



**Birla Institute of Technology & Science, Pilani**  
Hyderabad Campus

## **FIRST SEMESTER 2019-2020**

### Course Handout Part II

01-08-2019

In addition to part-I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

*Course No.* : CE F213  
*Course Title* : SURVEYING  
*Instructor-in-Charge* : RAJITHA K  
*Instructors* : M Mounika, Sandra Maria Cherian ,Uppari Ramakrishna

### **Scope and Objective of the Course:**

This course has been designed to introduce the fundamental concepts of surveying for Civil Engineering students. Different basic and advanced methods of Engineering surveying have been included in this course. The theory and practical sessions of the course has been designed in such a way that the students can handle the given projects independently in the field. The major focus of the course is to provide exposure towards the advanced surveying methods using total station, DGPS etc. through well-organized practical sessions.

**Course Outcomes:** At the end of the course, students will have the

- Ability to establish control points in the field using total station and DGPS
- Ability to generate contours using total station derived inputs
- Ability to utilize the spatial datasets derived from total station for different Civil Engineering related applications like area calculation cut and fill calculation for earthwork related application etc.
- Ability to evaluate the advantages of advanced surveying techniques compared to traditional techniques of surveying

Student Learning Outcomes (SLOs) assessed in this course: **(a), (b), (c), (d), (e), (h), (j) and (k).**

### **Text Books:**

T1. Duggal S.K.; Surveying; Tata Mcgrawhill, New Delhi, Vol. 1and II, 4<sup>th</sup> Edition, 2016

### **Reference Books:**

- R1. Arora K R, Surveying (In SI Unit) Vol. I , II and III Standard Book House,15<sup>th</sup> Edition, 2015  
R2. Punmia B.C et al; Surveying; Laxmi Publishers, Vol I, II and III, (2005).  
R3. S S Bhavikatti, Surveying and Levelling, I.K. International Pvt Ltd, Vol. I and II (2008).



Course Plan:

<b>Lecture No.</b>	<b>Topics to be covered</b>	<b>Learning objectives</b>	<b>Chapter in the Text Book</b>	<b>*SLO</b>
<b>1-2</b>	Fundamental definitions and concepts of surveying	Study the basic concepts of surveying Discuss coordinate system, and basics of GNSS	<b>Vol 1 – 1 Vol II-9 Lecture notes</b>	<b>(a), (k)</b>
<b>3-4</b>	Methods, accessories, ranging	Study the different types of linear measurement techniques Examine the errors of different linear measurement techniques	<b>Vol 1 - 1</b>	<b>(a), (b)</b>
<b>5-8</b>	Chain survey, field work and plotting, obstacles in chaining, Compass surveying	Study the basics of chain surveying and bearings Examine the methods for area calculations	<b>Vol 1 – 2,3 Vol.1- 12.4</b>	<b>(a), (b)</b>
<b>9-12</b>	Instrument, HI method, Rise and fall method, curvature and refraction corrections.	Study the basics of leveling  Examine the performance of levelling techniques  Solve problems related to gradient calculations	<b>Vol 1 - 6</b>	<b>(a), (b), (e)</b>
<b>13-14</b>	Objectives, use, methods of contouring, contour gradient, Applications of Contouring	Discuss the different methods for contour generation  Analyze contours of different landforms and related applications  Solve civil engineering related using contour datasets	<b>Vol 1 - 9</b>	<b>(a), (b), (d), (e)</b>
<b>15-18</b>	Methods, Open and Closed Traversing, adjustments and plotting, Consecutive coordinates	Discuss the traversing techniques  Examine its role in the field of surveying Solve close and open traverse problems	<b>Vol 1- 5 R1- Vol I-15</b>	<b>(a), (b), (e), (k)</b>
<b>19-20</b>	Accessories, methods, errors, Three Point	Study the plane Table Surveying techniques	<b>Vol 1 – 8</b>	<b>(a),(b)</b>

