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|------------------|--|
| Programme Name/s | : Agricultural Engineering/ Civil Engineering/ Civil & Rural Engineering/ Construction Technology/ Civil & Environmental Engineering |
| Programme Code | : AL/ CE/ CR/ CS/ LE |
| Semester | : Second |
| Course Title | : SURVEYING |
| Course Code | : 312339 |

I. RATIONALE

Surveying is generally used to make land maps and boundaries. The development of engineering survey is the basic foundation to ensure the quality of the project, because it can provide accurate data for the subsequent construction. Surveying is involved in everything right from accurately drawing boundaries between private and public land, to inspecting bridges and other critical infrastructure. Without surveying, the placement, security, and safety of projects cannot be assured. Therefore, the students are required to develop such competency to carry out the given type of survey using relevant equipment's so as to prepare the plan to interpret the information to take the appropriate decisions. This course will help the students in achieving in above mentioned goal.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Prepare plans and Contour maps using Surveying Equipment's and Techniques.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Suggest relevant type of survey required for the given situation.
- CO2 - Undertake cross staff and compass survey for the given field
- CO3 - Undertake survey using Theodolite for preparing a plan of the given terrain.
- CO4 - Determine Reduced Level to prepare Contour maps for the given type of terrain
- CO5 - Prepare the plan using Plane Table Surveying to locate relevant details.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

| Course Code | Course Title | Abbr | Course Category/s | Learning Scheme | | | | | Credits | Assessment Scheme | | | | | | | | | | | | |
|-------------|--------------|------|-------------------|--------------------------|----|----|-----|-----|---------|-------------------|--------|-------|-------|------------------|-------|-------------|-----|-------------|-----|-----|-----|-----|
| | | | | Actual Contact Hrs./Week | | | SLH | NLH | | Paper Duration | Theory | | | Based on LL & TL | | Based on SL | | Total Marks | | | | |
| | | | | CL | TL | LL | | | | | FA-TH | SA-TH | Total | Practical | | SLA | | | | | | |
| | | | | | | | | | | | | | | FA-PR | SA-PR | | | | | | | |
| | | | | | | | | | | | | | | | | | Max | | Min | Max | Min | Max |
| 312339 | SURVEYING | SUY | SEC | 3 | - | 4 | 1 | 8 | 4 | 3 | 30 | 70 | 100 | 40 | 25 | 10 | 50# | 20 | 25 | 10 | 200 | |

Total IKS Hrs for Sem. : 1 Hrs

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs. * 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

| Sr.No | Theory Learning Outcomes (TLO's) aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|-------|---|--|--|
| 1 | TLO 1.1 Explain the given basic principles of surveying. TLO 1.2 Classify the survey based on purpose, instruments used and nature of field. TLO 1.3 Use the conventional sign and symbols for preparing the plan of a given land. | Unit - I Overview and Classification of Surveying 1.1 Surveying: Introduction, Purpose, use and Principles. 1.2 Types of surveying- Primary and Secondary classification, Plane, Geodetic, Cadastral, Hydrographic, Photogrammetry Aerial, Layout survey, Control survey, Topographical survey, Route survey, Reconnaissance survey. 1.3 Conventional sign and symbols | Demonstration Assignment Video Demonstrations Chalk-Board Presentations |
| 2 | TLO 2.1 Describe the procedure of finding the distance between two given inter-visible and invisible survey stations. TLO 2.2 Explain the given Survey line and survey station used in survey. TLO 2.3 Explain the methods of ranging. TLO 2.4 Calculate the area of open field using chain and cross staff survey. TLO 2.5 Define Geographic/True Magnetic and Arbitrary Meridians and Bearings, Meridian and Bearing. TLO 2.6 Convert the Whole circle bearing to reduced bearing system and vise versa TLO 2.7 Calculate internal and external angle from bearing of line TLO 2.8 Determine the correct bearing from given Data TLO 2.9 Apply Bowditch's rule to complete the traverse of given land | Unit - II Cross Staff and Compass Surveying 2.1 Linear Measurement Instruments: Metric Chain, Tapes, Arrow, Ranging rod, Open cross staff (IKS) 2.2 Chain survey Station, Base line, Check line, Tie line, Offset, Tie station, Types of offsets: Perpendicular and Oblique 2.3 Ranging: Direct and Indirect Ranging. 2.4 Area Calculations of field by cross staff (Numerical problems) 2.5 Compass Traversing: open, closed. 2.6 Technical Terms: Geographic/True Magnetic and Arbitrary Meridians and Bearings, Meridian and Bearing, 2.7 Whole Circle Bearing System and Reduced Bearing System . Numerical on conversion of given bearing to another bearing (from one form to another), Fore Bearing and Back Bearing, 2.8 Calculation of internal and external angles from bearings at a station. 2.9 Components of Prismatic Compass and their Functions (No sketch) Temporary adjustments and observing bearings 2.10 Local attraction, Methods of correction of observed bearings- Correction at station and correction to included angles 2.11 Methods of plotting a traverse and closing error, Graphical adjustment of closing error. | Demonstration Chalk-Board Hands-on Collaborative learning Video Demonstrations Model Demonstration Presentations |

