertia of rectangle, triangle and circle.
  - 2.3 Theorem of perpendicular and parallel axes .
  - 2.4 Calculation of moment of inertia of common structural sections, I,T, circular, angle and built up sections.
  
- 3. Simple Stresses And Strains 6 hours**
  - 3.1 Elasticity.
  - 3.2 Definitions of stress & strain and types.
  - 3.3 Hook's law and Modules of Elasticity.
  - 3.4 Lateral strain and Poisons ratio.
  - 3.5 Shear stress, shear strain and Modules of rigidity.
  - 3.6 Mechanical properties of material, elasticity, plasticity, Ductility, Brittleness Hardness.
  - 3.7 Introduction to Universal testing machines and its attachments for tensile and compressive strength test.
  - 3.8 Procedure for tensile and compression test (Ductile material).
  - 3.9 Stress strain curve of mild steel, elastic limit, proportion limit, yield point, ultimate stress, Breaking stress, working stress, factor of safety.
  - 3.10 Numerical problems.
  
- 4. Hardness 4 hours**
  - 4.1 Brief Description
  - 4.2 Brinell Hardness Test & Rock wall Hardness test.

- 5. Shear Force And Bending Moment** **8 hours**
- 5.1 Definition of beam, types of supports, types of beams.
  - 5.2 Types of loading.
  - 5.3 Calculation of reactions for different types of beams
  - 5.4 Definition and significance of shear force and bending moment.
  - 5.5 Calculation of S.F. & B.M. for beams carrying Point loads, U.D.L. and combined loadings.
  - 5.6 Draw S.F.D, B.M.D. and elastic curve for beams.
  - 5.7 Calculation of maximum and minimum Shear force and Bending moments for the beams and their locations.
  - 5.9 Position of point of contraflexure & its significance.
- 6. Stresses In Beams** **4 hours**
- 6.1 Types of stresses in beams (Bending and Shearing stresses).
  - 6.2 Assumption in simple bending
  - 6.3 Normal stress distribution in Beams of Rectangular, I & circular section - using bending equation.
  - 6.4 Practical application and simple problems, based on Bending equation.
  - 6.5 Shear stress in beams and distribution of shear stress for rectangular, circular and I-sections.
- 7. Deflection Of Beams** **4 hours**
- 7.1 Definition - significance.
  - 7.2 Name of various methods of Deflection calculation.
  - 7.3 Formula for calculation of maximum deflection in cantilever and simply supported beams for various loading conditions.
    - a. **For Cantilever Beam**
      - i. Point load at free end.
      - ii. Point load at any where on the span.
      - iii. U.D.L. on full span.
      - iv. U.D.L. covering a part of span from fixed end.
      - v. Combination of above loads.
    - b. **For Simply Supported Beams**
      - i. Point load on mid span.
      - ii. Point load on anywhere on span
      - iii. U.D.L. on whole span.
      - iv. Combination of above loads.
- 8. Column** **6 hours**
- 8.1 Definition - short and long column, failure pattern of column.
  - 8.2 Axial and eccentric loading.
  - 8.3 End conditions - Effective length in each case - radius of Gyration-slenderness ratio.
  - 8.4 Crushing load - safe load - F.O.S.
  - 8.5 Euler's formula for calculating ultimate load and its application.

- 8.6 Rankine formula for calculating ultimate load and its application.
- 9. Torsion** **4 hours**
- 9.1 Definition and effects of torsion.
  - 9.2 Twisting moment, polar moment of inertia, Angle of twist - Torsion formula.
  - 9.3 Solid and Hollow circular shaft subjected to pure Torsion.
  - 9.4 H.P. transmitted by circular shaft & Design Problems of solid and hollow circular shaft.
- 10. Riveted Joints** **6 hours**
- 10.1 Rivetted joints - types and terms used.
  - 10.2 Failure of riveted joints, strength and efficiency of a joint.
  - 10.3 Design of riveted joints, strength, efficiency, pitch.
- 11. Welded Joints** **2 hours**
- 11.1 Introduction, Relative Merits and demerits over riveted joints.
  - 11.2 Types of welded joints.
  - 11.3 Design of welded joint, fillet welds only (strength and dimension).
- 12. Trusses/Analysis Of Truss** **6 hours**
- 12.1 Introduction, steel truss, types, parts.
  - 12.2 Determination of force in members of statically determinate truss by method of section and joints.
  - 12.3 Graphical determination of forces in members of statically determinate truss.
- 13. Retaining Walls** **6 hours**
- 13.1 Introduction, classification, angle of repose, level and surcharge backing, active and passive earth pressure.
  - 13.2 Pressures on retaining wall and stresses at base (toe and heel) Rankine formula and application.
  - 13.3 Condition of stability of retaining wall.
  - 13.4 Checking stability of retaining wall.