	Problem, Two point Problem	Analyze the methods of plane table surveying		
21-22	Theory, instrument constants, methods of Tachometric surveying, Normal and inclined lines of sights	Discuss the tachometric Surveying techniques  Evaluate its performance for various cases in the field	Vol 1 – 7	(a), (c)
23-25	Single plane and two plane methods of finding the elevation of the object and distance from the survey station	Discuss various types of trigonometrical leveling techniques Evaluate the techniques for different field applications	Vol 1 - 6	(a),(c)
26-29	Types of curves and staking in the field	Examine different types of Curves Discuss practical applications of curve setting	Vol 1 - 11	(b),(k)
30-32	Simpson 1/3 <sup>rd</sup> rule, Trapezoidal rule, Meridian Distance (MD), Double Meridian Distance (DMD), Double Parallel Distance (DPD) methods; Area by coordinates	Discuss various techniques for measurement of areas  Examine the performances of different methods  Solve problems related to civil engineering related applications	Vol 1 - 12	(a),(b), (e)
33-34	Prismoidal Formula, Trapezoidal Formula, Basic Case study examples	Discuss various techniques for measurement of volumes  Examine the performances of different methods  Solve problems related to civil engineering related applications	Vol 1 - 13	(a),(b), (e)
35-36	Definitions, Setting out of structures, Examples	Discuss setting out works and practical applications	Vol 1 – 14	(a), (k)
37-43	Hydrographic surveying, Remote sensing, GIS and DGPS,	Discuss advanced surveying techniques focusing the current multi-disciplinary applications  Solve real life applications using advanced techniques	Vol II- 4,6,8,9 Lecture notes	(d), (h), (j), (k)

**PRACTICALS:**

No.	Name of experiment	No. of turns
1	Demo of Total station and related software	1
2	Establishing control points using DGPS	1
3	Area calculation using total station	1
4	Levelling using total station	1
5	Contour survey using total station	1
6	Traverse using total station	1
7	Topo surveying using Total station	1
8	Setting simple circular curve using total station	1
9	Setting Reverse Curve using total station	1
10	Setting Compound Curve using total station	1
11	Utilities using total station [REM,MLM, Staking]	1

**\*Student Learning Outcomes (SLOs):**

SLOs are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

- (a) an ability to apply knowledge of mathematics, science and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) an ability to function on multidisciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.



**Evaluation Scheme:**

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid test	90 min	25	5/10, 9.00 -- 10.30 AM	CB
*Tutorial test		10		OB
Lab Performance, Records, Observation Book	-	20		OB
Laboratory Skill Test plus Viva	-	10		CB
Surprise test	-	5		OB
Comprehensive Examination	180 min	30	13/12 FN	CB

**\* All tutorial classes are evaluative.**

**Chamber Consultation Hour:** Will be announced in the class

**Notices:** Notices will be displayed on CMS and Google class room. Important notices will also be displayed on the notice board of civil engineering department.

**Make-up Policy:**

1. Make-up will be granted only on genuine reasons (medical emergencies). However, prior permission is a must.
2. For medical cases, a certificate from the concerned physician of the Medical Centre must be produced. Medical certificate along with the make-up request forwarded by warden is required for granting make-up for labs. For tests, the makeup application must be forwarded by chief warden for all medical cases.
3. For the skill tests, make-ups will not be granted.

**Special Instructions for Survey Practical:**

1. Students must collect the instruments in the specified time. Students those who are coming late will not be allowed to perform the experiments.
2. Digital copies of the details of experiments to be performed will be available to students prior to the experiment date. All the students must come to the field- work with a print out of the concerned lab experiments and all details have to be entered in the spaces provided in the sheets. Student without printed copy of the experiment will not be allowed to perform the experiment.
3. All the students have to bring pen, pencil, scale, eraser, sharpener, calculator and writing board.
4. Calculations have to be completed within the field itself and has to be verified and signed by the concerned instructor.
5. The fair record has to be submitted in digital form in CMS/Google classroom within the next practical class. Hard copies of the experiment sheet entered during the lab session must be submitted in the next practical class.
6. All the students are advised to wear caps and shoes during field surveys.
7. Students are advised to use the instruments with utmost care. Loss / misuse of equipment will attract fine and entire batch handling that experiment will be held responsible



8. The guidelines designed for individual lab experiments and skill test have to be followed for effective learning outcomes.

**Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**INSTRUCTOR-IN-CHARGE**

**CE F213**

