

**Scheme of Teaching and Examination for  
3rd Semester of 3 Years Diploma in Civil Engg..**

Duration of Semester : **14 Weeks**  
 Student Contact Hours : **36 Hrs**  
 Total Marks : **800**  
 Effective from : 2017 -18 Session

Sl. No.	Name of Subject	Subject Code	Subject	Teaching Scheme			Examination Scheme				
				L	T	P	Full Marks of Subject	Final Exam / committee marks	Internal Assessment	Pass Marks Final / Ext. Exam	Pass Marks in Subjects
1.	Engg Maths III	301	Theory	4		-	100	80	20	26	40
2.	Surveying	CIV 303	Theory	3	-	-	100	80	20	26	40
3.	Building Material	CIV 304	Theory	3	-	-	100	80	20	26	40
4.	Strength of Material	CIV 305	Theory	3		-	100	80	20	26	40
5.	Building Drawing (AutoCAD)	CIV 306	Theory	3	-	-	100	80	20	26	40
6	Surveying Lab	CIV 307	Sessional	-	-	4	100	60	40		50
7	Strength of Material Lab	CIV 308	Practical	-	-	2	50	40	10	13	20
8	Building Material Lab	CIV 309	Sessional	-	-	4	100	60	40		50
9	DLS	302	Sessional	-	-	4	50	30	20		25
<b>Total Hours of Teaching per week :</b>				<b>16</b>		<b>14</b>	<b>800</b>				

Total Marks : Theory : Practical : Sessional :  
 L : Lecture, T : Tutorial P : Practical

- Note:
1. Period of Class hours should be of 1 hrs duration as per AICTE norms.
  2. Remaining Hrs every week has been marked for students Library and Student Centered Activities.
  3. Drawing / Graphics / Practical / Sessional examinations will be held at parent institution.
  4. Board will depute examiner for Practical examination.
  5. Regarding sessional examination the parent institution will form a three member committee and this committee will examine the sessional records and hold viva of the examinee for 60 % marks allotted to the subject. Marks for remaining 40 % will be provided by the Faculty concerned on the basis of evaluation of each job / work throughout the semester.



**L T P**

**3**

**Subject : BUILDING DRAWING (AUTOCAD)**

**Subject Code CIV306**

Module	Contents
1	<b>CAD Software:</b> 6 Hrs Meaning of various CAD software available in the market auto CAD, Felix CAD, AutoCAD civil 3D, 3D max, etc. user interface Starting up of CAD, CAD window, Tool bar, Drop down menu, command window, saving the drawing. Introduction of graphic screen.
2	<b>CAD Command:</b> 6 Hrs WCS icon, UCS icon, co-ordinates, drawing limits, ellipse, polygon etc. Editing commands- copy, move, offset, fillet, chamfer, trim, lengthen, working with hatches, fills, dimensioning, text etc.
3	<b>Planning of Buildings</b> 6 Hrs Principles of planning of residential and public building ( Load bearing and RCC framed structure) Space requirements and norms for various units of residential and public buildings Rules and Jharkhand State byelaws of building for construction e.g. building line , open spaces , FSI / FAR, headroom, minimum room dimensions.
4	<b>Creating, modifying points and surfaces:</b> 6 Hrs I. Creating & managing points. II. AutoCAD user interface. III. Basics of using AutoCAD draw tools. IV. Basics of using AutoCAD modify tools. V. Creating surfaces. VI. Surface styles. VII. Edit surfaces.
5	<b>Parcel &amp; Alignments:</b> 6 Hrs I. Creating parcel. II. Editing parcel. III. Labelling parcel and creating tables. IV. Working with alignments. V. Editing alignments. VI. Working with alignments and parcels.
6	Drawing of Doors & Windows, Staircase and lift, lintel, beam and column 6 Hrs
7	<b>Submission/working Drawing:</b> 6 Hrs Generation of line plan, Detailed plan, elevation, section, site plan, Area statement. Generation of 3D view and print commands Introduction to Auto Civil, 3D Max.

**Reference Books :-**

AutoCAD  
Building Drawing  
Mastering AutoCAD ( Civil)

BPB Publication  
B P Verma

# **BUILDING MATERIALS**

**Total marks: 100 (80 + 20)**

**Subject Code CIV 304**

**Theory: 42**

**Rational:**

The subject of building material is very important for the diploma holder in civil engineering. The course material has been designed for the student to know the properties of the building material as well as the strength of the material as per IS code of practices. Further, practices input have been given for augmenting the learning by the student.

**Aim:**

To know the properties of different material for use and quality control in construction works.

