

**STATEBOARD OF TECHNICAL EDUCATION BIHAR**

Scheme of Teaching and Examinations for  
IV<sup>th</sup> SEMESTER DIPLOMA IN CIVIL ENGINEERING (CONSTRUCTION TECHNOLOGY)  
(Effective from Session 2022-23 Batch)

**THEORY**

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam. (ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Construction Planning and Scheduling.	2045401	03	03	10	20	70	100	28	40	03
2.	Advance Surveying	2015402	03	03	10	20	70	100	28	40	03
3.	Theory of structure	2015403	03	03	10	20	70	100	28	40	03
4.	Building Planning and Drawing	2015404	03	03	10	20	70	100	28	40	03
5.	R.C.C and steel Structure Design	2045405	03	03	10	20	70	100	28	40	03
<b>Total :-</b>			<b>15</b>				<b>350</b>	<b>500</b>			<b>15</b>

**PRACTICAL**

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (PA+ESE)	Pass Marks in the Subject	Credits
					Internal (PA)	External (ESE)			
6.	Theory of structure Lab	2045406	02 50% Physical 50% Virtual	03	15	35	50	20	01
7.	Advance Surveying Lab with introduction to Drone	2045407	02 50% Physical 50% Virtual	04	15	35	50	20	01
<b>Total :-</b>			<b>04</b>				<b>100</b>	<b>02</b>	

**TERM WORK**

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Marks of Internal (PA)	Marks of External (ESE)	Total Marks (PA+ESE)	Pass Marks in the Subject	Credits	
8.	Rural Engineering (TW)	2045408	04	07	18	25	10	02	
9.	Building Planning and Drawing (TW)	2015409	04	15	35	50	20	02	
10.	Repair and Rehabilitation of structure (TW)	2045410	02	07	18	25	10	01	
11.	Course STAAD. Pro / Others (TW)	2045411	04	15	35	50	20	02	
<b>Total :-</b>			<b>14</b>				<b>150</b>	<b>07</b>	
Total Periods per week Each of duration One Hour				<b>33</b>	Total Marks =			<b>750</b>	<b>24</b>

## CONSTRUCTION PLANNING AND SCHEDULING

<b>Subject Code 2045401</b>	<b>Theory</b>			<b>No. of Period in one Session - 42</b>			<b>Credits</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>			
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>100</b>	
	<b>03</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>	<b>70</b>	
	<b>—</b>	<b>—</b>	<b>—</b>	<b>CT</b>	<b>:</b>	<b>10</b>	
					<b>20</b>		

### **Course Objective:**

Following are the objectives of construction project planning.

- Planning of each activity
- Construction Methods
- Planning for Construction Equipment's and Machinery
- Procurement of materials
- Planning for employee skills
- Planning for required documents and drawings
- Financial Planning

<b>Name of the Topic</b>		<b>Hrs</b>
	<b>Introduction</b> 1.1 History of Construction Management, 1.2 Functions and Responsibilities of Construction Manager, 1.3 Future of Construction Management. 1.4 Major problems in Construction Industry,	<b>08</b>
Unit -2	<b>Decision Making in Construction Industry –</b> 2.1 Benefit-Cost Analysis, 2.2 Replacement Analysis, 2.3 Break Even Analysis	<b>08</b>
Unit – 3	<b>Project Cost and Value Management –</b> 3.1 Cost Planning, Cost Budgeting, Cost Controlling. 3.2 Fundamentals of Value Engineering, 3.3 Application of Value Engineering to Construction Industry	<b>10</b>
Unit – 4	<b>Concept and importance of Safety in Construction Industry</b> 4.1 Unsafe Conditions and Unsafe Acts, 4.2 Safety Benefits to Employers, 4.3 Employees and Customers, 4.4 Construction Safety Problems, 4.5 Approaches to improve Construction Safety.	<b>08</b>

Unit – 5	<b>Project Monitoring and Control Systems</b> 5.1 Communication Systems, 5.2 Cost and Progress Control, 5.3 Fundamentals and Significance of Management Information Systems, 5.4 Application of Management Information Systems in Construction Industry.	08
	Total	48

**Suggested Text Book:**

1. Construction Management and Practice. Raina, C.M. Tata McGraw-Hill,
2. Construction Management by Williams, Cengage publishing Pvt Ltd
3. Construction Project Management, K N Jha, Pearson publications.

