K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF CIVIL ENGINEERING

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K. S. School of Engineering and Management

VISION

To impart quality education in engineering and management to meet technological business and social needs through holistic education and research.

MISSION

K. S. School of Engineering and Management shall,

- Establish state-of-art infrastructure to facilitate effective dissemination of technical and managerial knowledge.
- Provide comprehensive educational experience through a combination of curricular and experiential learning, strengthened by industry-institute interaction.
- Pursue socially relevant research and disseminate knowledge.
- Inculcate leadership skills and foster entrepreneurial spirit among students.

Department of Civil Engineering

VISION

To emerge as one of the leading civil Engineering Department by Producing competent and quality ethical engineers with strong foot hold in the areas of Infrastructure development and research.

MISSION

Department of civil Engineering shall,

- **Provide industry oriented academic training with strong fundamental and applied skills.**
- **Engage in research activities in civil Engineering and allied fields, inculcating the desired perception and value system in the students.**

K. S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU-560109

TENTATIVE CALENDAR OF EVENTS: III ODD SEMESTER (2022-2023)

SESSION: OCT 2022 – APR 2023

Week No.	Month	Day						Days	Activities
		Mon	Tue	Wed	Thu	Fri	Sat		
1	**OCT/NOV**	31*	**1H**	2	3	4 TA	5 DH	4	31* - Commencement of III Sem 1- Kannada Rajyotsava
2	**NOV**	7	8	9	10	**11H**	12	5	11- Kanakadasa Jayanti 12- Tuesday Time Table
3	**NOV**	14	15	**16**	**17**	**18**	19 DH	5	
4	**NOV**	**21**	**22**	**23**	24	25	26 TA	6	24- FieldVisit to RMC plant 26 - Wednesday Time Table
5	**NOV/DEC**	**28 T1**	**29 T1**	**30 T1**	1	2	3 DH	5	
6	**DEC**	5	6	7	**8 LT1**	**9 LT1**	**10 LT1**	6	
7	**DEC**	12 * FFB1	13 BV	14 ASD	15	16	17 DH	5	12* - First Faculty Feed Back
8	**DEC**	19	20	21	22	23	24	6	24 - Wednesday Time Table
9	**DEC**	**26**	**27**	**28**	29	30	31 TA	6	31 - Monday Time Table
10	**JAN**	**2 T2**	**3 T2**	**4 T2**	5	6	7 DH	5	
11	**JAN**	9	10	11	12 BV	13 ASD	14	6	14- Friday Time Table
12	**JAN**	16* FFB2	17	18	19	20	21 DH	5	16* - First Faculty Feed Back 20- Industrial visit to ashirvad plumbing school
13	**JAN**	**23**	**24**	**25**	**26 H**	27	28	5	26- Republic Day 28- Wednesday Time Table
14	**JAN/FEB**	**30**	**31**	**1**	**2**	**3**	4 DH	5	
15	**FEB**	**6**	**7**	**8**	**9**	**10**	11	6	11- Thursday Time Table
16	**FEB**	13	14	15	16	17	**18 DH**	5	17- Industrial visit to stina Exhibition 18- Maha Shivaratri
17	**FEB**	20	21	22	23	24	25	6	25- Wednesday Time Table
18	**FEB/MAR**	**27**	28	**1**	**2**	**3**	**4 DH**	5	
19	**MAR**	**6 * FFB2**	**7**	8	9	10	**11**	6	6* - Second Faculty Feed Back 6-8- SCR Activity 11 - Tuesday Time Table
20	**MAR**	13	14	15	16	17	**18 DH**	5	
21	**MAR**	**20 LT2**	**21 LT2**	**22 H**	**23 LT2**	24 TA	**25**	5	22- Ugadi 25-Tuesday Time Table
22	**MAR/APR**	**27 T3**	**28 T3**	**29 T3**	**30**	**31**	**1***	6	1* - Last Working day 1- Monday Time Table
Total No of Working Days : 118									

Total Number of working days (Excluding holidays and Tests)=103

H	Holiday
BV	Blue Book Verification
T1,T2,T3	Tests 1,2, 3
ASD	Attendance & Sessional Display
DH	Declared Holiday
LT	Lab Test
TA	Test attendance

Monday	20
Tuesday	20
Wednesday	22
Thursday	20
Friday	21
Total	**103**

Professor & Head
Dept. of Civil Engineering
K.S. Group of Institutions
K.S. School of Engineering & Management
Bangalore-560 062

Dr. K. RAMA NARASIMHA
Principal/Director
K S School of Engineering and Management
Bengaluru - 560 109

K S SCHOOL OF ENGINEERING & MANAGEMENT		
DEPARTMENT OF CIVIL ENGINEERING		
3RD SEM CLASS LIST		
Sl no	USN NO	Name of the Student
1	1KG21CV001	K MANEESH
2	1KG21CV002	MANJUNATH S
3	1KG21CV003	PRATHEEK SIDDHARTH
4	1KG21CV004	PRIYADARSHINI J
5	1KG21CV005	RAJA L
6	1KG21CV006	RANJITHA M
7	1KG21CV007	TEJAS V
8	1KG21CV008	VIJAY P
9	1KG21CV009	VISHAL KUMAR
10	1KG19CV404	NANDARAJ(26/11/22)
11	DIPLOMA	AMOGHA VARSHA (01/12/22)
12	DIPLOMA	JEEVAN (28/11/22)
13	DIPLOMA	MD AMEER KHALEEL AHMED(01/11/22)
14	DIPLOMA	DEEPAK L D (7/10/22)
15	DIPLOMA	NIKHIL (16/11/22)
16	DIPLOMA	PRAJWAL (19/12/2022)
17	DIPLOMA	SAI NAGA KAUSHAL (11/01/2023)
18	DIPLOMA	SUHAS P (31/10/22)
19	DIPLOMA	VIRAT D (20/10/22)
20	DIPLOMA	VISHNU KISHORE (25/11/22)

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III Semester

Geodetic Engineering			
Course Code	21CV32	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	2:2:2:0	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	4	Exam Hours	03

Course objectives:

- Provide basic knowledge about principles of surveying for location, design and construction of engineering projects
- Develop skills for using surveying instruments including, levelling instruments, plane tables, theodolite, compass
- Make students to familiar with cooperative efforts required in acquiring surveying data and applying fundamental concepts to eliminate errors and set out the works
- Provide information about new technologies that are used to abstracting the information of earth surface

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. The survey of India topomap has to be shared with students and few exercise must be given
2. The satellite imagery has to be procured and shared with students
3. The manual for conducting field survey has to be provided
4. The online courses available should be shared with students
5. YouTube videos
6. Power point presentations

Module-1

Introduction to Surveying: Importance of surveying in Civil Engineering, Concepts of plane and geodetic surveying Principles of surveying –Plans and maps – Surveying equipment's, Meridians, Bearings, Dip, Declination, Local attraction, Calculation of bearings and included angles. Compass surveying and Plane Table Surveying

Compass surveying: Prismatic and surveyor's compasses, temporary adjustments.

Plane Table Surveying: plane table and accessories, advantages and disadvantages of plane table survey, method of plotting - radiation, intersection, traversing, resection, two point and three point method

Teaching-Learning Process	Chalk and talk, PowerPoint Presentation, YouTube videos

Module-2

Levelling – Principles and basic definitions – Types of Levels – Types of adjustments and objectives – Types of levelling – Simple, Differential, Fly, Reciprocal, Profile, Cross sectioning – Booking of levels – Rise & fall and H. I methods (Numerical)

Areas and volumes: Measurement of area – by dividing the area into geometrical figures, area from offsets, mid ordinate rule, trapezoidal and Simpsons one third rule, area from co-ordinates, introduction to planimeter, digital planimeter. Measurement of volumes-trapezoidal and prismoidal formula.

Teaching-Learning	Chalk and talk, PowerPoint Presentation, YouTube videos

Process	

Module-3

Theodolite Surveying: Theodolite and types, fundamental axes and parts of theodolite, temporary adjustments of transit theodolite, Horizontal and Vertical angle measurements by repetition and reiteration Trigonometric levelling: Single and Double plane for finding elevation of objects Computation of distances and elevations using Tacheometric method.

Teaching-Learning Process	Chalk and talk, PowerPoint Presentation, YouTube videos

Module-4

Curve Surveying: Curves – Necessity – Types, Simple curves, Elements , Designation of curves, Setting out simple curves by linear methods (numerical problems on offsets from long chord & chord produced method), Setting out curves by Rankine's deflection angle method (numerical problems). Compound curves, Elements, Design of compound curves, Setting out of compound curves (numerical problems). Reverse curve between two parallel straights (numerical problems on Equal radius and unequal radius). Transition curves Characteristics, numerical problems on Length of Transition curve, Vertical curves –Types – (theory).

Teaching-Learning Process	Chalk and talk, PowerPoint Presentation, YouTube videos

Module-5

Photogrammetry and aerial survey: Introduction, definitions, basics principles, methods, importance of scale, height, applications.

Remote sensing: Introduction, Principle of Remote sensing, EMR, types, resolutions, types of satellites, type of sensors, LIDAR, visual and digital image processing and its applications. **Global Positioning System:** Definition, Principles of GPS and applications. Geographical Information System: Introduction and principle of Geographical Information System, components of GIS, applications

Advanced instrumentation in surveying: classification, measuring principles, Electronic theodolite, EDM, Total Station, Drones

Teaching-Learning Process	Chalk and talk, PowerPoint Presentation, YouTube videos

LABORATORY EXPERIMENTS

1.	Study of various instruments used for surveying, namely chain, tape, Compass,
2.	Dumpy level, Auto-level, Theodolite, Tacheometer, Total station and GPS. To find the distance between two points shown in the field using method of pacing, chaining and taping.
3.	To set regular geometric figures (Hexagon and Pentagon) using chain tape and accessories.
4.	To set regular geometric figures (Hexagon and Pentagon) using prismatic compass, given the bearing of one line.
5.	Study of use of Dumpy level and to determine the different in elevation between two points by differential levelling using Dumpy level
6.	To find the true difference in elevation between two points situated far apart by using Reciprocal levelling.

7.	Trigonometrical levelling: Single plane method and Double plane method
8.	Measurement of horizontal angle using theodolite by: i) Method of Repetition and ii) Reiteration method.
9.	Setting simple circular curve-Instrumental method,
10.	Setting compound curve using theodolite
11.	Plane table : Setting, orientation, radiation, intersection
12.	Demo: Total station, GPS

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Execute survey using compass and plane table
2. Find the level of ground surface and Calculation of area and volumes
3. Operate theodolite for field execution
4. Estimate the capacity of reservoir
5. Interpret satellite imageries

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

CIE for the theory component of IPCC

Two Tests each of **20 Marks (duration 01 hour)**

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Scaled-down marks of two tests and two assignments added will be CIE marks for the theory component of IPCC for **30 marks**.

CIE for the practical component of IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. **The15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test **(duration 02/03 hours)** at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 05 marks.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **20 marks**.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally scaled down to 50 Marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Books

1. Surveying & levelling Vol. I ,II & III, B. C. Punmia, Laxmi Publications; seventeenth edition (2016)
2. Advanced Surveying: Total Station, GPS, GIS & Remote Sensing by Pearson 2017 by GopiSatheesh, R.Sathikumar, N. Madhu
3. Surveying Vol.I& II, S. K. Duggal, McGraw Hill Education; Fourth edition (2017)

4. Surveying and Levelling, R. Subramanian , second edition, 2012, Oxford University Press;
5. Engineering Surveying, Schofield and Breach, 6th edition, Butterworth-Heinemann (Elsevier publication, 2007)
6. Surveying , A Banister, S Raymond, R Baker, 7th edition, Pearson , New Delhi

Web links and Video Lectures (e-Resources):

- NPTEL courses

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF CIVIL ENGINEERING

CO-PO Mapping

Course: Geodetic Engineering				
Type: Integrated Professional Core Course			Course Code: 21CV32	
No of Hours				
Theory (Lecture Class)	Tutorials	Practical/Field Work/Allied Activities	Total/Week	Total hours of Pedagogy
2	2	2	6	50
Marks				
CIE	SEE		Total	Credits
50	50		100	4

Aim/Objectives of the Course

1. Provide basic knowledge about principles of surveying for location, design and construction of engineering projects
2. Develop skills for using surveying instruments including, levelling instruments, plane tables, theodolite, compass
3. Make students to familiar with cooperative efforts required in acquiring surveying data and applying fundamental concepts to eliminate errors and set out the works.
4. To set out the simple curves by using different methods.
5. Provide information about new technologies that are used to abstracting the information of earth surface

Course Learning Outcomes

After completing the course, the students will be able to

CO1	**Calculate** the bearings of the survey line and also included angle of the various geometrical figures using prismatic compass.	**Applying (K3)**
CO2	**Calculate** the Reduced level of various points using Height of Instrument and Rise and fall method.	**Applying (K3)**
CO3	**Calculate** the distance and elevation of the object using trigonometric levelling.	**Applying (K3)**
CO4	**Calculate** the offsets of various points to set out simple curve using various methods.	**Applying (K3)**
CO5	**List** the types of satellites, LIDAR, Visual and Digital Image Processing along with their applications.	**Applying (K3)**

Syllabus Content

Module 1: Introduction to Surveying: Importance of surveying in Civil Engineering, Concepts of plane and geodetic surveying Principles of surveying – Plans and maps – Surveying equipment's, Meridians, Bearings, Dip, Declination, Local attraction, Calculation of bearings and included angles.