<b>1.0 Bricks:</b>	<b>05 hrs</b>
1.1 Bricks earth – its composition & selection	
1.2 Brick making – preparation of brick moulding, drying, burning in kiln	
1.3 Classification of bricks, size of traditional and modular bricks, qualities of good building bricks	
1.4 Uses of brick bats and surkhi, uses of hollow bricks.	
<b>2.0 Lime:</b>	<b>01 hrs</b>
2.1 Type of lime	
2.2 Uses of lime	
<b>3.0 Cement:</b>	<b>02 hrs</b>
3.1 Type of cements	
3.2 Properties of cements	
3.3 Testing of quality of cement	
3.4	
<b>4.0 Sand:</b>	<b>02 hrs</b>
4.1 Sources and classification of sand	
4.2 Bulking factor and finesses of sand	
4.3 Qualities and grading of sand for plaster and for masonry Work as per BIS specification (IS:1542,2116,383)	
<b>5.0 Stone:</b>	<b>03 hrs</b>
5.1 Classification of rock, uses of stone, natural bed of stone, Qualities of good building stone.	
5.2 Stone quarrying- tools for blasting, process of blasting, Precautions in blasting, machines for quarrying, dressing of stone.	
5.3 Characteristics of different type of stone and their uses	

<b>6.0 Refractory material and clay products:</b>	<b>03 hrs</b>
6.1 Definition, classification of refractory	
6.2 Properties and uses of refractory like terracotta, porcelain glazing.	
6.3 Different types of Tile and similar products.	
<b>7.0 Mortar and concrete:</b>	<b>10 Hrs</b>
7.1 Composition and properties of ingredients in both cement & lime mortar and concrete	
7.2 Properties and uses of cement & lime mortar and concrete	
7.3 Grading of aggregates in concrete	
7.4 Water- cement ratio	
7.5 Concreting- mechanical properties of aggregate, mixing of ingredients, placing, compacting and curing of concrete.	
7.6 Introduction to Ready Mixed Concrete	
7.7 Factors responsible for deterioration of concrete	
<b>8.0 Timber:</b>	<b>04 Hrs</b>
8.1 Classification and structure of timber	
8.2 Defects in timber	
8.3 Disease and decay of timber	
8.4 Seasoning and preservation of timber	
8.5 Manufacturing and uses of plywood	
8.6 Special characteristics of Assam type timber	
8.7 Substitute building materials of timber	
<b>9.0 Paint, Varnish and Distemper:</b>	<b>04 Hrs</b>
9.1 Purpose of painting a surface	
9.2 Characteristics of ideal paint and varnish	
9.3 Ingredients of paint and varnish	
9.4 Process of painting and varnishing	
9.5 Repainting of old surface	
9.6 Purpose of applying distemper, properties, ingredients, process of distempering	
9.7 Application of white washing and colour washing	
<b>10.0 Iron and steel:</b>	<b>03 Hrs</b>
10.1 Uses of cast iron, wrought iron, mild steel and tor steel	
10.2 Classification and uses of steel	
<b>11.0 Bituminous material:</b>	<b>03 hrs</b>
11.1 Distinction among tar, bitumen and asphalt	
11.2 Different types of asphalt and tor and their uses	
12. Introduction to Nano Materials	<b>02 Hrs</b>

**List of Experiments (Minimum 10 Experiments are to be performed)**

1. Identification of various construction materials
2. Determination of compressive strength of brick.
3. Water absorption test on Bricks, Stones and Tiles.
4. Hardness test of floor marbles and tiles.
5. Construction of bonds in brick work
6. Compressive strength test of Cement mortar
7. Tensile strength of cement mortar
8. Compressive strength of concrete cube
9. Slump test of concrete.
10. Demonstration of log of a timber cross section.
11. Checking spreading quality of paints.
12. Determination of Hardness of glass.

**REFERENCE OF BOOKS :**

1. Materials of construction- by D.N Ghosh, :Tata Mc-Grew hills
2. Text book of materials- by Rangawala.
3. Building Materials – by Shri S.K. Basu and Shri A.K. Ray;; S.K. Lahiri & Co. (P) ltd
4. Civil engineering materials- T.T.T.I, Chandigarh, Tata McGrew Hills
5. Building Materials – Duggal
6. Building Materials - J Jha & S K Sinha
7. Building Materials – Sushil Kumar

### 3<sup>rd</sup> Semester Diploma in Engineering (Common)

**Subject Title : Development of Life Skills- I**

**Subject Code :302**

**Rationale:**

In today's competitive world, the nature of organizations is changing at very rapid speed. In this situation the responsibility of diploma holder is not unique. He will be a part of a team in the organization. As such the individual skills are not sufficient to work at his best.