| Sr.No | Theory Learning Outcomes (TLO's) aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|-------|--|--|--|
| 3 | <p>TLO 3.1 Explain the given components of a transit Theodolite.</p> <p>TLO 3.2 Explain the relationship between the given fundamental axis of theodolite along with typical characteristics</p> <p>TLO 3.3 Describe the procedure to measure the horizontal Angle using Theodolite for the given situation.</p> <p>TLO 3.4 Describe the procedure to measure vertical angles using Theodolite for the given situation.</p> <p>TLO 3.5 Compute Latitude, Departure, Consecutive co ordinates. Independent coordinates from the data given.</p> <p>TLO 3.6 Determine the type of traverse by undertaking relevant check in the given situation.</p> <p>TLO 3.7 Calculate the bearing from given angles.</p> <p>TLO 3.8 Apply Bowditch's rule along with Transit rule to balance the traverse for a given data.</p> <p>TLO 3.9 Prepare Gale's Traverse table for the given data.</p> | <p>Unit - III Theodolite Surveying</p> <p>3.1 Types and uses of Theodolite; Component parts of transit Theodolite and their functions, Reading the Vernier of transit Theodolite</p> <p>3.2 Technical terms- Swinging, Transiting, Face left, Face right</p> <p>3.3 Fundamental axes of transit Theodolite and their relationship</p> <p>3.4 Temporary adjustment of transit Theodolite</p> <p>3.5 Measurement of horizontal angle- Direct and Repetition method, Errors eliminated by method of repetition</p> <p>3.6 Measurement of vertical Angle</p> <p>3.7 Theodolite traversing by included angle method and deflection angle method</p> <p>3.8 Checks for open and closed traverse, Calculations of bearing from angles</p> <p>3.9 Traverse computation-Latitude, Departure, Consecutive coordinates, independent coordinates, Balancing the traverse by Bowditch's rule and Transit rule, Gale's Traverse table computation</p> | <p>Model</p> <p>Demonstration</p> <p>Chalk-Board</p> <p>Hands-on</p> <p>Collaborative learning</p> <p>Video</p> <p>Demonstrations</p> <p>Site/Industry Visit</p> <p>Case Study</p> <p>Demonstration</p> <p>Presentations</p> |