Compass surveying: Prismatic and surveyor's compasses, temporary

adjustments. **Plane Table Surveying:** plane table and accessories, advantages and disadvantages of plane table survey, method of plotting - radiation, intersection, traversing, resection, two point and three point method **LO:** At the end of this session the student will be able to 1. List the importance of Surveying. 2. Explain the principles of Surveying. 3. Explain the different types of Bearings and Meridians. 4. Differentiate between Surveyor Compass and Prismatic Compass. 5. Explain the temporary adjustments of Prismatic Compass. 6. Explain the various accessories used in Plane Table Surveying. 7. Explain the different methods of plotting using Plane Table Surveying. **Laboratory Experiments:** Study the various instruments used in Surveying, measure the distance of two points using chain, tape and pacing, to set out geometrical figures using chain and Prismatic compass, To plot the various points using different methods of plane table surveying. **LO:** At the end of this session the student will be able to 1. To study the various instruments used in Surveying. 2. To measure the distance between two points using Pacing, Chaining and Taping. 3. To set out Pentagon and Hexagon using Chain and Tape. 4. To set out Pentagon and Hexagon using Prismatic Compass. 5. To set out various points using Plane Table Surveying using Radiation and Intersection Method.	**CO1** 10 hrs PO1-3 PO2-2 PO5-2 PO6-3 PO7-3 PO9-3 PO10-3 PO11-2 PO12 -3 PSO1-3 PSO2-2
Module 2: Levelling – Principles and basic definitions – Types of Levels – Types of adjustments and objectives – Types of levelling – Simple, Differential, Fly, Reciprocal, Profile, Cross sectioning – Booking of levels – Rise & fall and H. I methods (Numerical) **Areas and volumes:** Measurement of area – by dividing the area into geometrical figures, area from offsets, mid ordinate rule, trapezoidal and Simpsons one third rule, area from co-ordinates, introduction to Planimeter, digital Planimeter. Measurement of volumes-trapezoidal and prismoidal formula **LO:** At the end of this session the student will be able to 1. Explain the different types of Levels. 2. Explain the different types of Levelling. 3. Explain the temporary adjustments of Levelling. 4. Calculate the Reduced Level of various points using H.I and Rise and Fall method. 5. Calculate the area of the ground by different methods. 6. Calculate the volume of earthwork by using different methods.	**CO2** 10 hrs. PO1-3 PO2-2 PO4-2 PO5-2 PO6-3 PO7-3 PO9-3 PO10-3 PO11-2

7. Explain the different types of Planimeter. **Laboratory Experiments:** To calculate the elevation of various points using different methods of levelling **LO:** At the end of this session the student will be able to 1. To determine the difference in elevation between two points using differential levelling. 2. To find the true difference in elevation between two points suited far apart by using Reciprocal Levelling.	PO12 -3 PSO1-3 PSO2-2
Module 3: Theodolite Surveying: Theodolite and types, fundamental axes and parts of theodolite, temporary adjustments of transit theodolite, Horizontal and Vertical angle measurements by repetition and reiteration Trigonometric levelling: Single and Double plane for finding elevation of objects Computation of distances and elevations using Tacheometric method.. **LO:** At the end of this session the student will be able to 1. Explain the different types of theodolite. 2. List the fundamental axis of theodolite. 3. Measure the horizontal angle between two points using Repetition and Reiteration method. 4. To determine the elevation of the object by using Trigonometric Levelling 5. Calculate the distance and elevations of the object using Tacheometric Levelling. **Laboratory Experiments:** To measure the horizontal angle using Theodolite, To determine the elevation of object using Trigonometric levelling **LO:** At the end of this session the student will be able to 1. Measure the horizontal angle by repetition and reiteration method using theodolite. 2. Calculate the distance and elevation of the object by using Single Plane Method. 3. Calculate the distance and elevation of the object by using Double Plane Method. 4. Calculate the distance and elevation of the object using Tacheometric method.	**CO3** 10 hrs PO1-3 PO2-2 PO4-2 PO5-2 PO6-3 PO7-3 PO9-3 PO10-3 PO11-2 PO12 -3 PSO1-3 PSO2-2
Module 4: Curve Surveying: Curves – Necessity – Types, Simple curves, Elements , Designation of curves, Setting out simple curves by linear methods (numerical problems on offsets from long chord & chord produced method), Setting out curves by Rankine's deflection angle method (numerical problems). Compound curves, Elements, Design of compound curves, Setting out of	**CO4** 10hrs PO1-3 PO2-2

compound curves (numerical problems). Reverse curve between two parallel straights (numerical problems on Equal radius and unequal radius). Transition curves Characteristics, numerical problems on Length of Transition curve, Vertical curves –Types – (theory) **LO:** At the end of this session the student will be able to 1. Explain the different types of curves. 2. Set out the simple curve by using different methods. 3. Set out the compound curves 4. Define the transition curve and characteristics of it. 5. Calculate the length of the transition curve. **Laboratory Experiments:** To set out simple curve and compound curve. **LO:** At the end of this session the student will be able to 1. To set out the simple curve by using Instrumental Method. 2. To set out the compound Curve by using Theodolite.	PO4-2 PO5-2 PO6-3 PO7-3 PO9-3 PO10-3 PO11-2 PO12 -3 PSO1-3 PSO2-2
Module 5: Photogrammetry and aerial survey: Introduction, definitions, basics principles, methods, importance of scale, height, applications. Remote sensing: Introduction, Principle of Remote sensing, EMR, types, resolutions, types of satellites, type of sensors, LIDAR, visual and digital image processing and its applications. Global Positioning System: Definition, Principles of GPS and applications. Geographical Information System: Introduction and principle of Geographical Information System, components of GIS, applications Advanced instrumentation in surveying: classification, measuring principles, Electronic theodolite, EDM, Total Station, Drones. **LO:** At the end of this session the student will be able to 1. Explain the principles of Photogrammetry. 2. Explain the principles of Remote Sensing. 3. Explain the types of Sensors and Satellites. 4. Explain the components and applications of GIS. **Laboratory Experiments:** Demo: Total Station and GPS **LO:** At the end of this session the student will be able to 1. To operate the Total Station and GPS.	**CO5** 10hrs PO1-3 PO2-2 PO5-2 PO6-3 PO7-3 PO9-3 PO10-3 PO11-2 PO12 -3 PSO1-3 PSO2-2
Suggested Learning Resources: 1. B. C. Punmia, **Surveying & levelling** Vol. I ,II & III, . Laxmi Publications; seventeenth edition (2016) 2. GopiSatheesh, R.Sathikumar, N. Madhu, Advanced **Surveying: Total Station, GPS, GIS &**	

Remote Sensing, Pearson 2017 by

3. S. K. Duggal, **Surveying** Vol.I& II, McGraw Hill Education; Fourth edition (2017) 5
4. R. Subramanian , **Surveying and Levelling**, second edition, 2012, Oxford University Press;

Web links and Video Lectures (e-Resources):

- https://www.nptel.ac.in

Useful Journals

- Journal of Surveying Engineering, ASCE

Teaching and Learning Methods

1. Lecture class: 18 hrs.
2. Tutorial classes: 18 hrs. +03 hrs.
3. Practical: 14 hrs.
4. Revision: 17hrs.

Assessment

Type of test/examination: Written examination

Continuous Internal Evaluation (CIE): Theory component: Two out of Three Tests each of 20 marks and Two assignments each of 10 Marks reduced to 30 Marks.
Practical component 20 Marks.
Total CIE: 50 Marks
Semester End Exam (SEE): 100 marks (students have to answer all main questions) which will be reduced to 50 Marks.

Test duration: 1 hrs

Examination duration: 3 hrs

CO to PO Mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:**Environment and Sustainability **PO8:**Ethics **PO9:**Individual & Team Work **PO10:** Communication **PO11:**Project Management & Finance **PO12:**Lifelong Learning

PSO1: The proficiency in mathematics, physical and management sciences helps to excel in the areas of planning, analysis related to Civil Engineering systems.

PSO2: Identify sustainable materials and technologies, code of practices in construction industry and transportation systems.

CO	PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
21CV32	K-level														
CO1	K3	3	2	-	-	2	3	3	-	3	3	2	3	3	2
CO2	K3	3	2	-	2	2	3	3	-	3	3	2	3	3	2
CO3	K3	3	2	-	2	2	3	3	-	3	3	2	3	3	2
CO4	K3	3	2	-	2	2	3	3	-	3	3	2	3	3	2
CO5	K3	3	2	-	-	2	3	3	-	3	3	2	3	3	2

Course In Charge

Head - Dept
Professor & Head
Dept. of Civil Engineering
K.S. Group of Institutions
K.S. School of Engineering & Management
Bangalore-560 062.

IQAC Coordinator

Principal

Principal / Director
K.S. School of Engineering & Management
Bangalore-560 062

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF CIVIL ENGINEERING

SESSION: 2022-2023 (ODD SEMESTER)

LESSON PLAN

NAME OF THE STAFF : Mr. SHASHI PRASAD N

COURSE CODE/TITLE : 21CV32/GEODETIC SURVEYING

SEMESTER/YEAR : III/II

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date	Delivery Date
	MODULE 1						
1	**Introduction to Surveying:** Importance of surveying in Civil Engineering, Concepts of plane and geodetic surveying Principles of surveying,	L	LCD	01	01	31/10/2022	03/11/22
2	Plans and maps – Surveying equipment's, Meridians, Bearings, Dip, Declination,	L	LCD	01	02	31/10/2022	4/11/22
3	Local attraction, Calculation of bearings and included angles.	T	BB	02	04	02/11/2022	7/11/22
4	**Compass surveying:** Prismatic and surveyor's compasses, temporary adjustments. **Plane Table Surveying:** plane table	L	LCD	01	05	07/11/2022	12/11/22

	and accessories, advantages and disadvantages of plane table survey.						
5	Method of plotting - radiation, intersection, traversing, resection, two point and three point method.	L	LCD	01	06	07/11/2022	14/11/22
6	**Practical:** Study the various instruments used in Surveying, measure the distance of two points using chain, tape and pacing, to set out geometrical figures using chain and Prismatic compass.	P	D	02	08	04/11/2022	04/11/22
7	**Practical:** To plot the various points using different methods of plane table surveying.	P	D	02	10	18/11/2022	18/11/22
	MODULE 2						
8	**Levelling** – Principles and basic definitions – Types of Levels – Types of adjustments and objectives.	T	LCD	01	11	09/11/2022	16/11/22
9	Types of levelling – Simple, Differential, Fly, Reciprocal, Profile, Cross sectioning.	L	LCD	01	12	14/11/2022	21/11/22
10	Booking of levels - Rise & fall and H. I methods (Numerical)	L	BB	01	13	14/11/2022	22/11/22
11	**Areas and volumes:** Measurement of area – by dividing the area into geometrical figures, area from offsets, mid ordinate rule, trapezoidal and Simpsons one third rule, area from co-ordinates.	T	BB	02	15	16/11/2022	22/11/22
12	Introduction to Planimeter, digital Planimeter.	L	LCD	01	16	21/11/2022	25/11/22
13	Measurement of volumes-trapezoidal	L	BB	02	18	21/11/2022	26/11/22