This subject will develop the student as an effective member of the team. It will develop the abilities and skills to perform at highest degree of quality as an individual as well as a member of core group or team. Such skills will enhance his capabilities in the field of searching, assimilating information, managing the given task, handling people effectively, solving challenging problems.

**THE SUBJECT IS CLASSIFIED UNDER HUMAN SCIENCE. Objectives:** The

students will be able to:

1. Develop team spirit i.e. concept of working in teams
2. Apply problem solving skills for a given situation
3. Use effective presentation techniques
4. Apply techniques of effective time management
5. Apply task management techniques for given projects
6. Enhance leadership traits
7. Resolve conflict by appropriate method
8. Survive self in today's competitive world
9. Face interview without fear
10. Follow moral and ethics
11. Convince people to avoid frustration

**CONTENTS: Interaction by faculty / professional**

<b>Chapter</b>	<b>Name of the Topic</b>	<b>Suggested HOURS</b>
<b>1</b>	<b>SOCIAL SKILLS</b> Society, Social Structure, Develop Sympathy And Empathy.	<b>01</b>
<b>2</b>	Swot Analysis – Concept, How to make use of SWOT.	<b>01</b>
<b>3</b>	<b>Inter personal Relation</b> Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relations.	<b>02</b>

4	<p><b>Problem Solving</b></p> <p><b>I)STEPS IN PROBLEM SOLVING,</b></p> <p>1)Identify and clarify the problem,  2)Information gathering related to problem,  3)Evaluate the evidence,  4)Consider alternative solutions and their implications,  5)Choose and implement the best alternative,  6)Review</p> <p><b>II)Problem solving technique.</b>(any one technique may be considered)</p> <p>1) Trial and error, 2) Brain storming, 3) Lateral thinking</p>	02
5	<p><b>Presentation Skills</b></p> <p>Body language --  Dress like the audience  Posture, Gestures, Eye contact and facial expression. STAGE FRIGHT,  Voice and language – Volume, Pitch, Inflection, Speed, Pause  Pronunciation, Articulation,  Language, Practice of speech.  Use of aids –OHP,LCD projector, white board</p>	03
6	<p><b>Group discussion and Interview technique –</b></p> <p>Introduction to group discussion,  Ways to carry out group discussion,  Parameters— Contact, body language, analytical and logical thinking, decision making</p> <p><b>INTERVIEW TECHNIQUE</b></p> <p>Necessity,  Tips for handling common questions.</p>	03
7	<p><b>Working in Teams</b></p> <p>Understand and work within the dynamics of a groups.  Tips to work effectively in teams,  Establish good rapport, interest with others and work effectively with them to meet common objectives,  Tips to provide and accept feedback in a constructive and considerate way ,  Leadership in teams, Handling frustrations in group.</p>	02
8	<p><b>Task Management</b></p> <p>Introduction,  Task identification,  Task planning ,organizing and execution, Closing the task</p>	02
<b>TOTAL</b>		<b>16</b>



## CONTENTS: PRACTICAL -

### List of Assignment: (Any Eight Assignment)

1. SWOT analysis:- Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT.
  - a) Your past experiences,
  - b) Achievements,
  - c) Failures,
  - d) Feedback from others etc.
2. Undergo a test on reading skill/memory skill administered by your teacher.
3. Solve the true life problem.
4. Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.( One activity per group)
5. Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.
6. Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme. #####
7. Conduct an interview of a personality and write a report on it.
8. Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed
9. Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by your teacher.

**Note:** - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The **term work** will consist of any eight assignments.

**Mini Project** on Task Management: Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management.

### LEARNING RESOURCES:

#### BOOKS:

Sr. No	Title of the book	Author	Publisher
1	Adams Time management	Marshall Cooks	Viva Books
2	Basic Managerial Skills for All	E.H. Mc Grath , S.J.	Pretice Hall of India
3	Body Language	Allen Pease	Sudha Publications Pvt. Ltd.
4	Creativity and problem solving	Lowe and Phil	Kogan Page (I) P Ltd
5	Decision making & Problem Solving	by Adair, J	Orient Longman
6	Develop Your Assertiveness	Bishop , Sue	Kogan Page India
7	Make Every Minute Count	Marion E Haynes	Kogan page India
8	Organizational Behavior	Steven L McShane and Mary Ann Glinow	Tata McGraw Hill
9	Organizational Behavior	Stephen P. Robbins	Pretice Hall of India, Pvt Ltd
10	Presentation Skills	Michael Hatton ( Canada – India Project)	ISTE New Delhi