| 4 | <p>TLO 4.1 Explain the terms Level surfaces, level line, Horizontal and vertical surfaces, Datum, Bench Marks- GTS, Permanent, Arbitrary and Temporary, Reduced Level, Line of collimation, Back sight, Fore sight, intermediate sight, Change point, Height of instruments</p> <p>TLO 4.2 Explain the Construction of given levelling equipment with its silent features.</p> <p>TLO 4.3 Explain the temporary adjustments of dumpy level.</p> <p>TLO 4.4 Calculate Reduced Level of the given station using relevant method of surveying.</p> <p>TLO 4.5 Justify the relevant types of levelling with examples.</p> <p>TLO 4.6 Interpret the contour maps for the given type of topography.</p> <p>TLO 4.7 Describe the characteristics of contours for the given terrain.</p> | <p>Unit - IV Levelling and Contouring</p> <p>4.1 Terminologies: Level surfaces, level line, Horizontal and vertical surfaces, Datum, Bench Marks- GTS, Permanent, Arbitrary and Temporary, Reduced Level, Line of collimation, Back sight, Fore sight, intermediate sight, Change point, Height of instruments</p> <p>4.2 Types of levels: Dumpy, Auto level, Digital level, Fundamental axis of Dumpy Level . Temporary adjustments of Level.</p> <p>4.3 Types of Levelling Staffs: Self-reading staff and Target staff.</p> <p>4.4 Reduced level by Plane of collimation method and Rise/ Fall Method</p> <p>4.5 Find the R. L. by H.I. method with necessary checks (Numerical problems)</p> <p>4.6 Find the R.L by Rise and Fall method with necessary checks. (Numerical problems)</p> <p>4.7 Types of Levelling : Simple, Differential, Fly, Profile and Reciprocal Levelling</p> <p>4.8 Contour, contour interval, horizontal equivalent.</p> <p>4.9 Contour maps: Characteristics and uses of Contour maps</p> <p>4.10 Methods of Locating Contour: Direct and Indirect</p> | <p>Model</p> <p>Demonstration</p> <p>Video</p> <p>Demonstrations</p> <p>Chalk-Board</p> <p>Hands-on</p> <p>Collaborative learning</p> <p>Presentations</p> <p>Demonstration</p> <p>Case Study</p> |
| 5 | <p>TLO 5.1 Explain the functions and use of the given type of accessories of a plane table.</p> <p>TLO 5.2 Describe the method of orienting the plane table in a given situation.</p> <p>TLO 5.3 Select the relevant method of plane tabling for a given situation.</p> | <p>Unit - V Plane Table Surveying</p> <p>5.1 Principle of plane table survey.</p> <p>5.2 Accessories of plane table and their use, Telescopic alidade.</p> <p>5.3 Setting of plane table; Orientation of plane table - Back sighting and Magnetic meridian method</p> <p>5.4 Methods of plane table surveys- Radiation, Intersection and Traversing.</p> <p>5.5 Merits and demerits of plane table survey.</p> | <p>Model</p> <p>Demonstration</p> <p>Presentations</p> <p>Chalk-Board</p> <p>Collaborative learning</p> <p>Hands-on</p> <p>Demonstration</p> <p>Case Study</p> |