## ADVANCE SURVEYING

<b>Subject Code</b> <b>2015402</b>	<b>Theory</b>			No. of Periods in one Session : 42			<b>Credits</b> <b>03</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>			
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	:	<b>100</b>	
	<b>03</b>	—	—	<b>TA</b>	:	<b>10</b>	
	—	—	—	<b>CT</b>	:	<b>20</b>	

**Course Objective:**

- . To know methods of plane surveying and Theodolite surveying and their uses.
- . To learn tacheometric surveying and curve setting
- . To understand the principles of Electronic Distance Measurement equipment and total station and their use.
- . To know the concept of remote sensing, GPS and GIS

**Contents: Theory**

Name of the Topic	Hrs.
Unit -1 <b>Plane Table Surveying:</b> 1.1 Principles of plane table survey. Accessories of plane table and their use, Telescopic alidade. 1.2 Setting of plane table; Orientation of plane table - Back sighting and Magnetic meridian method. 1.3 Methods of plane table surveys-Radiation, Intersection and Traversing. Merits and demerits of plane table survey.	06
Unit -2 <b>Theodolite Surveying:</b> 2.1 Types and uses of Theodolite, Components of transit Theodolite and their functions, Reading the Vernier of transit Theodolite. 2.2 Temporary adjustment of transit Theodolite. 2.3 Measurement of horizontal angle-Direct and Repetition method, Errors eliminated by method of repetition. 2.4 Measurement of vertical Angle. 2.5 Traverse computation-Latitude, Departure, Consecutive coordinates, independent coordinates.	06
Unit – 3 <b>Tacheometric Surveying and Curve Setting:</b> 3.1 Principles of Tacheometry, Tacheometer and its component parts, Anallatic lens. 3.2 Tacheometric formula for horizontal distance with telescope horizontal and staff vertical. 3.3 Field method for determining constants of tacheometer, determining horizontal and vertical Distances with tacheometer by fixed Hair method and staff held vertical, Limitations of tacheometry.	08

Unit – 4	<b>Advance Surveying Equipment's:</b> 4.1 Principle of Electronic Distance Meter (EDM) its component parts and their Functions use of EDM. 4.2 Use of Electronic Digital Theodolite. 4.3 Use of Total Station, Use of function keys. 4.4 Measurements of Horizontal angles, vertical angles, distances and coordinates using Total Station, Traversing, Profile Survey and Contouring with Total Station.	14
Unit – 5	<b>Remote Sensing, GPS and GIS:</b> 5.1 Remote Sensing – Overview, Remote sensing system, Applications of remote sensing in Civil engineering. 5.2 Use of Global Positioning System (G.P.S.) instruments. 5.3 Geographic Information System (GIS): Over view, Components, Applications, Software for GIS. 5.4 Introduction to Drone Surveying.	08
	<b>Total</b>	<b>42</b>

**Suggested Text Book/Reference Book:**

1. Kanetkar T.P.; Kulkarni S.V., Surveying and Levelling PartlandII, Pune Vidyarathi Gruh Prakashan, Pune.
2. Basak N.N., Surveying and Levelling, McGraw Hill Education (India) Pvt. Ltd., Noida.
3. Duggal S.K., Survey I and Survey II, Tata Mc Graw Hill Education Pvt. Ltd. Noida.
4. Saikia MD.; Das. B.M.; Das. M.M., Surveying PHI Learning Pvt. Ltd., New Delhi.
5. R., Surveying and Levelling, Oxford University Press. New Delhi.
6. Punnia, B.C., Jain, Ashok Kumar, Jain Arun Kumar, Surveying Vol-I and II, Laxmi, Publication Pvt. Ltd, New Delhi.
7. Sweta Kumari , Advance Surveying , FPH
8. P.L. Bhatia , Advance Surveying , FPH

**COURSE OUTCOMES (COs):**

- . After completing this course, student will be able to:
- . Prepare plans using Plane Table Surveys.
- . Prepare plans using Theodolite surveys.
- . Find distances and elevations using Tacheometer.
- . Prepare plans using Total Station instrument.
- . Locate coordinates of stations using GPS.

