Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APRIL/MAY 2024

B.E MINING/ECE/MATERIAL SCIENCE/MECHANICAL/ IT ENGINEERING

Semester VI (OPEN ELECTIVE)

GI 5692 - TOTAL STATION AND GPS SURVEYING

(Regulation 2019)

Time: 3hrs Max. Marks: 100

CO 1	Learn the fundamentals of Total Station and GPS.
CO 2	Understanding the concepts of Electromagnetic waves and impact of Refractive Index.
CO 3	Work with Electro optical and microwave Total Station and understand error sources.
CO 4	Understand the working principle of GNSS, its components, signal structure, and error Sources
CO 5	Understand various GNSS surveying methods and processing techniques used in GNSS observations and familiarise various areas of GNSS applications and new developments.

BL – Bloom's Taxonomy Levels

(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysing, L5 - Evaluating, L6 - Creating)

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

Q. No	Questions	Marks	CO	BL
1	Classify the Electromagnetic Distance Measurement instrument based on the range and based on carrier wave used.	2	1	L1
2	What are the different time systems employed in GNSS.	2	1	L1
3	What are the factors affecting Refractive Index?	2	2	L2
4	Write short on Cauchy's equation.	2	2	L2
5	What is Zero error?	2	3	L2
6	What is the reason for applying first and second velocity corrections to the measured distance by EDM?	2	3	L3
7	Name the carrier frequencies used in GPS.	2	4	L1
8	Write about Anti Spoofing.	2	4	L1
9	What is the RINEX format? When it is used?	2	5	L2
10	Find the PDOP and GDOP values, if GNSS gives the DOP values of TDOP = 0.98, VDOP= 1.99 and HDOP=1.19	2	5	L2

PART- B (5 x 13 = 65 Marks)

(Restrict to a maximum of 2 subdivisions)

Q. No	Questions	Marks	CO	BL
11 (a)	Explain the various basic principles utilized in Electro-magnetic Distance Measurement.	13	1	L3
	OR			
11 (b)	Discuss the working principles of GNSS, including brief explanations of the Global Navigation Satellite System, Regional Navigation Satellite System, Satellite-Based Augmented System and Ground Based Augmented System.	13	1	L3

12 (a)	An Electro-Optical Total Station was designed to emit an infrared wave of wavelength 910nm and modulation wavelength of 20m at an atmospheric temperature of -11.8° C and an atmospheric pressure of 745mm of mercury. During the measurement, it was found that the modulation frequency (fm) is 14.984906 MHz Compute the correction to be applied to the observed distance due to variation of modulation frequency.	13	2	L4
	OR			
12 (b)	An electro optical total station was designed to emit carrier of wave length 910nm at -17.8°C and atmospheric pressure of 750mm of mercury. Compute the distance displayed by the instrument at the temperature of 45°C and atmospheric pressure of 758mm of mercury, if the distance displayed at reference condition is 4131.046m.	13	2	L4
13 (a)	i. Explain the components comprising an electro-optical Electronic Distance Measurement (EDM) system, dissecting their individual functionalities.	7	3	L3
	ii. Explain any three COGO functions employed in Total Station.	6	3	L2
	OR			
13 (b)	i. Discuss the sources of errors inherent in electro-optical total stations.	7	3	L3
	ii. What are the factors to be considered in the Care and maintenance of the Total Station?	6	3	L2
14 (a)	Discuss survey-grade GPS systems in depth, elucidating their underlying principles, advanced features, and applications across various domains. Additionally, critically evaluate the precision, accuracy, and reliability of survey-grade GPS technology.	13	4	L3
	OR			
14 (b)	Discuss the interdependent roles and functions of the space, control, and user segments within the GPS system.	13	4	L3
15 (a)	Analyze the functions and processes involved in GPS processing software, illustrating them through a detailed flowchart. Identify key steps in data acquisition, pre-processing, post-processing, and output generation, highlighting their interconnections and importance in ensuring accurate positioning.	13	5	L4
	OR			
15 (b)	Discuss the various survey techniques utilized in GPS surveys, providing comprehensive explanations for each method.	13	5	L4

PART- C (1 x 15 = 15 Marks)

(Q.No.16 is compulsory)

Q. No	Questions	Marks	CO	BL
16.	How would you design a detailed field procedure outlining the systematic preparation of a topographic map for our campus at a 1:2000 scale, integrating Total Station and GPS technologies? Please justify each step with an analysis of its significance and potential challenges?	15	3 & 5	L6