	and prismoidal formula						
14	**Practical:** To calculate the elevation of various points using different methods of levelling	P	D	02	20	25/11/2022	25/11/22
	MODULE 3						
15	**Theodolite Surveying:** Theodolite and types, fundamental axes and parts of theodolite, temporary adjustments of transit theodolite,	T	LCD	01	21	25/11/2022	30/11/22
16	Tutorials	T	BB	00	21	26/11/2022	9/12/22
17	Horizontal and Vertical angle measurements by repetition and reiteration	T	LCD	01	22	02/12/2022	12/12/22
18	Trigonometric levelling: Single and Double plane for finding elevation of objects	L	LCD	02	24	05/12/2022	12/12/22
19	Computation of distances and elevations using Tacheometric method	T	BB	02	26	07/12/2022	19/12/22
20	**Practical:** To measure the horizontal angle using Theodolite.	P	D	02	28	02/12/2022	02/12/22
21	**Practical:** To determine the elevation of object using Trigonometric levelling	P	D	02	30	16/12/2022	16/12/22
	MODULE 4						
22	**Curve Surveying:** Curves – Necessity – Types, Simple curves, Elements , Designation of curves,	L	LCD	01	31	12/12/2022	21/12/22
23	Setting out simple curves by linear methods (numerical problems on	L	BB	02	33	12/12/2022	24/12/22

	offsets from long chord & chord produced method),						
24	Setting out curves by Rankine's deflection angle method (numerical problems).	T	BB	01	34	16/12/2022	26/12/22
25	Compound curves, Elements, Design of compound curves. Setting out of compound curves (numerical problems).	L	BB	02	36	19/12/2022	28/12/22
26	Reverse curve between two parallel straights (numerical problems on Equal radius and unequal radius).	T	BB	01	37	21/12/2022	04/1/23
27	Transition curves Characteristics, numerical problems on Length of Transition curve, Vertical curves – Types – (theory)	T	LCD	01	38	23/12/2022	06/1/23
28	Tutorials	T	BB	00	38	24/12/2022	18/1/23
29	**Practical:** To set out simple curve and compound curve.	P	D	02	40	23/12/2022	23/12/22
	MODULE 5						
30	**Photogrammetry and aerial survey**: Introduction, definitions, basics principles, methods, importance of scale, height, applications	L	LCD	02	42	26/12/2022	23/1/23
31	Remote sensing: Introduction. Principle of Remote sensing, EMR, types, resolutions, types of satellites, type of sensors, LIDAR, visual and digital image processing and its	T	LCD	02	44	28/12/2022	25/1/23

	applications. Global Positioning System: Definition, Principles of GPS and applications.						
32	Tutorials	T	BB	00	44	31/12/2022	30/1/23
33	Geographical Information System: Introduction and principle of Geographical Information System, components of GIS, applications	T	LCD	02	46	06/01/2023	30/1/23
34	Advanced instrumentation in surveying: classification, measuring principles, Electronic theodolite, EDM, Total Station, Drones.	L	LCD	02	48	09/01/2023	01/2/23
35	**Practical:** Demo : Total Station and GPS	P	D	02	50	30/12/2022	30/12/22
36	Revision	P	D	00	50	06/01/2023	03/2/23
37	Revision	P	D	00	50	13/01/2023	08/2/23
38	Revision	T	BB	00	50	13/01/2023	10/2/23
39	Revision	L	BB	00	50	16/01/2023	10/2/23
40	Revision	L	BB	00	50	16/01/2023	12/2/23
41	Revision	T	BB	00	50	18/01/2023	13/2/23
42	Revision	P	D	00	50	20/01/2023	15/2/23
43	Revision	T	BB	00	50	20/01/2023	17/2/23
44	Revision	L	BB	00	50	23/01/2023	17/2/23
45	Revision	L	BB	00	50	23/01/2023	27/2/23
46	Revision	T	BB	00	50	25/01/2023	27/2/23
47	Revision	P	D	00	50	27/01/2023	1/3/23
48	Revision	T	BB	00	50	27/01/2023	10/3/23
49	Revision	T	BB	00	50	28/01/2023	10/3/23
50	Revision	L	BB	00	50	30/01/2023	13/3/23
51	Revision	L	BB	00	50	30/01/2023	13/3/23

52	Revision	T	BB	00	50	01/02/2023	15/2/23

	Week	Remarks
Assignment 1	**4th Week (24/11/2022)**	
Assignment 2	**9th week (29/12/2022)**	

Total No. of Lecture Hours = 18
Total No. of Tutorial Hours = 18 + 03
Total No. of Practical Hours = 14
Total No. of Revision Hours = 17

Course In charge

Head of Dept
Professor & Head
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IQAC Coordinator

Principal
Principal / Director
K.S. School of Engineering & Management
Bangalore-560 062

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109
DEPARTMENT OF CIVIL ENGINEERING
SESSION: 2022-2023 (ODD SEMESTER)

FIRST ASSIGNMENT

Degree	:	**B.E**	**Semester**	:	**III**
Branch	:	**Civil Engineering**	**Course Code**	:	**21CV32**
Course Title	:	**Geodetic Engineering**	**Max Marks**	:	**10**
Date	:	**30/11/2022**	**Last Date for submission**	:	**6/12/02022**

Q No.	Question	Marks	K-Level	CO mapping
1	**Define** Surveying. **List** the importance of Surveying.	1	K1 Remembering	CO1
2	**List** the advantages and disadvantages of Plane Table Surveying	1	K1 Remembering	CO1
3	**Differentiate** between Plane Surveying and Geodetic Surveying.	1	K2 Understanding	CO1
4	**Differentiate** between Surveyor Compass and Prismatic Compass.	1	K2 Understanding	CO1
5	**Explain** the temporary adjustments of Prismatic Compass.	1	K2 Understanding	CO1
6	The fore bearing of the lines of a closed traverse ABCDEFA are respectively $290^0 30'$, $250^0 30'$, $196^0 0'$, $175^0 30'$, $112^0 0'$, $30^0 0'$. **Determine** the included angles	1	K3 Applying	CO1
7	The following are the bearings observed while traversing with the prismatic compass. **Identify** which stations are affected by local attraction and **calculate** the corrected bearings. Line / F.B / B.B AB / $45^0 45'$ / $226^0 10'$ BC / $96^0 55'$ / $277^0 5'$ CD / $26^0 45'$ / $209^0 10'$ DE / $324^0 48'$ / $144^0 48'$	1	K3 Applying	CO1
8	**List** the different methods of determining the areas.	1	K1 Remembering	CO2
9	**Differentiate** between Trapezoidal Rule and Simpson's Rule.	1	K2 Understanding	CO2

10	The perpendicular offsets were taken at 10m intervals from a survey line to an irregular boundary are 2.25, 3.85, 4.50, 6.80, 5.20, 7.35, 8.90, 8.30 and 5.45m. **Determine** the area enclosed between the survey line, irregular boundary, the first and last offset by Trapezoidal Rule and Simpson's Rule	1	K3 Applying	CO2

Course Incharge

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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF CIVIL ENGINEERING

SESSION: 2022-2023 (ODD SEMESTER)

I SESSIONAL TEST QUESTION PAPER

SET-A

USN										

Degree	:	B.E	Semester	:	III
Branch	:	Civil Engineering	Course Code	:	21CV32
Course Title	:	Geodetic Surveying	Date	:	24/12/2022
Duration	:	60 Minutes	Max Marks	:	20

Note: Answer ONE full question from each part.

Q No.	Question	Marks	K-Level	CO mapping
	PART-A			
1(a)	**Differentiate** between Plane Surveying and Geodetic Surveying.	5	K2 Understanding	CO1
(b)	**List** the principles and Importance of Surveying.	5	K1 Remembering	CO1
	OR			
2(a)	**Differentiate** between Prismatic Compass and Surveyor Compass.	5	K2 Understanding	CO1
(b)	**List** the advantages and disadvantages of Plane Table Surveying.	5	K1 Remembering	CO1
	PART-B			
3(a)	The following are the bearings observed while traversing with the prismatic compass. **Identify** which stations are affected by local attraction and **calculate** the corrected bearings. Line / F.B / B.B AB / $45^0 45'$ / $226^0 10'$ BC / $96^0 55'$ / $277^0 5'$ CD / $26^0 45'$ / $209^0 10'$ DE / $324^0 48'$ / $144^0 48'$	5	K3 Applying	CO1
(b)	The perpendicular offsets were taken at 10m intervals from a survey line to an irregular boundary are 3.82, 4.37, 6.82, 5.26, 7.59, 8.90, 9.52, 8.42 and 6.430m. **Determine** the area enclosed between the survey line, irregular boundary, the first and last offset by Simpson's Rule.	5	K3 Applying	CO2
	OR			

4(a)	The fore bearing of the lines of a closed traverse ABCDEFA are respectively $290^0 30'$, $250^0 30'$, $196^0 0'$, $175^0 30'$, $112^0 0'$, $30^0 0'$. **Determine** the included angles.	5	K3 Applying	CO1
(b)	The perpendicular offsets were taken at 10m intervals from a survey line to an irregular boundary are 2.25, 3.85, 4.50, 6.80, 5.20, 7.35, 8.90, 8.30 and 5.45m. **Determine** the area enclosed between the survey line, irregular boundary, the first and last offset by Trapezoidal Rule.	5	K3 Applying	CO2

Course Incharge **HOD** **IQAC- Coordinator** **Principal**

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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109
DEPARTMENT OF CIVIL ENGINEERING
SESSION: 2022-2023 (ODD SEMESTER)
I SESSIONAL TEST SCHEME & SOLUTION
SET-A

USN | | | | | | | | | | |

Degree	:	B.E	Semester	: III
Branch	:	Civil Engineering	Course Code	: 21CV32
Course Title	:	Geodetic Engineering	Date	: 06/12/2022
Duration	:	60 Minutes	Max Marks	: 20

Note: Answer ONE full question from each part.

<table>
<tr><th>Q No.</th><th>Questions with Scheme & Solution</th><th>Marks</th></tr>
<tr><td colspan="3">PART-A</td></tr>
<tr><td>1(a)</td><td colspan="2">Differentiate between Plane Surveying and Geodetic Surveying</td><td>5</td></tr>
<tr><td>Sol.</td><td colspan="2"><table>
<tr><th>Sl.no</th><th>Plane Surveying</th><th>Geodetic Surveying</th></tr>
<tr><td>1.</td><td>Earth surface is considered as a plane surface.</td><td>Earth surface is considered as a curved surface.</td></tr>
<tr><td>2.</td><td>The curvature of the earth is ignored.</td><td>The curvature of the earth is considered.</td></tr>
<tr><td>3.</td><td>The line joining any two stations is considered as a straight line.</td><td>The line joining any two stations is considered as a curved line.</td></tr>
<tr><td>4.</td><td>The triangle formed by any three points is considered as a plane.</td><td>The triangle formed by any three points is considered as spherical.</td></tr>
<tr><td>5.</td><td>The angles of the triangles are considered to be plane angles.</td><td>The angles of the triangles are considered to be spherical.</td></tr>
</table></td><td>5X1=5</td></tr>
<tr><td>1(b)</td><td colspan="2">List the principles and Importance of Surveying.</td><td>5</td></tr>
<tr><td>Sol.</td><td colspan="2">PRINCIPLES OF SURVEYING (2)
1. The fundamental principle upon which the surveying is being carried are:
2. Working from whole to part.
3. To locate a point by at least two measurements from fixed reference points.
IMPORTANCE: (ANY3)
4. To locate and measure the property lines.
5. To lay out buildings, bridges, channels, highways, sewer and pipelines for constructions.
6. To obtain topographic information for mapping and charting.
7. To calculate the distances, levels, areas and quantities for the various engineering projects like building, roads, canals, railways, etc.
8. To determine the best alignment for canals, roads, railways, etc.
9. To determine and measure accurately the relative heights and relative positions of the distinctive features or objects on the surface of earths.
10. To establish correctly the boundary points of the property from the available</td><td>2x1=2
3x1=3</td></tr>
</table>

records.