## THEORY OF STRUCTURE

<b>Subject Code 2015403</b>	<b>Theory</b>						<b>Credits</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>			<b>03</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>100</b>	
	<b>03</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>	<b>70</b>	
	<b>—</b>	<b>—</b>	<b>—</b>	<b>CT</b>	<b>:</b>	<b>10</b>	
<b>—</b>	<b>—</b>	<b>—</b>	<b>CT</b>	<b>:</b>	<b>20</b>		

### Course Objective:

- To learn concept of eccentric loading and stresses in vertical members like column, chimneys, dam
- To analyze beams using various methods like slope deflection, three moment, and moment distribution
- To understand different methods of finding axial forces in trusses.

### Contents: Theory

<b>Name of the Topic</b>		<b>Hrs</b>
Unit -1	<p><b>Direct and Bending stresses in Vertical members:</b></p> <p>1.1 Concept of direct and eccentric loads, eccentricity about one principal axis, nature of stresses, maximum and minimum stresses, resultant stress distribution diagram.</p> <p>1.2 Condition for no tension or zero stress at extreme fiber, Limit of eccentricity, core of section for rectangular and circular cross sections, Middle third rule</p> <p>1.3 Column, pillar, chimney of uniform cross section subjected to lateral wind pressure, Coefficient of wind resistance &amp; resultant stress distribution at their bases.</p>	08
Unit -2	<p><b>Slope and deflection:</b></p> <p>2.1 Concept of slope and deflection, stiffness of Beam</p> <p>2.2 Relation between bending moment, slope, deflection &amp; radius of curvature (no derivation)</p> <p>2.3 Double integration method to find slope and deflection of simply supported and cantilever beam subjected to concentrated and uniformly distributed load.</p> <p>2.4 Macaulay method to find slope and deflection of simply supported and cantilever beam subjected to concentrated and uniformly distributed load</p>	08
Unit – 3	<p><b>Fixed and continuous Beam:</b></p> <p>3.1 Different types of Determinate &amp; Indeterminate Structures &amp; Stability of structure</p> <p>3.2 Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam over Simply supported beam.</p> <p>3.3 Principle of superposition, Fixed end moments from first principle for beam subjected to point load, UDL over entire span.</p> <p>3.4 Application of standard formulae in finding end moments, end reactions and drawing S.F. and B.M. diagrams for a fixed beam. (Derivation need not to be asked in exam).</p> <p>3.5 Clapeyron's theorem of three moments (no derivation). Application of theorem maximum up to three spans and two unknown support moment only, Support at same level, spans having same &amp; uniform moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span.</p> <p>3.6 Draw SF &amp; BM diagram of continuous beam showing net BM &amp; point of contra flexure for continuous beams.</p>	12
Unit – 4	<p><b>Moment distribution method:</b></p> <p>4.1 Introduction, sign convention.</p> <p>4.2 Carryover factor, stiffness factor, Distribution factor.</p> <p>4.3 Application of moment distribution method for various types of continuous beams subjected to concentrated loads and uniformly distributed load over entire span having same or different moment of inertia up to three spans and two unknown support moment only.</p>	08

Unit – 5	<b>Simple trusses:</b> 5.1 Types of trusses (Simple, Fink, compound fink, French truss, pratt truss, Howe truss, North light truss, King post and Queen post truss). 5.2 Calculate support reactions for trusses subjected to point loads at joints 5.3 Calculate forces in members of truss using Method of joint sand Method of sections	06
	Total	42

**Suggested Text Book:**

1. Theory of structures, S. Raman rutham
2. Mechanics of structures, S. B. Junnarkar
3. Analysis of Structures V.N. Vazirani & M.M. Ratwani
4. Theory of Structure R.S. Sharma

**COURSE OUTCOMES (COs):**

1. Analyze stresses induced in vertical member subjected to direct and bending loads.
2. Analyze slope and Deflection in fixed and continuous beams.
3. Analyze continuous beam under different loading conditions using the principles of Three Moments.
4. Analyze continuous beam using Moment Distribution Method under different loading conditions.
5. Evaluate axial forces in the members of simple truss.

