Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2021-2022

Course Handout Part II

Date: 20-08-2021

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 : Sandra Maria Cherian, Vogeti Rishith Kumar, 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 Tachometric surveying, Normal and inclined lines of sights	**D**iscuss the tachometric 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	**Vol 1 - 11**	**(b),(k)**

		applications of curve 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)**
37-42	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	Area calculation using chain surveying
6	Levelling using total station
7	Levelling using Auto-level
8	Contour generation using total station
9	Contour generation using Digital Elevation models and its applications
10	Introduction to satellite images in QGIS and basic processing using QGIS
11	Spatial data creation using satellite dataset in QGIS
12	Geo-spatial applications in Civil Engineering using QGIS

***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	20/10/2021 9.00 - 10.30AM	OB
Lab[1]	----	15	Continuous	OB
Lab test	30 min	5	TBA	OB
Tutorials[2]	----	10	Continuous	OB
Comprehensive Examination	120 min	40	16/12 FN	OB

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

[2] **All tutorial classes are evaluative.**

Chamber Consultation Hour: Saturday 2-3 PM

Notices: Notices will be displayed on Google class room.

Make-up Policy:

Only genuine cases will be granted make up. Each lecture class will have one live quiz session which are of non-evaluative in nature and the participation in the live quiz session will be considered for granting make ups for other evaluative sessions and subjected to the decision of the IC.

Special Instructions for Lab sessions:

- The online mode of lab sessions targets to provide soft skill in the domain of geo-spatial data processing. To achieve these, the students need to equip with laptops/desktops with software installed
- The open source software QGIS as well as AutoCAD are the main software that are required for the lab sessions

- Digital records need to be submitted for all the lab sessions except the demo in the given template in google class room and each lab sessions will have a lab viva.

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