## CT-253 MECHANICS OF STRUCTURES

### INSTRUCTIONAL OBJECTIVES

#### 1. Understand The Concept And Computation Of Center Of Gravity

- 1.1 Define center of gravity.
- 1.2 Explain terms; centeriod- first moment of area reference axis of symmetry
- 1.3 State positions of centeriod for simple regular figures
- 1.4 State methods of finding center of gravity.
  - 1.4.1 By geometrical consideration
  - 1.4.2 By the method of moments
  - 1.4.3 By graphical method
- 1.5 Determine position of C. G. for various structural sections i.e I-section, T-section angle section, Z-section and built up sections by method of moments
- 1.6 Determine position of centeriod of simple and built up sections by graphical method.

#### 2. Understand The Concept Of Moment Of Inertia And Its Determination

- 2.1 Define moment of inertia- second moment of area - polar moment - radius of gyration
- 2.2. State moment of inertia of simple geometrical shapes-rectangle -triangle - circle
- 2.3 State perpendicular and parallel axis theorem
- 2.4 Determine moment of inertia of simple and built up sections by applying parallel axes theorem.
- 2.5 Determine polar moment of Inertia for circular section applying perpendicular axes theorem

#### 3. Understand Behavior Of Materials Under Simple Stress

- 3.1 Define terms: Elasticity- Strain-Modules of Elasticity Longitudinal Strain- Lateral Strain, Poison's ratio-Modules of Rigidity-Volumetric strain-Bulk Modules.
- 3.2 State Hooks Law.
- 3.2 Distinguish between tensile, compressive, shear and bending stresses.
- 3.3 Explain mechanical properties of material. Elasticity-Plasticity Ductility- Brittleness and Hardness.
- 3.4 Identity parts and attachments of Universal Testing machine for tensile and compressive strength test.
- 3.5 Explain the procedure for tensile and compressive strength test on ductile material.
- 3.6 Explain the salient points in stress-strain curve for ductile material.
- 3.7 Solve problems on relationship between simple-stresses and strain under axial load.

#### 4. Understand The Hardness Property Of Material

- 4.1 Define Hardness.
- 4.2 Explain Hardness test, (a) Brinell`s Hardness test (b) Rock Wall Hardness test.

#### 5. Determine shear force and bending moment, draw b.m.d., s.f.d. & elastic curve

- 5.1 Define Beam.
- 5.2 State type of supports & beams.
- 5.3 State types of loading.

- 5.4 Calculate reactions for simply supported and overhanging beams under various loading conditions (Point loads-U.D.L & Combined loading).
- 5.5 Explain shear force & Bending Moment in beams.
- 5.6 Calculate shear forces and Bending moment at various sections of beam, under different loading conditions (Point loads-U.D.L & Combine loadings).
- 5.7 Draw shear force and bending moment diagrams of beams (Simply supported beam, over hanging beam & cantilever beam).
- 5.8 Calculate maximum and minimum shear force and bending moment and determine their positions.
- 5.9 Explain point of contraflexure.

## **6. Understand The Shear And Bending Stresses In Beam**

- 6.1 Explain the types of stresses in beams (Bending & Shear stress).
- 6.2 State the assumption made in theory of bending.
- 6.3 State Equation for/simple bending.
- 6.4 Explain Bending stress Distribution across rectangular I & circular section.
- 6.5 Solve problems on theory of simple bending.
- 6.6 State formula for shear stress.
- 6.7 Explain shear stress distribution across rectangular & I-sections of beam.