## BUILDING PLANNING AND DRAWING

<b>Subject Code 2015404</b>	<b>Theory</b>			No of periods in one session=42			<b>Credits</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>			<b>03</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	:	<b>100</b>	
	<b>03</b>	—	—	<b>TA</b>	:	<b>10</b>	
	—	—	—	<b>CT</b>	:	<b>20</b>	

### Course Objective:

1. To learn basic principles of building planning and drawing.
2. To know graphical representation of various components of buildings.
3. To draw complete plan and elevation of a building.
4. To learn basics of perspective drawings and Computer Aided Drawings

### Contents: Theory

Name of the Topic		Hrs
Unit -1	<p><b>Conventions and Symbols:</b></p> <p>1.1.1 Conventions as per IS 962, symbols for different materials such as earth work, brick work, Stone work, concrete, wood work and glass.</p> <p>1.1.2 Graphical symbols for doors and windows, Abbreviations, symbols for sanitary and electrical installations.</p> <p>1.1.3 Types of lines-visible lines, Centre line, hidden line, section line, dimension line, extension line, pointers, arrow head or dots. Appropriate size of lettering and numerals for titles, sub-titles notes and dimensions.</p> <p>1.1.4 Types of scale, criteria for Proper Selection of scale for various types of drawing</p> <p>1.1.5 Sizes of various standard papers/sheets</p>	04
Unit -2	<p><b>Planning of Building:</b></p> <p>2.1.1 Principles of planning for Residential and Public building- Aspect, Prospect, Orientation, Grouping, Privacy, Elegance, Flexibility, Circulation, Furniture requirements, Sanitation, Economy.</p> <p>2.1.2 Space requirement and norms for minimum dimension of different units in the residential and public buildings as per IS 962.</p> <p>2.1.3 Rules and bye-laws of sanctioning authorities for construction work</p> <p>2.1.4 Plot area, built up area, super built-up area, plinth area, carpet area, floor area and FAR (Floor Area Ratio).</p> <p>2.1.5 Line plans for residential building of minimum three rooms including water closet (WC), bath and stair case as per principles of planning.</p> <p>2.1.6 Line plans for public building-school building, primary health centre, hostel and Library.</p>	07

Unit – 3	<b>Drawing of Load Bearing Structure:</b> 3.1.1 Drawing of Single storey Load Bearing residential building (2BHK) with staircase. 3.1.2 Data drawing–plan, elevation, section, site plan, schedule of openings, construction notes with specifications, area statement, Planning and design of stair case- Rise and Tread for residential and public building. 3.1.3 Working drawing–developed plan, elevation, section passing through stair case or WC and bath. 3.1.4 Foundation plan of Load bearing structure.	14
Unit – 4	<b>Drawing of Framed Structure:</b> 4.1 Drawing of Two storied Framed Structure (G+1), residential building (2 BHK) with staircase. 4.2 Data drawing–developed plan, elevation, section, site plan, schedule of openings, construction notes with specifications, area statement. 4.3 Working drawing of Framed Structure –developed plan, elevation, section passing through stair case or WC and bath 4.4 Foundation plan of Framed Structure. 4.5 Details of RCC footing, Column, Beam, Chajjas, Lintel, Stair case and slab 4.6 Drawing with CAD-Draw commands, modify commands, layer commands.	12
Unit – 5	<b>Perspective Drawing:</b> Definition of perspective drawing Types of perspective, terms used in perspective drawing, principles used in perspective drawing Two Point Perspective of small objects only such as steps, monuments, pedestals	03
	Total	42

### **Suggested Text Book/ Reference Book:**

1. Malik and Mayo, Civil Engineering Drawing , Computech Publication Ltd New Asian Publishers ,New Delhi.
  2. M.G. Shah and C.M. Kale, Principles of Perspective Drawing, Mcgraw Hill Publishing company Ltd. New Delhi.
  3. Swamy, Kumara; Rao, N, Kameshwara ,A. Building Planning and Drawing, Charotar Publication, Anand.
  4. Bhavikatti, S.S., Building Construction, Vikas Publication House Pvt. Ltd., New Delhi.
  5. Mantri, Sandip, A to Z Building Construction, Satya Prakashan, New Delhi.
  6. Singh, Ajit, Working with AutoCAD 2000, Mcgraw Hill Publishing company Ltd. New Delhi.
- Sane, Y.S., Planning and design of Building, Allied Publishers, New Delhi

### **COURSE OUTCOMES (COs):**

1. Interpret the symbols, signs and conventions from the given drawing.
2. Prepare line plans of residential and public buildings using principles of planning.
3. Prepare submission and working drawing for the given requirement of Load Bearing structure
4. Prepare submission and working drawing using CAD for the given requirement of Frame structure
5. Draw two-point perspective drawing for given small objects

# R.C.C & STEEL STRUCTURE DESIGN

<b>Subject Code</b> <b>2045405</b>	<b>Theory</b>			<b>No. of Period in one Session - 42</b>			<b>Credits</b> <b>03</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>			
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>100</b>	
	<b>03</b>	—	—	<b>TA</b>	<b>:</b>	<b>70</b>	
	—	—	—	<b>CT</b>	<b>:</b>	<b>10</b>	

## Course Objectives:

Following are the objectives of this course:

- To learn the concept of limit state design for tension and compression steel members.
- To learn the concept of limit state design of steel beams.
- To understand design of RCC elements.
- To know the design of short and long RCC columns.