11. To study the site for its suitability for engineering works.
12. To locate the stations for launching and tracking satellites.
13. To execute hydrographic and oceanographic charting and mapping.
14. To chart coastlines, navigable streams and lake.
15. To prepare an archeological map including places where ancient relics exist, etc.
16. To fix the national and state boundaries.
17. To establish control points.

OR

2(a) **Differentiate** between Prismatic Compass and Surveyor Compass. **5**

Sol.

SL.NO	Surveyor's Compass	Prismatic Compass
1	The readings are taken directly by seeing through top of the box glass.	The readings are taken with the help of a prism, provided at the eye vane.
2	The graduated card is attached to the box and not to the needle. The cart rotates along with the line of sight.	The graduated card ring is attached with the needle. The ring does not rotate along with the line of sight.
3	The graduations are in Reduced bearing system , having zero degree at North and South and 90 degree at East and West. East and West are interchanged.	The graduations are in whole circle bearing system, having zero degrees at South end, 90 degree at West , 180 degree at North and 270 degree at East.
4	The needle is of edge bar type. The needle acts as the index also.	The needle is of broad needle type. The needle does not act as index.
5	Sighting and reading cannot be done simultaneously.	Sighting and reading be done simultaneously.
6	The instrument can be held in hand and also while making the observation.	The instrument cannot be used without a tripod.
7	The eye vane consists of small vane with a small slit.	The eye vane Consists of a metal vane with a large slit.1st

Any 5
5x1=5

2(b) **List** the advantages and disadvantages of Plane Table Surveying. **5**

Sol.

Disadvantages and disadvantages of Plane table surveying: (Any 5)

Advantages:

1. The plan is drawn by the outdoor surveyor himself while the country is before his eyes, and therefore there is no possibility of omitting the necessary measurements.
2. The surveyor can compare plotted work with the actual feature of the area.
3. Since the area is in view, contour and irregular objects may be represented accurately.
4. Direct measurements may be almost entirely dispensed with, as the linear and angular dimensions are both to be obtained by graphical means.
5. Notes of measurements are seldom required and the possibility of mistakes in booking is eliminated.
6. It is particularly useful in magnetic areas where the compass may not be used.

Any 5
5X1=5

	7. It is simple and hence cheaper than the theodolite or any other type of survey. 8. It is most suitable for small scale maps. 9. No great skill is required to produce a satisfactory map and the work may be entrusted to a subordinate. **Disadvantages:** 1. Since notes of measurements are not recorded, it is a great inconvenience if the map is required to be reproduced to some different scale. 2. The plane tabling is not intended for very accurate work. 3. It is essentially a tropical instrument. 4. Due to heaviness, it is inconvenient to transport. 5. Since there are so many accessories, there is every likelihood of these being lost	
	PART-B	
3(a)	The following are the bearings observed while traversing with the prismatic compass. **Identify** which stations are affected by local attraction and **calculate** the corrected bearings. **Line** / **F.B** / **B.B** AB / $45^0 45'$ / $226^0 10'$ BC / $96^0 55'$ / $277^0 5'$ CD / $26^0 45'$ / $209^0 10'$ DE / $324^0 48'$ / $144^0 48'$	**5**
Sol.	Stations D and E are free from local attraction. A, B,C are affected due to local attraction. **Corrected Bearings are:** **Line** / **F.B.** / **B.B.** **AB** / $45^0 45'$ / $225^0 45'$ **BC** / $96^0 30'$ / $276^0 30'$ **CD** / $29^0 10'$ / $209^0 10'$ **DE** / $324^0 48'$ / $144^0 48'$	**01** **04**
(b)	The perpendicular offsets were taken at 10m intervals from a survey line to an irregular boundary are 3.82, 4.37, 6.82, 5.26, 7.59, 8.90, 9.52, 8.42 and 6.430m. **Determine** the area enclosed between the survey line, irregular boundary, the first and last offset by Simpson's Rule.	**5**
Sol.	**By Simpson's Rule:** A = d/3 ((O0+On) + 4 (Odd offsets) + 2 (Even Offsets) A = 10/3 ((3.82+6.43) + 4 (4.37+5.26+8.9+8.42)+ 2 (6.820+7.590+9.520)) **= 549.03 m^2.**	**1.5** **1.5** **02**
	OR	
4(a)	The fore bearing of the lines of a closed traverse ABCDEFA are respectively $290^0 30'$, $250^0 30'$, $196^0 0'$, $175^0 30'$, $112^0 0'$, $30^0 0'$. **Determine** the included angles.	**5**

Sol.			4

Line	F.B	B.B	Interior Angle
AB	$290^0 30'$	$110^0 30'$	@A= $80^0 30'$
BC	$250^0 30'$	$70^0 30'$	@B= $140^0 00'$
CD	$196^0 00'$	$16^0 00'$	@C= $125^0 30'$
DE	$175^0 30'$	$355^0 30'$	@D= $159^0 30'$
EF	$112^0 00'$	$292^0 00'$	@E= $116^0 30'$
FA	$30^0 00'$	$210^0 00'$	@F= $98^0 00'$

Sum of all interior angle = $80^0 30' + 140^0 00'' + 125^0 30'' + 159^0 30' + 116^0 30' + 98^0 00' = 720^0 0'$ — 1

Sum of all interior angle = $(2n-4)\times 90 = (2\times 6-4)\times 90 = 720^0 0'$

(b)	The perpendicular offsets were taken at 10m intervals from a survey line to an irregular boundary are 2.25, 3.85, 4.50, 6.80, 5.20, 7.35, 8.90, 8.30 and 5.45m. **Determine** the area enclosed between the survey line, irregular boundary, the first and last offset by Trapezoidal Rule.	5
Sol.	**By Trapezoidal Rule:** $A = ((O_1+O_n)/2 + O_2 + O_3 + \ldots\ldots + O_{n-1})d$ $A = ((2.25+5.45)/2 + 3.85+4.50+6.80+5.20+7.35+8.90+8.30)\ 10 =$ $= 487.5\ m^2$.	1.5 1.5 02

Course Incharge

HOD

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IQAC- Coordinator

Principal

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF CIVIL ENGINEERING

SESSION: 2022-2023 (ODD SEMESTER)

I SESSIONAL TEST QUESTION PAPER

SET-B

USN										

Degree	:	B.E	Semester	:	III
Branch	:	Civil Engineering	Course Code	:	21CV32
Course Title	:	Geodetic Surveying	Date	:	06/12/2022
Duration	:	60 Minutes	Max Marks	:	20

Note: Answer ONE full question from each part.

Q No.	Question	Marks	K-Level	CO mapping
	PART-A			
1(a)	**List** the advantages of Plane table surveying.	5	K1 Remembering	CO1
(b)	The following are the bearings observed while traversing with the prismatic compass. **Identify** which stations are affected by local attraction and **calculate** the corrected bearings.	5	K3 Applying	CO1
	OR			
2(a)	**List** the disadvantages of Plane table surveying.	5	K1 Remembering	CO1
(b)	The bearings of the sides of a traverse ABCDE are as follows. **Calculate** the interior angles of the traverse and apply the check.	5	K3 Applying	CO1
	PART-B			
3(a)	**Differentiate** between Prismatic Compass and Surveyor Compass.	5	K2 Understanding	CO1

Line	F.B	B.B
AB	$45^0 45'$	$226^0 10'$
BC	$96^0 55'$	$277^0 5'$
CD	$26^0 45'$	$209^0 10'$
DE	$324^0 48'$	$144^0 48'$

Line	F.B	B.B
AB	$107^0 15'$	$287^0 15'$
BC	$22^0 00'$	$202^0 00'$
CD	$281^0 30'$	$101^0 30'$
DE	$189^0 15'$	$9^0 15'$
EA	$124^0 45'$	$304^0 45'$

(5)

(b)	The perpendicular offsets were taken at 10m intervals from a survey line to an irregular boundary are 2.25, 3.85, 4.50, 6.80, 5.20, 7.35, 8.90, 8.30 and 5.45m. **Determine** the area enclosed between the survey line, irregular boundary, the first and last offset by Simpson's Rule.	5	K3 Applying	CO2
	OR			
4(a)	**Differentiate** between Plane Surveying and Geodetic Surveying.	5	K2 Understanding	CO1
(b)	The perpendicular offsets were taken at 10m intervals from a survey line to an irregular boundary are 3.82, 4.37, 6.82, 5.26, 7.59, 8.90, 9.52, 8.42 and 6.430m. **Determine** the area enclosed between the survey line, irregular boundary, the first and last offset by Trapezoidal Rule.	5	K3 Applying	CO2

Course Incharge **HOD** **IQAC- Coordinator** **Principal**

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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109
DEPARTMENT OF CIVIL ENGINEERING
SESSION: 2022-2023 (ODD SEMESTER)
I SESSIONAL TEST SCHEME & SOLUTION
SET-B

USN										

Degree	:	B.E	Semester	: III
Branch	:	Civil Engineering	Course Code	: 21CV32
Course Title	:	Geodetic Engineering	Date	: 06/12/2022
Duration	:	60 Minutes	Max Marks	: 20

Note: Answer ONE full question from each part.

Q No.	Questions with Scheme & Solution	Marks
	PART-A	
1(a)	**List** the advantages of Plane table surveying.	5
Sol.	**Advantages:** 1. The plan is drawn by the outdoor surveyor himself while the country is before his eyes, and therefore there is no possibility of omitting the necessary measurements. 2. The surveyor can compare plotted work with the actual feature of the area. 3. Since the area is in view, contour and irregular objects may be represented accurately. 4. Direct measurements may be almost entirely dispensed with, as the linear and angular dimensions are both to be obtained by graphical means. 5. Notes of measurements are seldom required and the possibility of mistakes in booking is eliminated. 6. It is particularly useful in magnetic areas where the compass may not be used. 7. It is simple and hence cheaper than the theodolite or any other type of survey. 8. It is most suitable for small scale maps. 9. No great skill is required to produce a satisfactory map and the work may be entrusted to a subordinate.	Any 5 5x1=5
1(b)	The following are the bearings observed while traversing with the prismatic compass. **Identify** which stations are affected by local attraction and **calculate** the corrected bearings. Line | F.B | B.B AB | $45^0 45'$ | $226^0 10'$ BC | $96^0 55'$ | $277^0 5'$ CD | $26^0 45'$ | $209^0 10'$ DE | $324^0 48'$ | $144^0 48'$	5
Sol.	Stations D and E are free from local attraction. A, B,C are affected due to local attraction. **Corrected Bearings are:**	01

		Line	**F.B.**	**B.B.**	**04**
		AB	$45^0\,45'$	$225^0\,45'$	
		BC	$96^0\,30'$	$276^0\,30'$	
		CD	$29^0\,10'$	$209^0\,10'$	
		DE	$324^0\,48'$	$144^0\,48'$	
	OR				
2(a)	**List** the disadvantages of Plane table surveying.				**5**
Sol.	**Disadvantages:** 1. Since notes of measurements are not recorded, it is a great inconvenience if the map is required to be reproduced to some different scale. 2. The plane tabling is not intended for very accurate work. 3. It is essentially a tropical instrument. 4. Due to heaviness, it is inconvenient to transport. 5. Since there are so many accessories, there is every likelihood of these being lost.				**5x1=5**
2(b)	The bearings of the sides of a traverse ABCDE are as follows. **Calculate** the interior angles of the traverse and apply the check.				**5**
		Line	**F.B**	**B.B**	
		AB	$107^0 15'$	$287^0 15'$	
		BC	$22^0 00'$	$202^0 00'$	
		CD	$281^0 30'$	$101^0 30'$	
		DE	$189^0 15'$	$9^0 15'$	
		EA	$124^0 45'$	$304^0 45'$	
Sol.		**Line**	**F.B**	**B.B**	**Interior Angle**
		AB	$107^0 15'$	$287^0 15'$	$@A= 162^0 30'$
		BC	$22^0 00'$	$202^0 00'$	$@B= 94^0 45'$
		CD	$281^0 30'$	$101^0 30'$	$@C= 79^0 30'$
		DE	$189^0 15'$	$9^0 15'$	$@D= 87^0 45'$
		EA	$124^0 45'$	$304^0 45'$	$@E= 115^0 30'$
	Sum of all interior angle = $162^0 30'+ 94^0 45'+79^0 30'+87^0 45'+ 115^0 30'= 540^0 0'$				**04**
	Sum of all interior angle = $(2n-4)x90 = (2x5-4) \times 90 = 540^0 0'$				**01**
	PART-B				
3(a)	**Differentiate** between Prismatic Compass and Surveyor Compass.				**5**
Sol.	**SL.NO**	**Surveyor's Compass**		**Prismatic Compass**	**Any 5 5x1=5**
	1	The readings are taken directly by seeing through top of the box glass.		The readings are taken with the help of a prism, provided at the eye vane.	