## **7. Understand Deflection Of Beams Under Loading**

- 7.1 Define deflection of beam.
- 7.2 State variation of deflection in different types of beams.
- 7.3 Name various methods of deflection calculation.
- 7.4 State formulas for calculation of maximum deflection in cantilever & simply supported beam for various loading conditions.

### **a. For cantilever beam.**

- i Point load at free end.
- ii Point load any where on span
- iii U.D.L on full span.
- iv U.D.L covering a part of span from free end

### **b. For simply supported beam.**

- i Point load at mid span.
- ii Point load at anywhere on span.
- iii U.D.L on whole span.
- iv Combination of above loads.

## **8. Understands The Behaviors Of Columns Under Axial Loads**

- 8.1 Distinguish between short column & long column.
- 8.2 State failure patterns of short & long column.
- 8.3 Distinguish between Axial & Eccentric loading.
- 8.4 Explain end conditions effective length in each case & slenderness ratio.
- 8.5 Define crushing load safe load & factor of safety.
- 8.6 State Euler's formula & Rankine's formula for calculating ultimate load.
- 8.7 Calculate the load carrying capacity of a column using Euler's formula & Rankine formula.

## **9. Understand The Effects Of Pure Torsion On Solid And Hollow Circular Shaft**

- 9.1 Define torsion testing moment polar moment of inertia Angle of twist.
- 9.2 Describe effects of torsion.
- 9.3 State the torsion formula for solid & hollow circular shafts.
- 9.4 Calculate the diameters of solid & Hollow circular shafts to transmit given horse power at permissible shear stress and at a permissible angle of twist.



9.5 Solve problems on torsion applying torsion formula.

**10. Understand The Behavior Of Rivetted Joint**

- 10.1 Define terms: Pitch, nominal diameter of rivets, gross dia of rivets strength and efficiency of riveted joints.
- 10.2 Explain the different types of rivetted joints.
- 10.3 Explain the types of failure of rivetted joints.
- 10.4 Calculate the strength and efficiency of a rivetted joints.

**11. Understand The Behavior Of Welded Joints**

- 11.1 Define welded joint.
- 11.2 Compare welded and rivetted joints.
- 11.3 Calculate strength & dimensions of welded joints.

**12. Understand The Effect Of Loads On Statically Determinate Truss**

- 12.1 Define truss.
- 12.2 State types & parts of steel truss.
- 12.3 State methods of truss analysis.
- 12.4 Determine force in members of statically determinate truss by method of joints & method of sections.
- 12.5 Determine graphically forces in members of statically determinate roof truss.

**13. Calculate Stability Of Retaining Wall, Comparing Against Standards.**

- 13.1 Define Retaining wall angle of repose level & surcharge backing active and passive earth pressure.
- 13.2 State the classification of retaining wall.
- 13.3 Explain the pressures on retaining wall and stresses at Base.
- 13.4 State formulas for Intensity of pressure (Horizontal & Vertical). Eccentricity & Maximum & Minimum stresses.
- 13.5 Describe condition of stability of retaining walls.
- 13.6 Compare the results of stability of retaining walls with standards.
- 13.7 Calculate pressures & Stresses (Numerical Problems)

## CT-253 MECHANICS OF STRUCTURES

### LIST OF PRACTICALS

96 hours

1. Find graphically the C.G of Angle, Channel, T & I Sections.
2. Solving problems of M.O.I for composite sections.
3. To find the relation between the stress and strain of a given copper wire with the help of a Young's modulus apparatus. Plot a graph between the stress and strain. Hence find the Young's modulus of the substances of the wire.
4. To find tensile strength of a mild steel specimen plotting and interpretation of stress strain curve.
5. Rock wall/Brinell Hardness test on aluminum, copper and mild steel.
6. Draw S.F.D. and B.M.D in case of simply supported beams under various loading conditions.
7. Draw S.F.D.& B.M.D in case of over hanging beams under various loading conditions.
8. Draw S.F.D & B.M.D of cantilever beams under various loading conditions.
9. Practice in designing the homogeneous beam by simple bending equation.
10. Draw shear stress distribution for various beam section.
11. Show by means of deflection of beams apparatus that the deflection is proportional to the cube of span also draw a graph and also show that the deflection is proportional to the load.
12. Solving problems on deflection of beams
13. Solving problems on Euler's formula
14. Design of column-Rectangular, circular and Hollow circular section by Rankin's formula.
15. Design & drawing of a double cover butt-joint and Lap joint.
16. Design problems on welded joints
17. Practice in finding stresses in various members of a given truss by joint and section method.
18. Analysis of given truss by graphical method
19. Check Stability of given retaining wall.