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

| Practical / Tutorial / Laboratory Learning Outcome (LLO) | Sr No | Laboratory Experiment / Practical Titles / Tutorial Titles | Number of hrs. | Relevant COs |
|--|-------|---|----------------|--------------|
| LLO 1.1 Find the distance between two given inter-visible points. | 1 | *Measure the distance between two inter-visible survey stations using chain, tape and ranging rods. | 2 | CO2 |
| LLO 2.1 Undertake chain and cross staff survey for the given plot | 2 | *Determine area of open field using chain and cross staff survey. | 2 | CO2 |
| LLO 3.1 Calculate area of irregular plot from given plan of plot | 3 | Determine area of irregular field using Digital Planimeter | 2 | CO2 |
| LLO 4.1 Determine bearing using Prismatic Compass | 4 | *Measure Fore Bearing and Back Bearing of survey lines of open traverse using Prismatic Compass | 2 | CO2 |
| LLO 5.1 Prepare traverse using Prismatic Compass | 5 | *Measure Fore Bearing and back bearing of a closed traverse of 5 to 6 sides and correct the bearings and included angles. | 4 | CO2 |
| LLO 6.1 Use transit theodolite to measure Horizontal angle by Direct Method. | 6 | Measure Horizontal angle by using Transit Theodolite by Direct Method | 2 | CO3 |
| LLO 7.1 Use transit theodolite to measure Horizontal angle by method of Repetition | 7 | *Measure Horizontal angle by using Transit Theodolite by method of Repetition | 4 | CO3 |
| LLO 8.1 Use transit theodolite to measure Vertical angle | 8 | *Measure vertical angle using Transit Theodolite | 4 | CO3 |
| LLO 9.1 Prepare traverse using Transit Theodolite | 9 | *Use transit theodolite to carry out Survey Project for closed traverse for minimum 5 sides (Compulsory). | 6 | CO2 CO3 |
| LLO 10.1 Undertake differential leveling by Height of instrument method using dumpy level/Auto Level and leveling staff. | 10 | *Determine Reduced Level by Height of Instrument Method | 4 | CO4 |
| LLO 11.1 Undertake differential leveling by Rise and fall method using dumpy level/Auto Level and leveling staff. | 11 | *Determine Reduced Level by Rise and Fall Method | 4 | CO4 |
| LLO 12.1 Undertake fly leveling with double check using dumpy level/ Auto level and leveling staff | 12 | *Perform Fly Levelling to check levelling work | 2 | CO4 |
| LLO 13.1 Perform Road profile and cross section of given terrain | 13 | *Profile leveling and cross-sectioning for a road length of 300 m with cross-section at 20 m interval. (Compulsory). | 6 | CO4 |
| LLO 14.1 Undertake differential levelling operation for agriculture land | 14 | Undertake differential leveling by using dumpy level/Auto Level and leveling staff for Installation of irrigation pipelines | 4 | CO4 |
| LLO 15.1 Conduct block contouring for the area of 40m x 40m to draw its contour plan | 15 | Prepare Contour Plan/map using Block Contouring for the area of 40m x 40m to draw its contour plan | 4 | CO4 |
| LLO 16.1 Prepare Contour Plan/map using block contouring method | 16 | *Plotting contour map using block contouring method for a block of 150m x 150m with grid of 10m x 10m for given land parcel. (Compulsory). | 6 | CO4 |

| Practical / Tutorial / Laboratory Learning Outcome (LLO) | Sr No | Laboratory Experiment / Practical Titles / Tutorial Titles | Number of hrs. | Relevant COs |
|--|-------|--|----------------|--------------|
| LLO 17.1 plotting contour map using block contouring method for 10 Are Agriculture land. | 17 | Prepare Contour plan for control farming using block contouring method | 2 | CO4 |
| LLO 18.1 Use plane table survey to prepare plan and locate details by using Radiation Method. | 18 | *Prepare plans and locate details by using Radiation Method. | 2 | CO5 |
| LLO 19.1 Use plane table survey to prepare plans and locate details by Intersection Method | 19 | *Prepare plans and locate details by Intersection Method | 2 | CO5 |
| LLO 20.1 Use plane table survey to prepare plans locate details by Traversing Method | 20 | *Prepare traverse using Plane table Surveying | 4 | CO5 |
| LLO 21.1 Use plane table survey to prepare plans plan to establish plant nursery | 21 | Prepare plan to establish plant nursery | 2 | CO5 |
| Note : Out of above suggestive LLOs - <ul style="list-style-type: none"> *Marked Practicals (LLOs) Are mandatory. Minimum 80% of above list of lab experiment are to be performed. Judicial mix of LLOs are to be performed to achieve desired outcomes. | | | | |

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Collect the contour maps of different terrains available with various authorities & prepare a report on its interpretation.
- Determine the RLs of the components of existing structures like Plinth, lintels, chajja, slab, and beam etc
- Collect the information of survey instruments available in the market with their specifications.
- Prepare a flex chart to explain one method of plane tabling.
- Compare Traversing with plane table and compass method
- Perform reconnaissance survey for plotting the alignment of road.
- Observe Topographical maps and interpret the details
- Carry out comparative study of following survey instruments of different make and brands : Auto level and Dumpy Level
- Collect the map of city /town and calculate the ward wise and total area using digital planimeter.