11	Stress Management Through Yoga and Meditation	--	Sterling Publisher Pvt Ltd
12	Target setting and Goal Achievement	Richard Hale ,Peter Whilom	Kogan page India
13	Time management	Chakravarty, Ajanta	Rupa and Company
14	Working in Teams	Harding ham .A	Orient Longman

#### INTERNET ASSISTANCE

1. <http://www.mindtools.com>
2. <http://www.stress.org>
3. <http://www.ethics.com>
4. <http://www.coopcomm.org/workbook.htm>
5. <http://www.mapfornonprofits.org/>
6. <http://www.learningmeditation.com> <http://bbc.co.uk/learning/courses/>
7. <http://eqi.org/>
8. <http://www.abacon.com/commstudies/interpersonal/indisclosure.html>
9. <http://www.mapnp.org/library/ethics/ethxgde.htm>
10. [http://www.mapnp.org/library/grp\\_cnfl/grp\\_cnfl.htm](http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm)
11. <http://members.aol.com/nonverbal2/diction1.htm>
12. [http://www.thomasarmstron.com/multiple\\_intelligences.htm](http://www.thomasarmstron.com/multiple_intelligences.htm)
13. <http://snow.utoronto.ca/Learn2/modules.html>
14. <http://www.quickmba.com/strategy/swot/>

# STRENGTH OF MATERIALS

**Total marks : 100 (80+20)**

**Total Contact hours: 42**

**Subject Code: CIV 305**

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## **RATIONALE.:**

Mechanics of Materials deals with the internal behaviour of variously loaded solid bodies, such as ; Shafts, bars, beams, plates and columns, as well as structures and machines that are assemblies of these Components. Mechanics of materials focuses primarily on mechanical properties of materials, analysis of stress, strain and evaluation of deformations. The subjects like structural analysis, design of structures as well as machines are based on adequate knowledge and understanding of Mechanics of Materials. Therefore, it is an important basic subject for Diploma students in Civil and Mechanical Engineering.

## **AIM :**

The aim of the subject Mechanics of Materials is to develop background preparation of students for taking up Engineering subjects like Theory and Design of Structures, Design of Machines mostly through the followings:

- ▶ Describe the Mechanical properties of important Engineering materials.
- ▶ Determination stresses strains and deformations in elastic bodies of different shapes under different loading conditions for engineering applications.
- ▶ Determination load carrying capacity of different types of members.

### **1. Introduction**

**02 Hrs**

Elementary knowledge of stress & strain. Concept of Homogeneous, Isotropic & orthotropic material. Principle of superposition, St. Venant principle. Assumption in the analysis of solid material and their idealized behaviors: elastic, linearly elastic, ductile, brittle, viscous & viscoelastic such as creep & stress relaxation.

### **2. Stress and Strain :**

**12 Hrs**

- 2.1 Stress & strain and their types, complimentary shear stress. Tensile test of ductile & brittle material. Feature point on the curve. Factor of safety.
- 2.2 Hooke's law, poisson's ratio, Generalized Hooke's law, relation among the elastic constants for an isotropic material. Volumetric strain & their calculation for some common solid shapes.

- 2.3 Thin cylindrical & spherical shell. Hoop stress & strain. Change in dimension due to rise in pressure.
- 2.4 Deformations of Axially Loaded Members: Bars of varying section, tapering rod, bars of composite section, Deformation due to self weight, Thermal stress. (Simple problems on determination of stresses and shortening).

**3. Centroid & Moment of Inertia. 05 hrs**

Difference between c.g & centroid, Axis of symmetry. Centroid of simple common Figure by 1<sup>st</sup> principle, Calculation of centroid of composite section M.I. & their Calculation for simple plane shape by 1<sup>st</sup> principle perpendicular axis theorem. Polar Moment of inertia. Parallel axis theorem and their use for calculation M.I. of composite section radius of gyration.

**4. Analysis of beams : 8 hrs**

Forces, Types, Resolution of forces, Equilibrium of forces Types of support, load and beam. Shear force and bending moment . Relation between Shear force, bending moment & uniformly distributed load. Shear force diagram and bending moment diagram of simply supported & cantilever beam with concentrated, UDL or combination of them. Introduction of singularity function for calculation SFD & BMD.