### CONTENTS: THEORY

Name of the Topic		Hrs
Unit -1	<b>Design of Steel Tension and Compression Members (Limit State Method)</b> 1.1 Types of sections used for Tension members and Compression members. 1.2 Strength of tension member by yielding of section, rupture of net cross-section and block shear 1.3 Calculation of effective length, Radius of gyration and slenderness ratio, Permissible values of slenderness ratio as per IS 800, Design compressive stress. 1.4 Introduction to build up sections, lacing and battening (Meaning and purpose), Diagrams of single and double lacing and battening system. (No numerical problems).	12
Unit -2	<b>Design of Steel beams (Limit State Method)</b> 2.1 Standard beam sections, Bending stress calculations 2.2 Design of simple I and channel section 2.3 Check for shear as per IS 800.	06
Unit – 3	<b>Design of Reinforced Concrete Beams by Limit State Method</b> 3.1 Concept of Limit state, Stress block diagram, Introduction to singly and doubly reinforced sections, IS 456. 3.2 Design of singly reinforced beam, concept of under reinforced, over reinforced and balanced section, Simple numerical problem on ultimate moment of resistance and design of beam section. 3.3 Design of doubly reinforced sections, stress and strain diagrams, depth of neutral axis, simple numerical problems on ultimate moment of resistance of reinforced beam, Calculation of Ast and Asc.	12
Unit – 4	<b>Shear, Bond and Development length in Design of RCC member</b> 4.1 Nominal shear stress in RCC section, Design shear strength of concrete, Design of shear reinforcement, Minimum Shear Reinforcement, Provisions of IS 456, forms of shear reinforcement. 4.2 Types of bond, Bond stress, check for bond stress, Determination of Development length in tension and compression members and check as per codal provisions, Anchorage value of 90 degree hook, Lapping of bars. 4.3 Simple numericals on: Shear reinforcement, Adequacy of section for shear. 4.4 Introduction to serviceability limit state check.	08

Unit – 5	<b>Design of axially loaded RCC Column</b> <b>5.1</b> Definition and classification of column, Limit state of compression members, Effective length of column. <b>5.2</b> Provisions of IS 456 for minimum steel, cover, maximum steel, spacing of ties etc. <b>5.3</b> Design of axially loaded short column - Square, Rectangular, and Circular only.	04
	<b>Total</b>	<b>42</b>

**Course outcomes:**

After completing this course, student will be able to perform:

- CO 1 : Design of steel tension and compression member
- CO 2 : Design of steel beams including check for shear.
- CO 3 : Design of singly and doubly reinforced RCC beam.
- CO 4 : Design of shear reinforcement in RC beams
- CO 5 : Design of RCC column as per IS 456.

## THEORY OF STRUCTURE LAB

<b>Subject Code</b> <b>2045406</b>	<b>Practical</b>			<b>Credits</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Internal (PA)</b>	<b>:</b>	<b>15</b>
	—	—	<b>02</b>	<b>External (ESE)</b>	<b>:</b>	<b>35</b>

### Course Objective:

1. To understand and analyze stress & strain, shear force & bending moment.
2. To study behavior of column.
3. To learn hinge action.
4. To analyze deflection of beams

### Contents: Practical

1. To Verify Strain in an externally loaded beam with the help of a strain gauge indicator and to verify theoretically.
2. To study behavior of different types of Columns: (i) Both ends fixed (ii) One end fixed and other Pinned (iii) Both ends pinned (iv) One end fixed and other free.
3. To find Euler's buckling load for different types of Columns: (i) Both ends fixed (ii) One end fixed and other pinned. (iii) Both ends pinned (iv) One end fixed and other free.
4. To Study two hinged arch for the horizontal displacement of the roller end for a given system of loading and to compare the same with those obtained analytically.
5. Determination of Shear force and bending moment of beam.
6. Compression test on metal.
7. Determination of deflection of beam.
8. Determination of moment of Inertia of fly wheel.