Assignment

- Explain one method each to measure the distance between points on either side of obstacles in case of following: River, Lake, Building.
- Set the alignment of proposed road using Theodolite
- Interpret the given contour maps.
- Draw the representative contour maps for the following: Ridge of a mountain, Hillock, Valley, Pond/lake, Gentle slope, Very Steep Slope, Plain Surface
- Determine the reservoir capacity from a give contour map of reservoir.
- Measure area of small open ground by plane tabling.
- Measure the height of the flag post using Theodolite.
- Determine the reservoir capacity from a give contour map of reservoir.

Note :

“These are the just suggestive topics. Faculty must design Microproject/Activities/ Assignments based on Course Outcome requirements”.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

| Sr.No | Equipment Name with Broad Specifications | Relevant LLO Number |
|-------|---|--|
| 1 | Metric Chain made from galvanized mild steel wires 4mm in dia, brass handles with swivel joints, brass tallies provided at every 5 m length of chain - 20 and 30m. | 1,2 |
| 2 | Pegs of length 400 mm and c/s area of 50 mm x 50 mm | 1,2,3,4,5,6,7,8,9,18,19,20,21 |
| 3 | Arrows 400 mm long and made up of good quality hardened and tempered steel wire of 4 mm in diameter. | 1,2 |
| 4 | Metallic Ranging rods of 2 m length, circular or octagonal in cross section of 30 mm diameter, Lower shoe of 150 mm long. Painted in black, white and red stripes of 200 mm each. | 1,2,3,4,5,6,7,8,9,13,14,15,16,17,18,19,20,21 |
| 5 | Prismatic compass confirming to IS 1957-1961 with stand, made in Gun metal material having diameter of 85-110 mm and the least count of 30 minutes. | 4,5 |
| 6 | Dumpy level and automatic levels confirming to IS: 9613 – 1986 with stand and internal focusing telescope of standard make. | 10,11,12,13,14,15,16,17 |
| 7 | Leveling staff- 2 m and 4 m, telescopic type confirming to IS 11961 -1986 or Folding type confirming to IS 1779 (1961), 5 mm least count | 10,11,12,13,14,15,16,17 |
| 8 | Digital planimeter of standard make with Ni Cd batteries and AC Adapters | 3 |
| 9 | Plane table with accessories- Plane and telescopic Alidade, Trough compass, U-fork ,Spirit level. | 18,19,20,21 |
| 10 | Twenty Second Transit theodolite with accessories. | 6,7,8,9 |
| 11 | Metallic tape-, Steel tape, Invar, Fiber glass tape satisfying IS 1269 (Part 1 and Part 2) : 1997 specifications | 1,2,5,9,13,14,15,16,17,18,19,20,21 |

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

| Sr.No | Unit | Unit Title | Aligned COs | Learning Hours | R-Level | U-Level | A-Level | Total Marks |
|-------------|------|--|-------------|----------------|---------|---------|---------|-------------|
| 1 | I | Overview and Classification of Surveying | CO1 | 4 | 2 | 4 | 0 | 6 |
| 2 | II | Cross Staff and Compass Surveying | CO2 | 10 | 4 | 4 | 6 | 14 |
| 3 | III | Theodolite Surveying | CO3 | 13 | 4 | 4 | 12 | 20 |
| 4 | IV | Levelling and Contouring | CO4 | 14 | 2 | 8 | 12 | 22 |
| 5 | V | Plane Table Surveying | CO5 | 4 | 4 | 4 | 0 | 8 |
| Grand Total | | | | 45 | 16 | 24 | 30 | 70 |

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Termwork, Assignment, Microproject (60% Weightage to process and 40% weightage to product), Question and Answer

Summative Assessment (Assessment of Learning)