	2	The graduated card is attached to the box and not to the needle. The cart rotates along with the line of sight.	The graduated card ring is attached with the needle. The ring does not rotate along with the line of sight.	
	3	The graduations are in Reduced bearing system, having zero degree at North and South and 90 degree at East and West. East and West are interchanged.	The graduations are in whole circle bearing system, having zero degrees at South end, 90 degree at West , 180 degree at North and 270 degree at East.	
	4	The needle is of edge bar type. The needle acts as the index also.	The needle is of broad needle type. The needle does not act as index.	
	5	Sighting and reading cannot be done simultaneously.	Sighting and reading be done simultaneously.	
	6	The instrument can be held in hand and also while making the observation.	The instrument cannot be used without a tripod.	
	7	The eye vane consists of small vane with a small slit.	The eye vane Consists of a metal vane with a large slit.1st	
(b)	The perpendicular offsets were taken at 10m intervals from a survey line to an irregular boundary are 2.25, 3.85, 4.50, 6.80, 5.20, 7.35, 8.90, 8.30 and 5.45m. **Determine** the area enclosed between the survey line, irregular boundary, the first and last offset by Simpson's Rule.			5
Sol.	**By Simpson's Rule:** A = d/3 ((O0+On) + 4 (Odd offsets) + 2 (Even Offsets) A = 10/3 ((2.25+5.45) + 4 (3.85+6.80+7.35+8.30)+ 2 (4.50+5.20+8.90)) **= 500.30 m^2.**			1.5 1.5 02
	OR			
4(a)	**Differentiate** between Plane Surveying and Geodetic Surveying.			5
Sol.	**Sl.no**	**Plane Surveying**	**Geodetic Surveying**	5X1=5
	1.	Earth surface is considered as a plane surface.	Earth surface is considered as a curved surface.	
	2.	The curvature of the earth is ignored.	The curvature of the earth is considered.	
	3.	The line joining any two stations is considered as a straight line.	The line joining any two stations is considered as a curved line.	
	4.	The triangle formed by any three points is considered as a plane.	The triangle formed by any three points is considered as spherical.	
	5.	The angles of the triangles are considered to be plane angles.	The angles of the triangles are considered to be spherical.	
(b)	The perpendicular offsets were taken at 10m intervals from a survey line to an irregular boundary are 3.82, 4.37, 6.82, 5.26, 7.59, 8.90, 9.52, 8.42 and 6.430m. **Determine** the area enclosed between the survey line, irregular boundary, the first and last offset by Trapezoidal Rule.			5

Sol.	**By Trapezoidal Rule:** $A = ((O_1+O_n)/2 + O_2 + O_3 + \ldots\ldots+O_{n-1})d$ $A = ((3.82+6.43)/2 + 4.37+6.82+5.26+7.59+8.90+9.52+8.42)\ 10 =$ $=560.05\ m^2$.	1.5 1.5 02

Course Incharge

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Principal

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109
DEPARTMENT OF CIVIL ENGINEERING
SESSION: 2022-2023 (ODD SEMESTER)
SECOND ASSIGNMENT

Degree	:	**B.E**	**Semester**	:	**III**
Branch	:	**Civil Engineering**	**Course Code**	:	**21CV32**
Course Title	:	**Geodetic Engineering**	**Max Marks**	:	**10**
Date	:	**02/01/2023**	**Last Date for submission**	:	**10/01/2023**

Q No.	Question	Marks	K-Level	CO mapping
1	A road at constant RL 115.000m runs from north to south. The ground from east to west is horizontal. The ground levels along the centre line of the road as follows: Chainage in 'm': 0 | 50 | 100 | 150 | 200 | 250 | 300 R.L in 'm': 117.500 | 116.250 | 115.950 | 116.650 | 117.200 | 117.850 | 115.750 **Calculate** the volume of the earthwork by trapezoidal rule and Prismoidal rule for a road 8m wide at formation with side slopes 1:1	1	K3 Applying	CO2
2	**Explain** the temporary adjustments of dumpy level.	1	K2 Understanding	CO2
3	**Differentiate** between H.I Method and Rise and Fall Method.	1	K2 Understanding	CO2
4	Following readings were taken on a continuous sloping ground with four meter levelling staff at common interval of 30m. 0.855 (on A), 1.545, 2.335, 3.115, 3.825, 0.455, 1.380, 2.055, 2.855, 3.455, 0.585, 1.015, 1.850, 2.755, 3.845 (on B). The reduced level of A was 380.500m. Make the entries in a level book and apply the checks. **Calculate** the R.L of all points by 1. Rise and Fall Method 2. Height of Instrument. and also **Determine** the gradient of AB.	1	K3 Applying	CO2
5	**List** the fundamental axes of theodolite and state the relation between them.	1	K1 Remembering	CO3
6	**Define** the following terms: a. Transiting b. Swinging the telescope c. face left observation d. Single plane method e. Double plane method	1	K1 Remembering	CO3
7	**Define** theodolite. **Explain** the types of theodolite.	1	K2 Understanding	CO3
8	**Determine** the elevation of top of the chimney, the following observations were made: Station A and B and top of the chimney are in the same vertical plane. Find the elevation to the top of the chimney, if the	1	K3 Applying	CO3

	distance between A and B is 50m **Inst. Station** / **Reading on B.M** / **Angle of Elevation to Aerial Pole** / **Remarks** A / 0.860 / $18^0 36'$ / R.L of B.M = 420.500m b / 1.220 / $10^0 12'$			
9	**Determine** the R.L. of a top of tower from the following observations: Distance between A and B is 100m. R.L of B.M is 168.270m. A and B are not in the same line with the top of the tower. Horizontal angle at A between B and top of the tower is $73^0 44'$. Horizontal angle between A and top of the tower at B is $52^0 08'$ **Inst. Station** / **Vertical Angle** / **Reading on B.M with horizontal line of sight** A / $16^0 42'$ / 1.73 B / $13^0 38'$ / 2.23	1	**K3 Applying**	**CO3**
10	**Explain** the measurement of horizontal angle by repetition method.	1	**K2 Understanding**	**CO3**

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plane. Find the elevation to the top of the chimney, if the distance between A and B is 50m

Inst. Station	Reading on B.M	Angle of Elevation to Aerial Pole	Remarks
A	0.860	$18^0 36'$	R.L of B.M = 420.500m
b	1.220	$10^0 12'$	

OR

4(a) Fill the missing readings (X) and **calculate** the reduced levels of all points and apply arithmetic check

B.S	I.S	F.S	Rise	Fall	R.L
2.285					232.460
1.650		X	0.020		
	2.105			X	
1.625		1.960	X		
2.050		1.925		0.300	
	X		X		232.255
1.690		X	0.340		
2.865		2.100		X	
		X	X		233.425

5 | K3 Applying | CO2

(b) **Determine** the R.L. of a top of tower from the following observations:

Distance between A and B is 100m. R.L of B.M is 168.270m. A and B are not in the same line with the top of the tower. Horizontal angle at A between B and top of the tower is $73^0 44'$. Horizontal angle between A and top of the tower at B is $52^0 08'$

Inst. Station	Vertical Angle	Reading on B.M with horizontal line of sight
A	$16^0 42'$	1.73
B	$13^0 38'$	2.23

5 | K3 Applying | CO3

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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109
DEPARTMENT OF CIVIL ENGINEERING
SESSION: 2022-2023 (ODD SEMESTER)
II SESSIONAL TEST SCHEME & SOLUTION
SET-A

USN										

Degree : B.E
Branch : Civil Engineering
Course Title : Geodetic Engineering
Duration : 60 Minutes

Semester : III
Course Code : 21CV32
Date : /01/2023
Max Marks : 20

Note: Answer ONE full question from each part.

Q No.	Questions with Scheme & Solution	Marks
	PART-A	
1(a)	A road at constant RL 115.000m runs from north to south. The ground from east to west is horizontal. The ground levels along the centre line of the road as follows:	5

Chainage in 'm'	0	50	100	150	200	250	300
R.L in 'm'	117.500	116.250	115.950	116.650	117.200	117.850	115.750

Calculate the volume of the earthwork by prismoidal rule for a road 8m wide at formation with side slopes 1:1.

Sol.

Distance	Ground Level	Formation Level	Depth of Filling
0	157.600	160.000	2.40
30	158.200	160.000	1.80
60	158.800	160.000	1.20
90	157.900	160.000	2.10
120	158.500	160.000	1.50
150	159.100	160.000	0.90
180	159.400	160.000	0.60

02

d = 30m B=8m S =1.5

Area of the section A =(B+Sh)h

$A_1 = (8 + 1.5x2.4)2.4 = \mathbf{27.84m^2}$.

$A_2 = (8 + 1.5x1.8)1.8 = \mathbf{19.26m^2}$.

$A_3 = (8 + 1.5x1.20)1.2 = \mathbf{11.76m^2}$.

$A_4 = (8 + 1.5x2.10)2.1 = \mathbf{23.42m^2}$.

	$A_5 = (8 + 1.5x1.5)1.5 = \mathbf{15.38m^2}$. $A_6 = (8 + 1.5x0.9)0.9 = \mathbf{8.42m^2}$. $A_7 = (8 + 1.5x0.6)0.6 = \mathbf{5.34m^2}$. **By Prismoidal Rule:** **V = d/3 ((A_0+A_n) + 4 (Odd offset area) + 2 (Even Offsets area)** = 30/3 ((27.84+5.34)+ 4(19.26+23.42+8.42) + 2 (11.76+15.38)) **V = 2918.6 m^3.**	**02** **01**
1(b)	List the fundamental axes of theodolite and state the relation between them.	**5**
Sol.	**The fundamental axes of theodolite instrument are:** The vertical axis. The horizontal axis. The line of collimation or the line of sight. Axis of the altitude level tube. Axis of the plat level. **The following are the relation between the fundamental axes are as follows:** 1. Axis of the plate level must be perpendicular to the vertical axis. 2. Horizontal axis must be perpendicular to the vertical axis. 3. Line of collimation must be perpendicular to the horizontal axis. 4. Axis of the altitude level must be parallel to the line of collimation. 5.Vertical circle vernier must be zero when the line of collimation is horizontal.	**02** **03**
	OR	
2(a)	A railway embankment is 9m wide at the formation level with a side slope of 2:1. Assuming the ground to be level transversely, **calculate** the volume of the embankment in cubic metres in a length of 180m, the centre height at 30m interval being 1.6, 0.8, 1.5, 1.8, 0.75, 0.3 and 0.67m respectively. Use trapezoidal rule.	**5**
Sol.	d = 30m B=9m S =2 Area of the section A =(B+Sh)h $A_1 = (9 + 2x1.6)1.6 = \mathbf{19.52m^2}$. $A_2 = (9 + 2x0.8)0.8 = \mathbf{8.48m^2}$. $A_3 = (9+ 2x1.5)1.5= \mathbf{18m^2}$. $A_4 = (9 + 2x1.8)1.8 = \mathbf{22.68m^2}$. $A_5 = (9 + 2x0.75)0.75 = \mathbf{7.88m^2}$. $A_6 = (9 + 2x0.3)0.3 = \mathbf{2.88m^2}$. $A_7 = (9 + 2x0.67)0.67 = \mathbf{6.93m^2}$. **Volume = $((A_0+A_n)/2 + A_1 + A_2 + \ldots\ldots + A_{n-1})d$** **=((19.52+6.93)/2 + 8.48+18+22.68+7.88+2.88)x30** **Volume=2194.35 m^3.**	**03** **02**
2(b)	**Define** the following terms:	**5**

	a. Transiting b. Swinging the telescope c. face left observation d. Single plane method e. Double plane method	
Sol.	**a. Transiting:** It is process of turning the telescope in the vertical plane through 1800 about trunnion axis. Since it is reversed in this operation, it is also called as known as plunging or reversing. **b. Swinging the telescope:** It is the process of turning the telescope in the horizontal plane. If the telescope is rotated in the clock wise direction, known as right swing. If the telescope is rotated in the anti-clock wise direction, known as left swing. **c. Face left observation:** If the face of the vertical circle is to the left of the observer, the observation of the angle is known as face left observations. **d. Single plane method:** It is defined as if the two instrument stations so chosen lie in the same vertical plane passing through the elevated object. **e. Double plane method:** If the chosen two instrument stations do not lie in the same vertical plane passing through the elevated object, then it is known as double plane method.	**5X1=5**
	PART-B	
3(a)	Following readings were taken on a continuous sloping ground with four meter levelling staff at common interval of 30m. 0.855 (on A), 1.545, 2.335, 3.115, 3.825, 0.455, 1.380, 2.055, 2.855, 3.455, 0.585, 1.015, 1.850, 2.755, 3.845 (on B). The reduced level of A was 380.500m. Make the entries in a level book and apply the checks. **Calculate** the R.L of all points by H.I and also **Determine** the gradient of AB.	**5**
Sol.		**03.**