### **Text Book/ Reference Book:**

1. Theory of structures, S. Ramam ratham, Dhanpatrai & Sons.
2. Mechanics of structures, S.B. Junnarkar, Charotar publishing House, Anand

### Practical Outcomes:

1. Interpret shear force & bending moment.
2. Interpret buckling of column.
3. Interpret the result of hinge action.

## Advance Surveying Lab with Introduction to Drone

<b>Subject Code</b> <b>2045407</b>	<b>Practical</b>						<b>Credits</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>	<b>01</b>
	—	—	<b>02</b>	<b>Internal (PA)</b>	<b>:</b>	<b>15</b>	
	-	-	-	<b>External (ESE)</b>	<b>:</b>	<b>35</b>	

### Course Objective:

- . To know methods of Theodolite surveying and their uses.
- . To learn tacheometric surveying and curve setting.
- . To understand the principles of Electronic Distance Measurement and Total station and their uses.
- . To know the concept of Remote Sensing, GPS and GIS.
- . To know the concept of Drone Aerial photography.

### Contents : Practical

#### Perform any Eight Experiments:

1. Use transit theodolite to measure Horizontal and Vertical angle by Direct Method.
2. Plot the traverse on A1 size imperial drawing sheet for the collected data from preceding Theodolite Survey Project.
3. Use Theodolite as a Tacheometer to compute reduced levels and horizontal distances.
4. Set out a circular curve by Rankine's Method of Deflection Angles.
5. Use Micro optic Theodolite to Measure Horizontal angle by Direct Method.
6. Use EDM to measure horizontal distance.
7. Use Total station instrument to measure horizontal distances.
8. Use Total station instrument to measure vertical angle.
9. Use Total station instrument to carry out Survey Project for closed traverse for minimum five sides.
10. Plot the traverse on A1 size imperial drawing sheet for the collected data from preceding Total Station Survey Project.
11. Use GPS to locate the coordinates of a station.
12. Introduction to techniques for drone based photography
13. Introduction to drone techniques including drone flight operations, shooting methods
14. Introduction to camera set-up, image processing.
15. Introduction to drone based enterprises.

### ReferenceBook/Link:

1. Kanetkar, T.P.; Kulkarni, S.V., Surveying and Levelling Part I and II, Pune Vidyarthi Gruh Prakashan, Pune.
2. Basak, N.N., Surveying and Levelling, McGraw Hill Education (India) Pvt. Ltd., Noida.
3. Duggal, S.K., Survey I and Survey II, Tata McGraw Hill Education Pvt. Ltd., Noida.
4. Saikia, MD.; Das. B.M.; Das. M.M., Surveying PHI Learning Pvt. Ltd., New Delhi.
5. Subramanian, R., Surveying and Levelling, Oxford University Press, New Delhi. Surveying Vol. I and Surveying Vol. II,

### Practical Outcomes :

- . Prepare plans using Theodolite surveys.
  - . Find distances and elevations using Tacheometer.
  - . Make measurements using Total Station.
  - . Locate coordinates of survey stations using GPS
  - . Demonstrate techniques for drone based photography

## RURAL ENGINEERING (TW)

Subject Code 2045408	Practical						Credits
	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal (PA)	:	07	
	—	—	04	External (ESE)	:	18	

### **Course Objective:**

Rural Engineering Program aims to train managers able to apply engineering principles to increase agricultural production through the design, analysis, planning, management and control of irrigation schemes, rural constructions, rural water supply and agricultural mechanization.

