Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2022-2023

Course Handout Part II

Date: 29-08-2022

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 : Krishendu Sivadas

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 have been designed in such a way that the students can gain exposure on advanced geo-spatial applications using open source platforms like QGIS. The primary focus of the course is to provide technical know-how of advanced surveying methods using total station and DGPS through well-organized online lab sessions.

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

- Ability to gain knowledge on establishing 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, 5th Edition, 2019

Reference Books:

R1. Arora K R, Surveying (In SI Unit) Vol. I , II and III Standard Book House,15th Edition, 2015

R2. Punmia B.C et al; Surveying; Laxmi Publishers, Vol I, II and III, 17th Edition, 2016.

R3. S S Bhavikatti, Surveying and Levelling, I.K. International Pvt Ltd, Vol. I and II, 2nd edition, 2016.

Course Plan:

Lecture No.	Topics to be covered	Learning objectives	Chapter in the Text Book	*SLO
1-2	Fundamental definitions and concepts of surveying	**S**tudy the basic concepts of surveying **D**iscuss coordinate system, and basics of GNSS	**Vol 1 – 1** **Vol II-9** **Lecture notes**	**(a), (k)**
3-4	Methods, accessories, ranging	**S**tudy the different types of linear measurement techniques **E**xamine the errors of different linear measurement techniques	**Vol 1 - 1**	**(a), (b)**
5-8	Chain survey, field work and plotting, obstacles in chaining, Compass surveying	**S**tudy the basics of chain surveying and bearings **E**xamine the methods for area calculations	**Vol 1 – 2,3** **Vol.1-12.4**	**(a), (b)**
9-12	Instrument, HI method, Rise and fall method, curvature and refraction corrections.	**S**tudy the basics of leveling **E**xamine the performance of levelling techniques **S**olve problems related to gradient calculations	**Vol 1 - 6**	**(a), (b), (e)**

13-14	Objectives, use, methods of contouring, contour gradient, Applications of Contouring	**D**iscuss the different methods for contour generation **A**nalyze contours of different landforms and related applications **S**olve civil engineering related using contour datasets	**Vol 1 - 9**	**(a), (b), (d), (e)**
15-18	Methods, Open and Closed Traversing, adjustments and plotting, Consecutive coordinates	**D**iscuss the traversing techniques **E**xamine its role in the field of surveying Solve close and open traverse problems	**Vol 1- 5 R1- Vol I-15**	**(a), (b), (e), (k)**
19-20	Accessories, methods, errors, Three Point Problem, Two point Problem	**St**udy the plane Table Surveying techniques **A**nalyze the methods of plane table surveying	**Vol 1 – 8**	**(a),(b)**
21-22	Theory, instrument constants, methods of Tacheometric surveying, Normal and inclined lines of sights	**D**iscuss the tacheometric Surveying techniques **E**valuate 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	**D**iscuss various types of trigonometrical leveling techniques **E**valuate the techniques for different field applications	**Vol 1 - 6**	**(a),(c)**
26-29	Types of curves and staking in the field	**E**xamine different types of Curves **D**iscuss practical applications of curve	**Vol 1 - 11**	**(b),(k)**

		setting		
30-32	Simpson 1/3rd rule, Trapezoidal rule, Meridian Distance (MD), Double Meridian Distance (DMD), Double Parallel Distance (DPD) methods; Area by coordinates	**D**iscuss various techniques for measurement of areas **E**xamine the performances of different methods **S**olve problems related to civil engineering related applications	**Vol 1 - 12**	**(a),(b), (e)**
33-34	Prismoidal Formula, Trapezoidal Formula, Basic Case study examples	**D**iscuss various techniques for measurement of volumes **E**xamine the performances of different methods **S**olve problems related to civil engineering related applications	**Vol 1 - 13**	**(a),(b), (e)**
35-36	Definitions, Setting out of structures, Examples	**D**iscuss setting out works and practical applications	**Vol 1 – 14**	**(a), (k)**
37-40	Hydrographic surveying, Remote sensing, GIS and DGPS,	**D**iscuss advanced surveying techniques focusing the current multi-disciplinary applications **S**olve real life applications using advanced techniques	**Vol II-4,6,8,9 Lecture notes**	**(d), (h), (j), (k)**

Lab session:

No.	Name of the session
1	Demo of software related to geospatial applications

2	QGIS basic spatial analysis- Understanding the spatial dataset
3	Establishment of control point using DGPS
4	Area calculation using total station
5	Levelling using total station
6	Contour generation using total station
7	Traverse using total station
8	Topo surveying using Total station
9	Setting simple circular curve using total station
10	Setting Reverse Curve using total station
11	Setting Compound Curve using total station
12	Utilities using total station [REM,MLM, Staking]

***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
Midsemester Test	90 min	30	02/11 11.00 - 12.30PM	CB
Lab[1]	----	20	Continuous	OB
Laboratory Skill Test plus Viva	30 min	10		OB
Tutorials[2]	----	5	Continuous	OB
Comprehensive Examination	180 min	35	22/12 AN	CB

[1] **All lab sessions except Demo are evaluative and viva will be conducted for all evaluative labs**

[2] **All tutorial classes are evaluative. Out of the n tutorial classes, best of (n-2) evaluations will be considered for grading.**

Chamber Consultation Hour: Friday 5-6 PM

Notices: Notices will be displayed on Google classroom.

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 Lab sessions:

- Students must collect the instruments in the specified time. Students those who are coming late will not be allowed to perform the experiments.
- 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.
- All the students have to bring pen, pencil, scale, eraser, sharpener, calculator and writing board.
- Calculations have to be completed within the field itself and has to be verified and signed by the concerned instructor.
- 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.
- All the students are advised to wear caps and shoes during field surveys.
- 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
- 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