### REFERENCES BOOKS

1. Strength of Material by Singer.
2. Strength of Materials by William A. Nash.
3. Strength of Material by R.S. Khurmi.
4. Mechanics of solid by F. Warnik.
5. Strength of material by Abdul Mubeen
6. Elementary structural Analysis McGraw Hill
7. Strength of Material by G.H. Ryder
8. Mechanics of structure by JUNARKAR

## CT-262 QUANTITY SURVEYING-I

### Total Contact Hours 128

Theory	32
Practical	96

T	P	C
1	3	2

### AIMS:

1. Understand the estimation of Earth Work and complete estimate of single storey building.
2. Work out the rate analysis and material statement of various items of work.
3. Understand complete estimates of bituminous and concrete roads, and sewerage scheme.

### COURSE CONTENTS

- 1. Introduction** **2 hours**
  - 1.1. Estimate and its types.
  - 1.2. Data for estimating.
- 2. Specifications** **4 hours**
  - 2.1. General specifications.
  - 2.2. Detailed specifications of all items of work.
- 3. Building Estimates** **7 hours**
  - 3.1. Rough cost estimate of Buildings.
  - 3.2. P.W.D, MES and English method of writing measurement.
  - 3.3. Instructions on working out quantities of various types of wall.
  - 3.4. Instructions on working out quantities and Abstract of quantities of various items of work of a single storey building (building portion only).
  - 3.5. Study of schedule of rate and preparation of abstract of cost for all item of work of a single storey building (building portion only).
  - 3.6. Annual and special repair estimates.
- 4. Earth Work Estimates** **4 hours**
  - 4.1. Units of measurement/payment.
  - 4.2. Preparation of proforma for earth works.
  - 4.3. Taking out quantities for embankment, roads, in plain and hills, irrigation channel (including remodeling).
- 5. Road Estimates** **3 hours**
  - 5.1. Units of measurements.
  - 5.2. Instruction regarding complete estimate of bituminous road, cement concrete road.
- 6. Rate Analysis** **4 hours**
  - 6.1. Instruction on Market rates, materials, labour and carriage.
  - 6.2. Schedule of labour.
  - 6.3. Rate analysis for
    - 6.3.1. Cement concrete of ratios.
    - 6.3.2. Brick work in cement mortar.
    - 6.3.3. Cement conglomerate floor
    - 6.3.4. Dry brick paving.

- 6.3.5 Cement plaster of ratios.
- 6.3.6 Cement pointing
- 6.3.7 White washing.
- 6.4 Material statement for various item of Building work.

**7. Sewerage Scheme 4 hours**

- 7.1 Units of measurement
- 7.2 Method of estimating sewer line and its components.

**8. Valuation Of Property 4 hours**

- 8.1 Introduction-definition and purpose of valuation.
- 8.2 Sinking fund, scrap value, salvage value, market value, book value and years purchase.
- 8.3 Depreciation of buildings-methods of calculating depreciation.
- 8.4 Methods of valuation.
- 8.5 Calculation of standard rent of buildings on capital %age basis method