Distance	B.S	I.S	F.S	H.I	R.L	Remarks
0	0.855			381.355	380.500	B.M
30		1.545			379.810	
60		2.335			379.020	
90		3.115			378.240	
120	0.455		3.825	377.985	377.530	C.P
150		1.380			376.605	
180		2.055			375.930	
210		2.855			375.130	
240	0.585		3.455	375.115	374.530	C.P
270		1.015			374.100	
300		1.850			373.265	
330		2.755			372.360	
360			3.845		371.270	

Arithmetic check:

$\sum BS - \sum FS$ = Last R.L – First R.L **01**

	1.895 – 11.125 = 371.270- 380.500 **-9.23 = -9.23** **Gradient** = (Difference in Level)/ Distance = (9.23)/360 = **1 in 39**	01
(b)	**Determine** the elevation of top of the chimney, the following observations were made: Station A and B and top of the chimney are in the same vertical plane. Find the elevation to the top of the chimney, if the distance between A and B is 50m	5

Inst. Station	Reading on B.M	Angle of Elevation to Aerial Pole	Remarks
A	0.860	$18^0 36'$	R.L of B.M = 420.500m
b	1.220	$10^0 12'$	

Sol.	**Solution: Given Data:** $S_1 = 3.525m$, $S_2 = 2.000M$, d= 50M, R.L OF B.M = 325.000M, $\alpha_1 = 16^0 30'$, $\alpha_2 = 10^0 30'$ Since the instrument axis B is higher than A. The distance equation is given by $D = (d \tan \alpha_2 + S) / (\tan \alpha_1 - \tan \alpha_2)$ $S = S_1 - S_2 = 1.220 - 0.860 = 0.36m$ $D = (50 \times \tan 10^0 12' + 0.360) / (\tan 18^0 36' - \tan 10^0 12') = 59.60m$ **D= 59.60m** Height of top of tower above the instrument axis B $h_1 = D \times \tan \alpha_1 = 59.60 \times \tan 18^0 36' = 20.06m$ **h_1= 20.06m** R.L to the top of the tower = R.L of B.M + S_1 + h_1 = 450.500+0.860+20.06 **= 441.420m** **Check:** Height of top of tower above the instrument axis A $h_2 = (D+d) \times \tan \alpha_2 = (59.60+50) \times \tan 10^0 12' = 19.72m$ **h_1= 19.72m** R.L to the top of the tower = R.L of B.M + S_2 + h_2 = 450.500+1.220+19.72 **= 441.420m**	02 03
	OR	
4(a)	Fill the missing readings (X) and **calculate** the reduced levels of all points and apply arithmetic check	5

B.S	I.S	F.S	Rise	Fall	R.L
2.285					232.460
1.650		X	0.020		
	2.105			X	
1.625		1.960	X		
2.050		1.925		0.300	
	X		X		232.255
1.690		X	0.340		
2.865		2.100		X	
		X	X		233.425

Sol.

B.S	I.S	F.S	Rise	Fall	R.L
2.285					232.460
1.650		**2.265**	0.020		232.480
	2.105			**0.455**	232.025
1.625		1.960	0.145		232.170
2.050		1.925		0.300	231.870
	1.665		**0.385**		232.255
1.690		**1.325**	0.340		232.595
2.865		2.100		**0.410**	232.185
		1.625	**1.240**		233.425

03

Finding (X) Value

Finding RL and applying check

$\sum$B.S -$\sum$F.S = $\sum$Rise-$\sum$Fall = L.RL-F.RL

12.165-11.200= 2.13-1.165=233.425-232.460

0.965=0.965=0.965

02

(b)

Determine the R.L. of a top of tower from the following observations:

Distance between A and B is 100m. R.L of B.M is 168.270m. A and B are not in the same line with the top of the tower. Horizontal angle at A between B and top of the tower is $73^0 44'$. Horizontal angle between A and top of the tower at B is $52^0 08'$

Inst. Station	Vertical Angle	Reading on B.M with horizontal line of sight
A	$16^0 42'$	1.73
B	$13^0 38'$	2.23

5

Sol.

Solution: Given Data:

$\theta_1 = 73^0 44'$, $\theta_2 = 52^0 08'$, S_1 = 1.730m, S_2= 2.23m, $\alpha_1 = 16^0 42'$, $\alpha_2 = 13^0 38'$, R.L OF B.M = 168.270m

horizontal angle ACB = $\theta_3 = 180^0 - (\theta_1 + \theta_2) = 180^0 - (73^0 44' + 52^0 08') = 54^0 08'$

Applying sine rule

$AC/\sin\theta_2 = AB/\sin\theta_3 = BC/\sin\theta_1$

$D_1/\sin\theta_2 = d/\sin\theta_3 = D_2/\sin\theta_1$

02

The horizontal distance between the instrument station A and the church spire C ;

$D_1/\sin\theta_2 = d/\sin\theta_3$

$D_1 = (d/\sin\theta_3) \times \sin\theta_2 = (100/\text{Sin}52^0 08') \times (\text{Sin}\ 52^0 08') =$ **94.42m**

The horizontal distance between the instrument station B and the church spire C ;

$d/\sin\theta_3 = D_2/\sin\theta_1 =$

$D_2 = (d/\sin\theta_3) \times \sin\theta_1 = (100/\sin 52^0 08') \times (\sin 73^0 44') =$ **118.46m**

02

The height of the tower above the instrument axis A

	$h_1 = D_1 \times \tan \alpha_1 = 94.42 \times \tan 16^0 42' =$ **29.23m** R.L to the top of the church spire above the instrument axis A = R.L OF B.M + S_1+ H_1 = 168.270+1.73+29.23=**199.230m** The height of the tower above the instrument axis B $h_2 = D_2 \times \tan \alpha_2 = 118.46 \times \tan 13^0 38 =$ **28.73m** R.L to the top of the church spire above the instrument axis A = R.L OF B.M + S_1+ H_1 = 168.270+2.23+28.73 =**199.230m**	**01**

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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF CIVIL ENGINEERING

SESSION: 2022-2023 (ODD SEMESTER)

II SESSIONAL TEST QUESTION PAPER

SET-B

USN | | | | | | | | | | |

Degree	:	B.E	Semester	:	III
Branch	:	Civil Engineering	Course Code	:	21CV32
Course Title	:	Geodetic Engineering	Date	:	-01-2023
Duration	:	60 Minutes	Max Marks	:	20

Note: Answer ONE full question from each part.

<table>
<tr><th>Q No.</th><th>Question</th><th>Marks</th><th>K-Level</th><th>CO mapping</th></tr>
<tr><td colspan="5">PART-A</td></tr>
<tr><td>1(a)</td><td>Differentiate between H.I Method and Rise and Fall Method.</td><td>5</td><td>K2 Understanding</td><td>CO2</td></tr>
<tr><td>(b)</td><td>Determine the elevation of top of the chimney, the following observations were made: Station A and B and top of the chimney are in the same vertical plane. Find the elevation to the top of the chimney, if the distance between A and B is 50m
<table>
<tr><th>Inst. Station</th><th>Reading on B.M</th><th>Angle of Elevation to Aerial Pole</th><th>Remarks</th></tr>
<tr><td>A</td><td>0.860</td><td>$18^0 36'$</td><td rowspan="2">R.L of B.M = 100.000m</td></tr>
<tr><td>b</td><td>1.220</td><td>$10^0 12'$</td></tr>
</table></td><td>5</td><td>K3 Applying</td><td>CO3</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td>2(a)</td><td>Explain the temporary adjustments of dumpy level.</td><td>5</td><td>K2 Understanding</td><td>CO2</td></tr>
<tr><td>(b)</td><td>Determine the R.L. of a top of tower from the following observations: Distance between A and B is 100m. R.L of B.M is 168.270m. A and B are not in the same line with the top of the tower. Horizontal angle at A between B and top of the tower is $73^0 44'$. Horizontal angle between A and top of the tower at B is $52^0 08'$
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<tr><td colspan="5">PART-B</td></tr>
<tr><td>3(a)</td><td>A road at constant RL 115.000m runs from north to south. The ground from east to west is horizontal. The ground levels along the centre line</td><td>5</td><td>K3 Applying</td><td>CO2</td></tr>
</table>

	of the road as follows: Chainage in 'm': 0 | 50 | 100 | 150 | 200 | 250 | 300 R.L in 'm': 117.500 | 116.250 | 115.950 | 116.650 | 117.200 | 117.850 | 115.750 **Calculate** the volume of the earthwork by prismoidal rule for a road 8m wide at formation with side slopes 1:1.			
(b)	**Explain** the measurement of horizontal angle by repetition method.	5	K2 Understanding	CO3
	OR			
4(a)	Following readings were taken on a continuous sloping ground with four meter levelling staff at common interval of 30m. 0.855 (on A), 1.545, 2.335, 3.115, 3.825, 0.455, 1.380, 2.055, 2.855, 3.455, 0.585, 1.015, 1.850, 2.755, 3.845 (on B). The reduced level of A was 380.500m. Make the entries in a level book and apply the checks. **Calculate** the R.L of all points by H.I and also **Determine** the gradient of AB.	5	K3 Applying	CO2
(b)	**Define** theodolite. **Explain** the types of theodolite.	5	K2 Understanding	CO3

Course Incharge **HOD** **IQAC- Coordinator** **Principal**

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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109
DEPARTMENT OF CIVIL ENGINEERING
SESSION: 2022-2023 (ODD SEMESTER)
II SESSIONAL TEST SCHEME & SOLUTION
SET-B

Degree	:	B.E	USN	
Branch	:	Civil Engineering	Semester	: III
Course Title	:	Geodetic Engineering	Course Code	: 21CV32
Duration	:	60 Minutes	Date	: /01/2023
			Max Marks	: 20

Note: Answer ONE full question from each part.