**5. Stresses in Beams: 9 hrs**

- 5.1 Assumptions in the theory of pure bending, derivation of bending stress formula, concept of neutral axis, section modulus,, calculation of bending stresses for different types of loading and sections ( in SS and Cantilever beam).
- 5.2 **Shear stresses in beams** – Formula for shear stress in rectangular cross section. Calculate shear stresses at different layers of a given Beam; draw the distribution of shear stress for different structural sections (only application of formula).
- 5.3 **Torsional Stresses:** Basic assumption for pure torsion, torsion of circular shafts (hollow and solid) – polar moment of inertia, torsional shearing stress, angle of twist, torsional rigidity. Determination of maximum shear stress and angle of twist in shafts transmitting given torque. Horse power transmitted by a shaft.

**6 Columns and Struts : 06 hrs**

Definition of columns and struts; Buckling load (critical or crippling load); Slenderness ratio, Classification of columns.  
Euler's Theory – Basic assumptions made in Euler's theory for column buckling. Effective lengths for different end conditions. Factors affecting buckling strength of long column. Limitations of Euler's theory.  
Other Formulae – Practical deviations from ideal column, Rankine's formula, factor of safety for different column materials, IS -800 latest edition.

## **Strength of Material Lab**

### **Subject Code CIV 308**

1. Tension test on Tor /deformed steel bar using UTM.
2. Determination of support reaction of beam.
3. Testing of central deflection of a simply supported beam model (e.g., M.S. flat) with concentrated loading at the middle.
4. Determination of Young's Modulus for the material of beam model by load deflection method.
5. Determination of torsion and torque of steel.
6. Fleural test on Floor Tiles/Marble.
7. Transverse strength test on flooring Tiles.
8. Determination of compressive strength of concrete cube by CTM.
9. Determination of compressive strength of cast iron
10. Determination of critical Euler's load of column

#### **REFEFENCE BOOKS :**

1. Elements of Strength of materials – by S.P. Timoshenko, D.H. Young; Affiliated East – West Press Private Limited.
2. Engineering Mechanics and Strength of materials of materials – by R.K. Bansal; Laxmi Publication, New Delhi.
3. Strength of Materials – by Surendra Singh; Vikas Publication House Pvt. Ltd.
4. Strength of Materials – by Ferdinand L.Singer; Harper and Row and John Weatherbill.
5. Theory and Problems of Strength of Materials – by William A Nash; Shaum'm outline of Shaum's Outline Series, Mc. Graw Hill. Inc.
6. Engineering Mechanics of Solids – by Egor P. Popov; Prentice Hall of India Private Ltd.. New Delhi.
7. Strength of Materials – by R.S. Khurmi.
8. Strength of Materials –by Dr. Sadhu Singh; Khanna Publications, Delhi – 110 006.
9. Engineering Mechanics & Strength of Materials – by S. Ramamrutham; Dhanpat Rai Publication Co. Delhi – 110 006.
10. Mechanics of Materials through problems – by A.C. Ugural; Mc. Graw Hill. Inc.
11. Strength of Materials – by D.R. Malhotra and H.C. Gupta; Satya Prakashan , New Delhi - 110 005.
12. Strength of Materials through problems – by B.K. Sarkar; Allied Publishers Limited, NEW DELHI-110002
13. Strength of Material by Bhavikatti

## **SURVEYING**

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3 0

**Subject Code :-CIV 303**

**Total Contact hrs. :**

*Theory : 42*

**Total marks : 100 (80+20)**

### **RATIONALE :**

Surveying is an essential component of the day to day work of a Civil Engineering Technician. The job includes conducting detailed surveying, plotting of survey data, preparation of survey maps etc. In view of its importance the course content has been divided into 2 parts and introduced sequentially as Surveying – 1. Each theory course is accompanied by practical course work to provide hands on experience.

The course content of Surveying –I includes the basic concept of surveying, horizontal linear and angular measurements and conducting surveys involving horizontal linear and angular measurements with stress on familiarization with various equipment used. It also includes vertical linear measurements to indicate the profile of the land surface by levelling has also been covered in details.

### **AIM :**

The course content of Surveying – I has been designed to provide adequate information to develop competency in a learner to-

1. Comprehend the concepts of surveying,
2. Carry out horizontal linear and angular measurements using appropriate equipment,
3. Conduct survey work in field using horizontal linear and angular measurements,
4. Record the data observed during the survey work,
5. Plot the survey map from the recorded data,
6. Compute the data required for plotting,
7. Interpret the plotted survey map and compute data from it,
8. Determination of elevations of points on the earth surface, using appropriate equipment,
9. Record the data observed during leveling,
10. Compute the data required for plotting.