## CT-262 QUANTITY SURVEYING-I

### INSTRUCTIONAL OBJECTIVES

- 1. Know The Importance And Types Of Estimates Of Works**
  - 1.1 Describe the importance of estimates.
  - 1.2 State the date required for preparation of estimates.
  - 1.3 State the type of estimates.
- 2. Understand Specifications Of All Items Of Works Of A Building**
  - 2.1 Define specifications.
  - 2.2 Explain the purpose and types of specification.
  - 2.3 State general specification of a building.
  - 2.4 Discuss the detailed specifications of important items of works.
- 3. Understand Principles Involved In Preparation Of Building Estimate**
  - 3.1 Prepare rough cost estimate of a building from given line plan or covered area.
  - 3.2 Distinguish between P.W.D and English method of recording measurements.
  - 3.3 List the all items of works for a residential building (only building position except public health and electrification portion).
  - 3.4 Determine quantities of all items of works for straight; T, L, F, V shaped walls and circular walls.
  - 3.5 Workout quantities of all items of works for a single storey building (building portion only) from a given drawing.
  - 3.6 Prepare bill of quantities and abstract of cost with the help of composite schedule of rates.
  - 3.7 Prepare annual and special repair estimate for a given building.
- 4. Understand The Principles Involved In Calculation Of Earth Work For Embankments, Roads, Irrigation Channels Etc**
  - 4.1 State data required for computation of earth works.
  - 4.2 Explain methods to determine quantity of earth work and their respective proforma.
  - 4.3 Work out (determine) quantity of earth work for embankments, roads irrigation channels.
  - 4.4 Explain remodelling of irrigations channels.
  - 4.5 Work out quantity of earth work for remodelling of a channel from given X-sections of channel.
- 5. Understand The Preparation Of Detailed Estimate Of Various Types Of Roads**
  - 5.1 Describe parts of road structure and their specifications.
  - 5.2 State the units and method of measurement of all items of works for a road.
  - 5.3 Prepare detailed estimate for bitumen and cement concrete road.
- 6. Understand Rate Analysis Of Major Items Of Works**
  - 6.1 Describe the purpose of rate analysis.
  - 6.2 Explain prerequisites for analysis of rate of items of works, i.e market rates of materials and labour, carriage, out-turn of labour, specifications, overhead costs etc.
  - 6.3 Determine quantity of materials required for various items of building works.
  - 6.4 Prepare material statement for various items of building works.
  - 6.5 Prepare analysis of rates for important items of work as given in subject

contents.

**7. Understand Detailed Estimate For A Sewer Line Along With Man Holes Etc**

- 7.1 List all item of works for a sewer line and their units measurements.
- 7.2 Explain instructions for working out quantities of all items of works.
- 7.3 Work out quantities of each item of work for sewer line and man hole from given drawing.
- 7.4 Prepare bill of quantity and abstract of cost.

**8. Understand Valuation Of Building And Fixation Of Rent**

- 8.1 State the purpose of valuation.
- 8.2 Explain terms, book value, market value, salvage value, scrap value, sinking fund, year's purchase, annuity, capitalized value and depreciation.
- 8.3 Determine the depreciation of a building by straight line method, constant percentage method and sinking fund method etc.
- 8.4 Determine the value of a building by rental method, valuation based on profit and depreciation method.
- 8.5 Determine rent for government and private building

## **CT-262 QUANTITY SURVEYING-I**

### **LIST OF PRACTICALS**

1. Preparation of rough cost estimates of buildings.
2. Writing specification.
3. Taking out measurements of a straight wall, T, L,H,F,U, shaped walls and circular walls.
4. Complete estimate of a single storey building.
5. Preparation of Annual repair/special repair estimates.
6. Working out earth work of earthen embankment of given design and data.
7. Working out earth work of road (in plain and hilly areas), and irrigation channel.
8. Complete estimate of arterial roads (bituminous and concrete road).
9. Rate analysis for various items of building work viz cement concrete of ratios, Brick work in cement in foundation and plinth and superstructure, dry brick paving, cement conglomerate floor, cement plaster of ratios, cement pointing, white washing.
10. Preparation of material statements of various items of building works.
11. Preparation of estimate of newer line including main hole etc.
12. Calculation of present market value of an existing building by standard rent method and depreciation method.

### **REFERENCE BOOKS**

1. Rasul Manual No.4 on Estimating.
2. Estimating and Costing by Dutta.
3. Estimating and Costing by M.A. Aziz. PROJECT MANAGEMENT