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<tr><th>Q No.</th><th>Questions with Scheme & Solution</th><th>Marks</th></tr>
<tr><td colspan="3">PART-A</td></tr>
<tr><td>1(a)</td><td colspan="1">Differentiate between H.I Method and Rise and Fall Method.</td><td>5</td></tr>
<tr><td>Sol.</td><td>
<table>
<tr><th>Sl.No</th><th>Plane of Collimation</th><th>Rise and Fall Method</th></tr>
<tr><td>1</td><td>It is simple, quicker, and less tedious as it involves few calculations.</td><td>It is time consuming, more tedious and involves more calculations.</td></tr>
<tr><td>2</td><td>There is no check on the RL od intermediate points.</td><td>There is a check on the RL of intermediate points.</td></tr>
<tr><td>3</td><td>Errors in intermediate RLs cannot be detected</td><td>Errors in intermediate RLs can be detected as all points are correlated.</td></tr>
<tr><td>4</td><td>There are two checks on the accuracy of RL calculations.</td><td>There are three checks on the accuracy of the RL calculations.</td></tr>
<tr><td>5</td><td>This method is more suitable in the situations where it is required to take a number of readings from the same instrument setting such as for profile levelling, setting out the levels for the constructional work, etc.</td><td>This method is more suitable for differential levelling, check levelling and other important jobs.</td></tr>
</table>
</td><td>5x1=5</td></tr>
<tr><td>1(b)</td><td>Determine the elevation of top of the chimney, the following observations were made: Station A and B and top of the chimney are in the same vertical plane. Find the elevation to the top of the chimney, if the distance between A and B is 50m
<table>
<tr><th>Inst. Station</th><th>Reading on B.M</th><th>Angle of Elevation to Aerial Pole</th><th>Remarks</th></tr>
</table>
</td><td>5</td></tr>
</table>

		A	0.860	$18^0 36'$	R.L of B.M = 100.000m		
		b	1.220	$10^0 12'$			
Sol.	**Solution: Given Data:** $S_1 = 3.525m$, $S_2 = 2.000M$, d= 50M, R.L OF B.M = 325.000M, $\alpha_1 = 16^0 30'$, $\alpha_2 = 10^0 30'$ Since the instrument axis B is higher than A. The distance equation is given by $D = (d \tan \alpha_2 + S) / (\tan \alpha_1 - \tan \alpha_2)$ $S = S_1 - S_2 = 1.220 - 0.860 = 0.36m$ $D = (50 \times \tan 10^0 12' + 0.360) / (\tan 18^0 36' - \tan 10^0 12') = 59.60m$ **D= 59.60m** Height of top of tower above the instrument axis B $h_1 = D \times \tan \alpha_1 = 59.60 \times \tan 18^0 36' = 20.06m$ **h_1= 20.06m** R.L to the top of the tower = R.L of B.M + S_1 + h_1 = 450.500+0.860+20.06 **= 441.420m** **Check:** Height of top of tower above the instrument axis A $h_2 = (D+d) \times \tan \alpha_2 = (59.60+50) \times \tan 10^0 12' = 19.72m$ **h_1= 19.72m** R.L to the top of the tower = R.L of B.M + S_2 + h_2 = 450.500+1.220+19.72 **= 441.420m**						02 03
	OR						
2(a)	**Explain** the temporary adjustments of dumpy level.						5
Sol.	The temporary adjustment of auto level consists of Setting, Leveling and Focusing. **Setting:** 1. The tripod stand is set up at a convenient height having its head horizontal (through eye estimation). 2. The instrument is then fixed on the head by rotating the lower part of the instrument with right hand and holding firmly the upper part with left hand. Before fixing, the leveling screws are required to be brought in between the tribratch and trivet. 3. The bull's eye bubble (circular bubble), if present, is then brought to the centre by adjusting the tripod legs. **Leveling:** Leveling of the instrument is done to make the vertical axis of the instrument truly vertical. It is achieved by carrying out the following steps: 1. The level tube is brought parallel to any two of the foot screws, by rotating the upper part of the instrument. 2. The bubble is brought to the centre of the level tube by rotating both the foot screws either inward or outward. (The bubble moves in the same direction as the left thumb.) 3. The level tube is then brought over the third foot screw again by rotating the upper part of the instrument. 4. The bubble is then again brought to the centre of the level tube by rotating the third foot screw either inward or outward. 5. Repeat Step 1 by rotating the upper part of the instrument in the same quadrant of the circle and then Step 2. 6. Repeat Step 3 by rotating the upper part of the instrument in the same quadrant of the circle and then Step 4.						01 02

7. Repeat Steps 5 and 6, till the bubble remains central in both the positions.
8. By rotating the upper part of the instrument through 180°, the level tube is brought parallel to first two foot screws in reverse order. The bubble will remain in the centre if the instrument is in permanent adjustment.

Focusing:

Focusing is required to be done in order to form image through objective lens at the plane of the diaphragm and to view the clear image of the object through eye-piece. This is being carried out by removing parallax by proper focusing of objective and eye-piece.

1. For focusing the eye-piece, the telescope is first pointed towards the sky or by holding a white paper in front of the eye-piece. Then the ring of eye-piece is turned either in or out until the cross-hairs are seen sharp and distinct.
2. Focusing of eye-piece depends on the vision of observer and thus required whenever there is a change in observer.
3. For focusing the objective, the telescope is first pointed towards the object. Then, the focusing screw is turned until the image of the object appears clear and sharp and there is no relative movement between the image and the cross-hairs. This is required to be done before taking any observation.

02

2(b)

Determine the R.L. of a top of tower from the following observations: Distance between A and B is 100m. R.L of B.M is 168.270m. A and B are not in the same line with the top of the tower. Horizontal angle at A between B and top of the tower is $73^0 44'$. Horizontal angle between A and top of the tower at B is $52^0 08'$

Inst. Station	Vertical Angle	Reading on B.M with horizontal line of sight
A	$16^0 42'$	1.73
B	$13^0 38'$	2.23

5

Sol.

Solution: Given Data:

$\theta_1 = 73^0 44'$, $\theta_2 = 52^0 08'$, $S_1 = 1.730$m, $S_2 = 2.23$m, $\alpha_1 = 16^0 42'$, $\alpha_2 = 13^0 38'$, R.L OF B.M = 168.270m

horizontal angle ACB = $\theta_3 = 180^0 - (\theta_1 + \theta_2) = 180^0 - (73^0 44' + 52^0 08') = 54^0 08'$

Applying sine rule

$AC/\sin\theta_2 = AB/\sin\theta_3 = BC/\sin\theta_1$

$D_1/\sin\theta_2 = d/\sin\theta_3 = D_2/\sin\theta_1$

02

The horizontal distance between the instrument station A and the church spire C ;

$D_1/\sin\theta_2 = d/\sin\theta_3$

$D_1 = (d/\sin\theta_3) \times \sin\theta_2 = (100/\text{Sin}52^0 08') \times (\text{Sin}\ 52^0 08') =$ **94.42m**

02

The horizontal distance between the instrument station B and the church spire C ;

$d/\sin\theta_3 = D_2/\sin\theta_1 =$

$D_2 = (d/\sin\theta_3) \times \sin\theta_1 = (100/\sin 52^0 08') \times (\sin 73^0 44') =$ **118.46m**

The height of the tower above the instrument axis A

$h_1 = D_1 \times \tan\alpha_1 = 94.42 \times \tan 16^0 42' =$ **29.23m**

R.L to the top of the church spire above the instrument axis A

= R.L OF B.M + $S_1 + H_1$ = 168.270+1.73+29.23=**199.230m**

01

The height of the tower above the instrument axis B

$h_2 = D_2 \times \tan\alpha_2 = 118.46 \times \tan 13^0 38 =$ **28.73m**

R.L to the top of the church spire above the instrument axis A

	= R.L OF B.M + S_1+ H_1 = 168.270+2.23+28.73 =**199.230m**	
	PART-B	
3(a)	A road at constant RL 115.000m runs from north to south. The ground from east to west is horizontal. The ground levels along the centre line of the road as follows:	**5**

Chainage in 'm'	0	50	100	150	200	250	300
R.L in 'm'	117.500	116.250	115.950	116.650	117.200	117.850	115.750

Calculate the volume of the earthwork by prismoidal rule for a road 8m wide at formation with side slopes 1:1.

Distance	Ground Level	Formation Level	Depth of Filling
0	157.600	160.000	2.40
30	158.200	160.000	1.80
60	158.800	160.000	1.20
90	157.900	160.000	2.10
120	158.500	160.000	1.50
150	159.100	160.000	0.90
180	159.400	160.000	0.60

02

Sol.

d = 30m B=8m S =1.5

Area of the section A =(B+Sh)h

A_1 = (8 + 1.5x2.4)2.4 = **27.84m^2.**

A_2 = (8 + 1.5x1.8)1.8 = **19.26m^2.**

A_3 = (8 + 1.5x1.20)1.2= **11.76m^2.**

A_4 = (8 + 1.5x2.10)2.1 = **23.42m^2.**

A_5 = (8 + 1.5x1.5)1.5 = **15.38m^2.**

A_6 = (8 + 1.5x0.9)0.9 = **8.42m^2.**

A_7 = (8 + 1.5x0.6)0.6 = **5.34m^2.**

02

By Prismoidal Rule:

V = d/3 ((A_0+A_n) + 4 (Odd offset area) + 2 (Even Offsets area)

= 30/3 ((27.84+5.34)+ 4(19.26+23.42+8.42) + 2 (11.76+15.38))

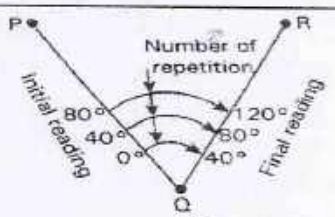
V = 2918.6 m^3.

01

(b)	**Explain** the measurement of horizontal angle by repetition method.	5

Sol.

Fig. (a)



$$P\hat{Q}R = \frac{120}{3} = 40°$$

Fig. (b)

02

Procedure:

1. Set up the instrument over the station Q and do all temporary adjustments. Keep the vertical circle to the left.
2. Set the vernier A to zero with the help of upper clamp and the tangent screws. Now the readings of the vernier A and B.
3. Loosen the lower clamp and turn the telescope towards the left signal at P. Clamp the lower clamp and bisect the point P exactly using the lower tangent screw.
4. Loosen the upper clamp and turn the instrument clockwise to bisect the signal at R. clamp the upper clamp and bisect R exactly using the upper tangent screw.
5. Read both the verniers to get approximate value of thee angle PQR.
6. Unclamp the lower plate and turn the telescope clockwise to sight P and again. Clamp the lower clamp and bisect P exactly using the lower tangent screw. Check that the vernier A and B readings have not changed.
7. Loosen the upper plate and turn the telescope clockwise and again bisect R. clamp the upper plate bisect R exactly using the upper tangent screw. The vernier will now read the twice the value of the angle PQR.
8. Repeat the steps 6 and 7 again. The final reading of the vernier a will be the thrice the angle PQR. 03
9. Read both the vernier. Divide the final reading by three to get the value of angle PQR.
10. Change the face of the instrument to right face. Repeat the steps 2 to 9. Determine the another value of the angle PQR .
11. Determine the average value of the two horizontal angles obtained with face left and face right. This is the precise value of angle PQR.
12. Record the all observations in the tabular form shown in the figure.

OR

4(a) Following readings were taken on a continuous sloping ground with four meter levelling staff at common interval of 30m. 0.855 (on A), 1.545, 2.335, 3.115, 3.825, 0.455, 1.380, 2.055, 2.855, 3.455, 0.585, 1.015, 1.850, 2.755, 3.845 (on B). The reduced level of A was 380.500m. Make the entries in a level book and apply the checks. **Calculate** the R.L of all points by H.I and also **Determine** the gradient of AB. **5**

Sol.