### Contents: Practical

#### **Term work shall consist of reports on any six of the following assignments:**

- 1.1** Socio Economic survey of village, to identify, the needs of village people
- 1.2** Visit to the Structures built under water shade management program (at least two structure)
  - a) Gabian structure
  - b) Underground Bandhara
  - c) Kolhapur type weir
  - d) Cement Plug, Contour Bunding Rain Water HarvestingPrepare neat labeled sketches and report on the above visits.
- 2** Visit to a farmer's house
  - 2.1 Profile of a farmer for case study
  - 2.2 Measured drawing of existing farmers house
  - 2.3 Preparation of modified plan with due suggestions with respect to water supply, sanitations, cattle shade, fodder shade, court yard, composting yard, bio/Gober Gas plant.
- 3** Report writing on the following with neat labeled sketches (Minimum one)
  - 3.1 Sprinkler Irrigation System, with capacity calculation, head and discharge calculation, power calculation for pump, pressure calculation for pipe.
  - 3.2. Drip Irrigation System with capacity calculation, head and discharge calculation, Power calculation for pump, pressure calculation for pipe
  - 3.3 Layout of Lift Irrigation, with capacity calculation, head and discharge calculation, power calculation for pump, pressure and dia. Calculation for pipe.
- 4** Report writing on any one of the cottage industries related to civil engineering regarding demand, utility, advantages, effect on rural economy etc.
  - a. Brick Manufacturing
  - b. Cement Block manufacturing
  - c. Cement concrete pole for fencing
  - d. Roof tiles / decorative Terracotta tiles manufacturing.
  - e. Stone Crusher.
- 5** Collecting information regarding schemes declared by State / Central Govt. in which Civil Engineer has effective participation (at least one)
  - a. Indira Awas Yojna
  - b. Walmiki Awas Yojna
  - c. Swajal Dhara Yojna
  - d. Jawahar Well Yojna
  - e. Village / Farm Tank.

**6** Collecting information regarding use of non-conventional energy source like- Solar energy, Bio/Gobar Gas plant, wind mill,

**7** A Study report on any one

1) Basic Study of electrical installation for house wiring, its components, different types of wires and its uses, need of fuse and its material used, need of earthing and its use.

2) Identification of electrical motor pump set, its electrical connection, fault finding and its remedies.

**8** A Study report on

Concept of Community Polytechnic in India regarding their role in upliftment of rural population, their area of working, such as manpower development, transfer of technology, technical support services, information dissemination, community services. A visit to nearest Community Polytechnic shall be arranged. A visit report shall be prepared covering all aspect.

**Text Book/ Reference Book:**

1. Theory of structures, S. Raman ratham
2. Mechanics of structures, S.B. Junnarkar

**Practical OutComes:**

At the end of the Rural Engineering Program, the graduate must be able to:

1. Master the physical and biological concepts related to application fields of Agricultural Engineering;
2. Apply scientific and technical knowledge for optimal approach in addressing rural engineering problems; 3. Use relevant technologies applicable to rural works;
4. Apply concrete knowledge to the development of engineering solutions to increase agricultural productivity;
5. Evaluate the impact of this work on the rural environment and its social impact .

## BUILDING PLANNING AND DRAWING (TW)

Subject Code 2015409	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal (PA)	:	15	
—	—	04	External (ESE)	:	35		

### Course Objectives:

- ☐ To learn the basic principles of building planning and drawing.
- ☐ To make graphical representation of various components of buildings.
- ☐ To draw complete plan and elevation of a building.
- ☐ To learn basics of perspective drawings and Computer Aided Drawings.

### Contents:- TW

1. Draw various types of lines, graphical symbols for materials, doors and windows, symbols for sanitary, water supply and electrical installations and write abbreviations as per IS 962.
2. Draw line plan of an existing building to the suitable scale.
3. Draw line plans to suitable scale for any one Public Buildings from the following (School Building, Primary Health Centre, Hostel and Library).
4. Draw submission drawing to the scale 1:100 of a single storey load bearing residential building (2BHK) with flat roof and staircase showing:
  - (a) Developed plan and elevation
  - (b) Foundation plan
  - (c) Site plan (1:200), area statement
5. Draw submission drawing to the scale of 1:100 of (G+1) Framed Structure Residential Building (2BHK) with flat roof and staircase showing:
  - a) Developed plan.
  - b) Elevation.
  - c) Site plan (1:200) and area statement.
6. Draw the above mentioned drawing at serial number 05 using CAD software and enclose the print out.
  - a) Developed plan.
  - b) Elevation.
  - c) Section passing through Staircase.
  - d) Foundation plan.
  - e) Site plan (1:200), area statement.
7. Draw working drawing for above mentioned drawing at serial number 05 showing:
  - a) Foundation plan to the scale 1:50
  - b) Detailed enlarged section of RCC column and footing with plinth filling.
  - c) Detailed enlarged section of RCC Beam, Lintel and Chajjas.
  - d) Detailed enlarged section of RCC staircase and slab.
8. Draw two point perspectives drawing of small objects - steps, monuments, pedestals (any one) scale 1:50
  - a) Draw plan, elevation, eye level, picture plane and vanishing points
  - b) Draw perspective view.