### **1.0 Introduction:**

**02 hrs**

- 1.1 Definition of surveying and related terms
- 1.2 Aims and objectives of surveying
- 1.3 Primary division of surveying with their purposes
- 1.4 Classification of surveying
- 1.5 Principles of surveying
- 1.6 Field work-essential feature and organization
- 1.7 Office work-feature, plotting, scales, effect of erroneous scale
- 1.8 Maintenance and adjustments of instruments
- 1.9 Precision and accuracy of measurements

## 2.0 Linear measurement:

10 hrs

- 2.1 Method of measuring distance, their merits and demerits.
- 2.2 Instruments for measuring distance:  
Tape and Chains
- 2.3 Equipment and accessories for chaining-description only
- 2.4 Use of chain- unfolding & folding, use of arrows, reading a chain, testing and adjusting of chain .
- 2.5 Ranging – purpose, signalling, direct and indirect ranging, line ranger- featuring and use, error due to incorrect ranging.
- 2.6 Method of chaining- Role of leader and follower, Chaining on flat ground, chaining on sloping ground-stepping method, Clinometers- feature and use, slope correction. (Demonstration in field)
- 2.7 Field problems- Setting perpendicular with chain & tape, chaining across different type of obstacles-
  - a) Chaining around obstacle possible:  
Vision free but chaining obstructed both vision and chaining obstructed.
  - b) Chaining around obstacle not possible:  
Vision free but chaining obstructed, chaining free but vision obstructed.Numerical problem on chaining across obstacles
- 2.8 Error and mistakes in liner measurement-classification, sources of error and remedies.
- 2.9 Correction to measured length due to-incorrect length, temperature variation, pull, sag, numerical problem applying corrections
- 2.10 Precaution during chaining.
- 2.11 Principle of chain surveying-well conditioned and ill conditioned triangles
- 2.12 Field books-single line & double line entry, field book recording
- 2.13 Selection of survey station, base line, Tie line, Check lines
- 2.14 Offsets-necessity, perpendicular and Oblique offsets, Setting offsets with chain & tape, Instruments for setting offset- Cross staff, optical Square, feature, use & handling , suitability, sources of error & remedies.
- 2.15 Error in chain surveying- causes & remedies, Precautions during chain surveying.

## 3.0 Compass Surveying :

08 hrs

- 3.1 Compass- types- surveyor's compass, Prismatic compass, feature, parts, merits & demerits, suitability of different types.
- 3.2 Concept of meridians-magnetic, true, arbitrary. Concept of bearings-whole circle bearing, Quadrantal bearing / Reduced bearing, numerical problems on conversion of bearings.
- 3.3 Use of compass- setting in field- centering, levelling, taking readings, concept of fore-bearing, Back bearing, Numerical problems on computation of interior & exterior angles from bearings.
- 3.4 Effect of earth's magnetism- dip of needle, magnetic declination, variation in declination, numerical problems on application of correction for declination.
- 3.5 Local attraction- causes, detection, error, corrections, numerical problems on application on application of correction due to local attraction.

- 3.6 Principle of traversing- open & closed traverse, advantage & disadvantages over chain surveying.
- 3.7 Method of traversing- locating objects, field book entry.
- 3.8 Plotting of traverse- check of closing error in closed & open traverse.
- 3.9 Computations of area from plotted survey, planimeter, feature, use of menstruation techniques- average ordinate rule. Trapezoidal rule, Simpson's rule.

#### **4.0 Levelling:**

**08**

- 4.1 Purpose of levelling
- 4.2 Definition of terms used in levelling- concept of level surface, Horizontal surface, vertical surface, datum, RL, Bench mark, Concept of line of collimation, axis of bubble tube, axis of telescope, vertical axis, BS, IS, FS, CP, HI.
- 4.3 Types of levels and Levelling staff, auto level.
- 4.4 Temporary adjustment of level, taking reading with level
- 4.5 Principle of levelling- simple levelling, Different types of levelling, use and method- Fly levelling, check levelling- longitudinal section and cross-sections
- 4.6 Field data, entry of level Book- Height of collimation method and rise & fall method, comparison, Numerical problems on reduction of level applying both methods, Arithmetic checks.
- 4.7 Effect of curvature and refraction, numerical problems on application of correction.
- 4.8 Reciprocal levelling- principle, method, numerical problems, precise levelling.
- 4.9 Difficulties in levelling, error in levelling and precautions
- 4.10 Contouring: Counter interval, horizontal interval, characteristics of counter lines, interpolation of contour , uses of contour maps

#### **5. Theodolite Survey**

**10 hrs**

- 5.1 Types of theodolite and terminologies in theodolite survey
- 5.2 Temporary and permanent adjustment of theodolite
- 5.3 Relation between fundamental lines of theodolite
- 5.4 Measurement of horizontal and vertical angles, base line, extension of base line
- 5.5 Features and use of Total Station and modern survey equipments.
- 5.6 Tachometry survey for determination of horizontal distance of plane and slope ground. ( numerical problems)
- 5.7 Latitude, departure and computation of length and bearing of closed traverse. Bowditch and transit rule.