- Pen and Paper Test (Written Test), Practical Exam, Oral Exam

XI. SUGGESTED COS - POS MATRIX FORM

| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | | | Programme Specific Outcomes* (PSOs) | | |
|-----------------------|--|-----------------------|---------------------------------------|------------------------|--|-------------------------|-------------------------|-------------------------------------|-------|-------|
| | PO-1 Basic and Discipline Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/ Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| CO1 | 3 | ---- | ---- | ---- | ---- | ---- | 2 | | | |
| CO2 | 3 | 3 | 1 | 2 | 1 | 1 | 3 | | | |
| CO3 | 3 | 3 | 2 | 3 | 1 | 2 | 3 | | | |
| CO4 | 3 | 3 | 2 | 3 | 1 | 2 | 3 | | | |
| CO5 | 3 | 2 | 2 | 3 | 1 | 2 | 3 | | | |

Legends :- High:03, Medium:02,Low:01, No Mapping: -
 *PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

| Sr.No | Author | Title | Publisher with ISBN Number |
|-------|---|-----------------------------------|---|
| 1 | Kanetkar T. P.; Kulkarni, S. V. | Surveying and Levelling volume I | Pune Vidyarthi Gruh Prakashan, Pune; ISBN:978-81-858-2511-3 |
| 2 | Basak, N. N. | Surveying and Levelling | McGraw Hill Education, New Delhi ISBN 93-3290-153-8 |
| 3 | S. K. Duggal | Survey I | McGraw Hill Education, New Delhi, ISBN: 978-00-701-5137-6 |
| 4 | Punmia, B.C, Jain, Ashok Kumar Jain, Arun Kumar | Surveying I | Laxmi Publications., New Delhi. ISBN: 8-17-008853-4 |
| 5 | Bhavikatti, S. S. | Surveying and Levelling, Volume I | I. K. International, New Delhi ISBN: 978-81-906-9420-9 |

XIII. LEARNING WEBSITES & PORTALS

| Sr.No | Link / Portal | Description |
|-------|---|---|
| 1 | https://archive.nptel.ac.in/courses/105/104/105104101/ | Introduction to Surveying, Principles of surveying, and Classification of Surveying |
| 2 | https://lnct.ac.in/wp-content/uploads/2020/03/UNIT-4B.pdf | Theodolite Surveying |
| 3 | https://www.slideshare.net/gauravhtandon1/plane-table-survey-27614680 | Plane Table Surveying-accessories and methods |
| 4 | http://www.pkace.org/Lecture_Notes/Survey-lecture-notes.pdf | Levelling-methods of levelling and types of levels |
| 5 | https://dspmuranchi.ac.in/pdf/Blog/Survey.pdf | Surveying and Levelling |
| 6 | https://civilplanets.com/compass-surveying/ | Compass Surveying and its types, Temporary adjustments |
| 7 | http://ecoursesonline.iasri.res.in/mod/page/view.php?id=128285 | Traversing by Prismatic Compass, WCB and RB conversion and Terms in Compass Surveying |
| 8 | https://www.youtube.com/watch?v=x9ZPMxrlS3U | Measurement of bearing by prismatic compass |
| 9 | https://youtu.be/j8poe2vvD2Q | Temporary adjustment of auto level |
| 10 | https://www.youtube.com/watch?v=c9U0xlmCzGI | Temporary adjustment of Transit Theodolite |
| 11 | https://youtu.be/L54T4uvpMTg | Levelling operation by using Dumpy Level |
| 12 | https://www.youtube.com/watch?v=boPrQFZEn9A | Radiation method by plane table surveying |
| 13 | https://www.youtube.com/watch?v=PQfr1LABZWg | Contouring and its characteristics, Methods of Contouring |
| 14 | https://www.youtube.com/watch?v=-mkf7uJG8DI | Intersection method of Plane Table Surveying |
| 15 | https://theconstructor.org/surveying/chain-survey/29812/ | Chain, Tapes and other linear measurement equipments |