**Suggested Text Book/ Reference Book:-**

1. Shah. M.G. Kale, CM, Patki, S.Y., Building Drawing, Mcgraw Hill Publishing
2. Malik and Mayo, Civil Engineering Drawing, Computech Publication Ltd
3. M. G. Shah and C. M. Kale, Principles of Perspective Drawing, Mcgraw Hill
4. Swamy, Kumara; Rao, N, Kameshwara, A ., Building Planning and Drawing, Charotar Publication, Anand.
5. Bhavikatti, S. S., Building Construction, Vikas Publication House Pvt. Ltd., Delhi.
6. Mantri, Sandip, A to Z Building Construction, Satya Prakashan, New Delhi.
7. Singh, Ajit, Working with Auto CAD 2000, Mcgraw Hill Publishing company Ltd.
8. Sane, Y.S., Planning and design of Building, Allied Publishers, New Delhi.

**Practical outcomes:**

- Interpret the symbols, signs and conventions from the given drawing.
- Prepare line plans of residential and public buildings using principles of planning.
- Prepare working drawing for the given requirement of Load Bearing Structure.
- Prepare working drawing using CAD for the given requirement of Framed Structure.
- Draw two-point perspective drawing for given small objects.

## Repair and Rehabilitation of structure (TW)

Subject Code 2045410	Term Work			Credits		
	No. of Periods Per Week			Full Marks		
	L	T	P/S	Internal (PA)	:	07
	—	—	02	External (ESE)	:	18

### Course Objective:

- The course seeks to recognize the mechanisms of degradation of concrete structures, provide the students with the knowledge of available techniques and their application for strengthening or upgrading existing structural systems.

### CONTENTS: -TERM WORK

1. Materials: Construction chemicals, Mineral admixtures, Composites, Fibre reinforced concrete, High performance concrete, Polymer-impregnated concrete.
2. Techniques to Test the Existing Strengths: Destructive and non-destructive tests on concrete.
3. Repairs of Multi-storey Structures: Cracks in concrete, Possible damages to the structural element beams, Slab, Column, Footing, etc., Repairing techniques like Jack Chu, Grouting, External pre-stressing, Use of chemical admixtures, Repairs to the fire damaged structure.
4. Repairs to Masonry Structures & Temples: Damages to masonry structures – Repairing techniques, Damages to temples – Repairing techniques.
5. Foundation Problems: Settlement of soils – Repairs, Sinking of piles – Repairs.
6. Corrosion of Reinforcement: Preventive measures – Coatings – Use of SBR modified cementitious mortar, Epoxy resin mortar, Acrylic modified cementitious mortar, Flowing concrete.
7. Temporary Structures: Need for temporary structures under any Hazard, Various temporary structures

### Suggested Guide lines for Developing Micro Projects:-Suggested Text Book:-

#### **Reference Book/Link:**

#### Text Books

1. Forensic Engineering by Raikar, R.N.
2. Deterioration, Maintenance and Repair of Structures by Johnson, McGraw Hill.

#### Reference Books

1. Renovation of Structures by Perkins.
2. Repairs of Fire Damaged Structures by Jagadish, R.

**TERM WORK**  
**Course STAAD. Pro / Others (TW)**

Subject Code 2045411	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal (PA)	:	15	
	—	—	04	External (ESE)	:	35	

**Course Objectives:**

Following are the objectives of this course:

- To learn the basic principles of Staad. Pro software.
- To understand the Staad. Pro workspace and user interface.
- To model complete plan, section and elevation of a civil engineering structure like building etc. using Staad. Pro.
- To analyses and design civil engineering structures using Staad Pro software.

1. Introduction to STRUCTURAL ENGINEERING Introduction to STAAD.Pro. V8i Getting familiar with STAAD window Model generation using STAAD editor
2. Introduction to Snap Node/Beam Editor Model generation using Node/Beam Editor Introduction to Translational Repeat Model generation using Translational Repeat
3. Assigning Properties Assigning Supports Assigning Loads Structure Analysis
4. Simply Supported Beam Analysis of Framed Structure Applying Floor Loads.
5. Wind Analysis Seismic Analysis Creating Load Combinations
6. Introduction to FEM Analysis of Framed Structure Including Slabs
7. Column & Beam Design Reinforced Concrete Design
8. Slab Design
9. Staircase Analysis