#### **6. Plane Table Survey**

**4 hrs**

- 6.1 Different instruments used
- 6.2 Different Methods



## **Sub: Surveying Lab**

### **Subject Code CIV 307**

**ALL PRACTICAL FIELD WORKS ARE ATTACHED WITH FIELD BOOK AND DRAWING WORK ON FULL IMPERIAL SIZE DRAWING SHEETS.**

**(Minimum experiments to be performed should be 10 )**

1. Measurement of distances with chain & tape on ground with direct or in Direct Ranging.
2. Use of Optical Square for setting out perpendicular and running survey line for locating details.
3. Measuring Fore bearing and Back bearing of 5-6 sided closed polygon. Identifying stations affected by local Attraction and their corrections.
4. Measuring for bearing and back bearing for an open traverse (5 to 6 sided). Calculate direct angles between successive lines.
5. Use of Dumpy Level, temporary adjustments and recording readings in Field Book.
6. Differential levelling practice, reduction of level by H.I. method/ Rise and fall method.
7. Carrying Benchmark from one point to another point about 200m by fly levelling with auto level.
8. Preparation of Contour Map of a small area by direct levelling
9. Locating details with plain table by method of Radiation and intersection.
10. Measurement of Horizontal Angle by Transit Theodolite (repetition method)
11. Measurement of Vertical Angles by theodolite.
12. To find reduced level and horizontal distances using Theodolite as a Tacheometer.
13. Use of Total Station for finding Horizontal and Vertical distances and reduced levels.
14. Use of Digital Planimeter for determination of area

#### **REFERENCE BOOKS:**

1. Surveying & levelling – by T.P. Kanetkar & S.V. Kuljarni; Griha prakash , Pune
2. Surveying – by B.C Punmia; Laxmi publication, Delhi-6
3. A text book of surveying and levelling- by R. Agor; Khanna Publishers, delhi-6
4. Surveying and levelling - by Hussain and Nagraj; S. Chand & co, Delhi
5. Surveying & levelling – by S.C Rangawal; Charotar Book Stall, Pune
6. Surveying & levelling –by N.N Basak; Tata Mc. Grave Hill
7. Plane Surveying –by A. De; S chand & co.

**Diploma in Engineering (All branch except Mining, Arch & Non Tech)**

**Semester : Third**

**Subject Title : Engineering Mathematics-III**

**Subject Code: 301**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
L	T	P	Full Marks.	External Exam Marks	Internal Exam Marks	External Pas Marks	Total Pass Marks	Duration of External Exams
TH								
03	01		100	80	20	26	40	3 Hrs

**NOTE: Internal marks will be allotted on the basis of two snap tests and 2 assignment of equal marks to be conducted by the faculty teaching the subject.**

Rationale:

The subject is extension of Engineering Mathematics – 1 & 2 of First year and stepping into the prerequisites to learn Applied Mathematics applicable in engineering solutions. Engineering Mathematics lay down the foundation to understand and express principles and laws involved in other technological subjects. The study of Engineering Mathematics will help to develop the skills essential for new emerging avenues.

Objective:

The student will be able to acquire knowledge of mathematical terms, concepts and principles. They can acquire sufficient mathematical techniques and can develop the ability to apply mathematical methods to solve technical and day to day practical problems and to execute management plans with precision.

Sub Objective:

This course is divided into five units. After completion of this course one could become able to learn the following.

- Intuitive meaning and Methods of finding integration definite integration and its properties.
- Application of Integration in finding Area, volume of irregular shapes.
- Methods of solving differential equation of first order and first degree.
- Methods for finding approximate roots by using bisection, Regula-falsi, Newton-Raphson method, Gauss elimination, Jacobi and Gauss- Seidal methods.
- Use of Binomial, Normal and Poisson distributions for solving different examples.

- Use of Laplace transform for solving problems of Differential Equations.
- Use of Fourier series for expansion of function at the given intervals

Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	<b>Integration:</b> 1.1 Definition of integration as anti-derivative. Integration of standard function. 1.2 Rules of integration (Integrals of sum, difference, scalar multiplication). 1.3 Methods of Integration. 1.3.1 Integration by trigonometrical transformation. 1.3.2 Integration by substitution 1.3.3 Integration by parts. 1.3.4 Integration of rational and irrational functions. 1.3.5 Integration by Partial fractions.	7	16
	<b>1.4 Definite Integration.</b> 1.4.1 Concept of definite integrations with examples. 1.4.2 Properties of definite integral with simple problems.	3	
	<b>1.5 Applications of definite integrals.</b> 1.5.1 Area under the curve. 1.5.2 Area bounded by two curves.	3	
2	<b>Differential Equation</b> 2.1 Definition of differential equation, order and degree of differential equation. Formation of differential equation. 2.2 Solution of differential equations of first order and first Degree such as variable separable form, reducible to Variable separable, Homogeneous and Linear Differential Equation.	6	16
	<b>2.3 Applications of Differential equations.</b> 2.3.1 Rectilinear motion (motion under constant and variable acceleration) 2.3.2 Newton's Law of Cooling	3	
	<b>Numerical Methods</b> <b>3.1 Solution of algebraic equations</b> Bisection method, Regula falsi method and Newton-Raphson method.	3	
3	<b>3.2 Solution of simultaneous equations containing 3 unknowns</b>		16

	<p>3.2.1 Gauss elimination method.</p> <p>3.2.2 Jacobi's Iterative method.</p> <p>3.3.3 Gauss Seidal method.</p>	3	
	<p><b>3.3 Interpolation</b></p> <p>3.3.1 Concept of interpolation and extrapolation.</p> <p>3.3.2 Different operators (<math>\Delta</math>, <math>\nabla</math> &amp; <math>E</math>), relation between them, some problems based on operators, formation of Difference Table.</p> <p>3.3.3 Newton's Forward and Backward difference interpolation formulae.</p> <p>3.3.4 Lagrange's interpolation formula.</p> <p>3.3.5 Problems based on above.</p>	6	
	<p><b>3.4 Numerical Differentiation &amp; Integration.</b></p> <p>3.4.1 Newton's forward and backward difference formulae for first and second order differentiation at any point.</p> <p>3.4.2 Numerical integration Trapezoidal rule and Simpson's <math>1/3^{\text{rd}}</math> rule.</p>	3	
4	<p><b>4.1 Probability:</b></p> <p>4.1.1 Definition of random experiment, sample space, event occurrence of event and types of events (impossible, mutually exclusive, exhaustive, equally likely)</p> <p>4.1.2 Definition of probability, addition and multiplication theorems of probability.</p>	05	16
	<p><b>4.2 Probability Distribution</b></p> <p>4.2.1 Binomial distribution.</p> <p>4.2.2 Poisson's distribution.</p> <p>4.2.3 Normal distribution</p> <p>4.2.4 Simple examples based on above.</p>	05	
5	<p><b>Laplace Transform</b></p> <p>5.1 Definition of Laplace transforms Laplace transform of standard functions.</p> <p>5.2 Properties of Laplace transform such as Linearity, first shifting, second shifting, multiplication by <math>t^n</math>, division by <math>t</math>.</p> <p>5.3 Inverse Laplace transforms. Properties-linearly first shifting, second shifting. Method of partial fractions,</p>	3	
6	<p><b>Fourier Series</b></p> <p>6.1 Definition of Fourier series (Euler's formula).</p> <p>6.2 Series expansion of continuous functions in the intervals <math>(0, 2l), (-l, l), (0, 2\pi), (-\pi, \pi)</math></p>	3	16

7	<b>Linear Programming</b> <b>7.1 Introduction</b> <b>7.2 Solution of Linear Programming problem (LPP) by Graphical Method.</b>	3	
	<b>TOTAL:</b>	56	80

**Tutorial:** Tutorials are to be used to get enough practice for solving problems. It is suggested that in each tutorial at least five problems should be solved.

**Learning Resources:**

**Text Book:**

Sr. No	Title	Authors	Publications
1	Higher Engg. Mathematics	B. S. Grewal	Dhanpat Rai

**Ref. Books:**

Sr. No	Title	Authors	Publications
1	Engineering Mathematics	H.K.Das	S.Chand & Company LTD, New Delhi
2	Higher Engineering Mathematics	B.V,Ramana	Mcgraw Hill Education ( India) Private limited , New Delhi
3	Practical Mathematics	I.B. Prasad	Khanna
4	Introductory Method of Numerical Analysis	S.S.Shastri	P.H.I
5	Linear Programming	G. Hadley	
6	A text book for class 12, Part- I & II	NCERT	NCERT, Delhi

**Note:**

In board examination, question setter may be advised to select 20% questions of objective, 30% of short type and remaining 50% of long type based on basic concepts, formula and calculations respectively.