Distance	B.S	I.S	F.S	H.I	R.L	Remarks
0	0.855			381.355	380.500	B.M
30		1.545			379.810	
60		2.335			379.020	
90		3.115			378.240	
120	0.455		3.825	377.985	377.530	C.P
150		1.380			376.605	
180		2.055			375.930	

		210		2.855			375.130	
		240	0.585		3.455	375.115	374.530	C.P
		270		1.015			374.100	
		300		1.850			373.265	
		330		2.755			372.360	
		360			3.845		371.270	
								03
	Arithmetic check:							
	$\sum BS - \sum FS$ = Last R.L – First R.L							01
	1.895 – 11.125 = 371.270- 380.500							
	-9.23 = -9.23							
	Gradient = (Difference in Level)/ Distance = (9.23)/360 = **1 in 39**							01
(b)	**Define** theodolite. **Explain** the types of theodolite.							5
Sol.	**Definition of Theodolite:** The theodolite is the most accurate instrument used mainly for measuring the horizontal and vertical angles. It can also be used for locating points on a line, prolonging survey lines, finding the difference in elevations, setting out of grades, ranging curves, etc.							02
	Types of theodolite: The following are the types of theodolites:							
	Non-Transit theodolite: The telescope cannot be revolved round the horizontal axis in the vertical plane. These instruments are compact in nature. Such theodolites are obsolete nowadays. Examples: Y-Theodolite.							
	Transit theodolite: The telescope can be rotated about its horizontal axis in a vertical plane by 180^0. All the modern theodolites are this type only. Hence transit theodolite name may be replaced by the theodolite							03

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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109
DEPARTMENT OF CIVIL ENGINEERING
SESSION: 2022-2023 (ODD SEMESTER)
THIRD ASSIGNMENT

Degree	:	**B.E**	**Semester** :	**III**
Branch	:	**Civil Engineering**	**Course Code** :	**21CV32**
Course Title	:	**Geodetic Engineering**	**Max Marks** :	**20**
Date	:	**21/03/2023**	**Last Date for submission** :	**31/04/2023**

Q No.	Question	Marks	K-Level	CO mapping
1	**Calculate** the necessary data for setting out of the curve by Rankien's Method and prepare the curve table. Two tangents intersects at chainage (59+60), the deflection angle being 50^0 30'. Radius of the curve 15 chains peg interval 100 links length of chain being 20m (100 links). Theodolite least count is 20".	2	K3 Applying	CO4
2	Two straights BA and AC are intersected by a line EF. The angle BEF and EFC are 140^0 and 145^0 respectively. The radius of the first curve is 600m and that of second arc 400m. **Find** the chainage of the tangent points and point of compound curvature given that the chainage of intersection point A is 3415 m.	2	K3 Applying	CO4
3	**Calculate** the necessary data for setting out of a circular curve with the following data: Angle of Intersection = 144^0 ,chainage of P.I = 1390m, Radius of Curve = 300m. The curve is to be set out by the offset from chord produced with an peg interval of 20m chainage.	2	K3 Applying	CO4
4	**Calculate** the ordinates at a 5m distances for a circular curve having the long chord of 40m and a versed sine of 2m.	2	K3 Applying	CO4
5	**With a neat sketch explain** the types of vertical curves.	2	K3 Applying	CO4
6	**Explain** the types of Electronic Measurement Distance Instrument.	2	K2 Understanding	CO5
7	**Explain** the applications of GIS and Remote Sensing in transportation.	2	K2 Understanding	CO5
8	**Differentiate** between the aerial photograph and map.	2	K2 Understanding	CO5
9	**Define** remote sensing and **explain** the principles of remote sensing.	2	K2 Understanding	CO5
10	**Define** GIS. **Explain** the components of GIS.	2	K2 Understanding	CO5

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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF CIVIL ENGINEERING

SESSION: 2022-2023 (ODD SEMESTER)

III SESSIONAL TEST QUESTION PAPER

SET-A

USN										

Degree : B.E
Branch : Civil Engineering
Course Title : Geodetic Engineering
Duration : 60 Minutes

Semester : III
Course Code : 21CV32
Date : 28 /03/2023
Max Marks : 20

Note: Answer ONE full question from each part.

Q No.	Question	Marks	K-Level	CO mapping
	PART-A			
I(a)	**Calculate** the necessary data for setting out of the curve by Rankien's Method and prepare the curve table. Two tangents intersects at chainage (59+60), the deflection angle being 50^0 30'. Radius of the curve 15 chains peg interval 100 links length of chain being 20m (100 links). Theodolite least count is 20".	5	K3 Applying	CO4
(b)	**Explain** the types of Electronic Measurement Distance Instrument.	5	K2 Understanding	CO5
	OR			
2(a)	Two straights BA and AC are intersected by a line EF. The angle BEF and EFC are 140^0 and 145^0 respectively. The radius of the first curve is 600m and that of second arc 400m. **Find** the chainage of the tangent points and point of compound curvature given that the chainage of intersection point A is 3415 m.	5	K3 Applying	CO4
(b)	**Explain** the applications of GIS and Remote Sensing in transportation.	5	K2 Understanding	CO5
	PART-B			
3(a)	**Calculate** the necessary data for setting out of a circular curve with the following data: Angle of Intersection = 144^0 ,chainage of P.I = 1390m, Radius of Curve = 300m. The curve is to be set out by the offset from chord produced with an peg interval of 20m chainage.	5	K3 Applying	CO4
(b)	**Differentiate** between the aerial photograph and map.	5	K2 Understanding	CO5
	OR			
4(a)	**Calculate** the ordinates at a 5m distances for a circular curve having the long chord of 40m and a versed sine of 2m.	5	K3 Applying	CO4
(b)	**Define** remote sensing and **explain** the principles of remote sensing.	5	K2 Understanding	CO5

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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109
DEPARTMENT OF CIVIL ENGINEERING
SESSION: 2022-2023 (ODD SEMESTER)
III SESSIONAL TEST SCHEME & SOLUTION
SET-A

USN										

Degree	:	B.E	Semester	: III
Branch	:	Civil Engineering	Course Code	: 21CV32
Course Title	:	Geodetic Engineering	Date	: 28/03/2023
Duration	:	60 Minutes	Max Marks	: 20

Note: Answer ONE full question from each part.

Q No.	Questions with Scheme & Solution	Marks
	PART-A	
1(a)	**Calculate** the necessary data for setting out of the curve by Rankien's Method and prepare the curve table. Two tangents intersects at chainage (59+60), the deflection angle being 50^0 30'. Radius of the curve 15 chains peg interval 100 links length of chain being 20m (100 links). Theodolite least count is 20".	5
Sol.	**Solution:** Length of one link = 0.2 m. Chainage @ intersection (B) = (59 x 20 + 60x0.2) = 1192 m. Radius of curve = 15x 20 = 300 m. Deflection Angle , $\Delta = 50^0 30'$ Tangent Length (T) = R.tanΔ/2 = 300 x tan 50030'/2 = **141.48m** **T= 141.48m.** Length of the curve (L) = $\pi R\Delta/180$ = Πx300x$50^0$30'/180 **L= 264.45m.** Chainage @ T1 = chainage @ P.I – tangent length (T) = 1192-141.48 **Chainage @ T1 = 1050.52 m.** Chainage @ T2 = chainage @ T1+ Length of the curve = 1050.52+ 264.45 **Chainage @ T2 = 1314.97 m.** Chainage @ peg 1 = 1060 m. Chainage of last peg = 1300 m. Number of full chords = (chainage @ last peg- chainage@ peg1) / (peg interval) = (1300-1060)/20 Number of full chords = 12 Nos. Therefore the total number of chords = 1+12+1= 14 Nos. Length of the first sub chord = 1060- 1050.52 = 9.48m.	01 02

	Length of Last sub chord = 1314.97-1300.00= 14.97m. Length of normal chords = 20m. Calculation of Tangential angle $\Delta 1 = 1718.9 \times 9.48 / 300 \times 60 = 0^0 54' 19.03"$ $\Delta 2 = 1718.9 \times 20/60 \times 300 = 1^0 54' 35.6"$ $\Delta 3 = 1718.9 \times 14.97/60 \times 30 = 1^0 25' 46.39"$ **Result of tabulation:** Arithmetic check = $\Delta / 2 = 50030'/2 = 25^0 15'00"$	**02**
1(b)	**Explain** the types of Electronic Measurement Distance Instrument.	**5**
Sol.	**1. Microwave Instruments:** These instruments make use of microwaves. They are also known as Tellurometers. Tellurometers can be used in day as well as in night. The range of these instruments is up to 100 km. It consists of two identical units. One unit is used as master unit and the other as remote unit. Just by pressing a button, a master unit can be converted into a remote unit and a remote unit into a master unit. **2. Infrared Wave Instruments:** In this instrument amplitude modulated infrared waves are used. Prism reflectors are used at the end of line to be measured. These instruments are light and economical and can be mounted on theodolite. With these instruments accuracy achieved is ± 10 mm. The range of these instruments is up to 3 km. These instruments are useful for most of the civil engineering works. **3. Visible Light Wave Instruments:** These instruments rely on propagation of modulated light waves. This type of instrument was first developed in Sweden and was named as Geodimeter. During night its range is up to 2.5 km while in day its range is up to 3 km. Accuracy of these instruments varies from 0.5 mm to 5 mm/km distance. These instruments are also very useful for civil engineering projects.	**01** **02** **02**
	OR	
2(a)	Two straights BA and AC are intersected by a line EF. The angle BEF and EFC are 140^0 and 145^0 respectively. The radius of the first curve is 600m and that of second arc 400m. **Find** the chainage of the tangent points and point of compound curvature given that the chainage of intersection point A is 3415 m.	**5**
Sol.	**Given Data:** RL = 600m, Rs = 400m The deflection angle of the curves: $\Delta 1 = 1800 - 1400 = 400$ $\Delta 2 = 1800 - 1450 = 350$ $\Delta = \Delta 1 + \Delta 2 = 400 + 350 =$ **750** T1E = ED = tL = RL x tan ($\Delta 1/2$) = 600 x tan (400/2) = **218.38 m.** T1F = DF = tS = RS x tan ($\Delta 2/2$) = 400 x tan (350/2) = **126.12 m.** EF = ED + DF = 218.38 + 126.12 = **344.50 m.** From triangle AEF , Applying sine rule, EF/ Sin 750 = AE/ Sin 350 = AF/ Sin 400	**02** **03**

	Therefore AE = (344.50/ Sin 750) X Sin 350 = **204.57 m.** And AF= (344.50/ Sin 750) X Sin 400 = **229.25 m.** Length of the first arc, l1= (πR1Δ1/180) = (πx 600 x 400/180) = 418.93m. Length of the Second arc, l2= (πR2Δ2/180) = (πx 400 x 350/180) = 244.38m. TS= AE+ tL= 204.57 + 218.38 = 422.95m. TL= AF+ tS= 229.25 + 126.12 = 335.37m. Chainage @ T1 = Chainage @ A – Tangent Length (TL) = 3415 – 422.95 = **2992.05 m.** Chainage @ D = Chainage @ T1 + l1 = 2992.05 + 418.93 = **3410.980 m.** Chainage @ T2 = chainage @ D + l2 = 3410.98 + 244.38 = **3655.36 m.**	
2(b)	**Explain** the applications of GIS and Remote Sensing in transportation.	**5**
Sol.	The for GIS in transportation planning include the following: • Executive information system. • Pavement management system. • Bridge management. • Maintenance management. • Safety management. • Transportation system management (TSM) • Travel demand forecasting • Corridor preservation and right-of-way	**05**
	PART-B	
3(a)	**Calculate** the necessary data for setting out of a circular curve with the following data: Angle of Intersection = 144^0 ,chainage of P.I = 1390m, Radius of Curve = 300m. The curve is to be set out by the offset from chord produced with an peg interval of 20m chainage.	**5**
Sol.	**R= 300m Δ= 1800-1440 = 360 P.I = 1390m Normal chord = peg interval = 20m.** Tangent Length (T) = R.tanΔ/2 = 300 x tan 360/2 = 97.48m **T= 97.48m.** Length of the curve (L) = πRΔ/180 = Πx300x36/180 **L= 188.52m.** Chainage @ T1 = chainage @ P.I – tangent length (T) = 1390-97.48 **Chainage @ T1 = 1292.52 m.** Chainage @ T2 = chainage @ T1+ Length of the curve = 1292.52+ 188.52 **Chainage @ T2 = 1481.04 m.** **Chainage @ peg 1 = 1310m.** **Chainage of last peg = 1470m.** Number of full chords = (chainage @ last peg- chainage@ peg1) / (peg interval) = (1470-1310)/20 **Number of full chords = 8 Nos.** Therefore the total number of chords = 1+8+1= 10 Nos. Length of the first sub chord = 1310-1292.52 = 17.48m. Length of Last sub chord = 1481.01-1470= 11.04m. Length of normal chords = 20m. Length of first offset, O1 = (C2/2R) = (17.482/2X300) = 0.51m. Length of second offset, O2 = C/2R (c+C) = (20 /2x300)x (17.48+20) = 1.25m. Length of O3,O4,O5,O6, O7,O8, O9 = (C2/R) = 202/300 = 1.33m. Length of Last sub chord, O10 = c'/2R (C+c') =(11.04 /2x300)x (20+11.04) = 0.57m.	**02** **03**

(b)	**Differentiate** between the aerial photograph and map.		5
Sol.			05

Map	Aerial Photograph
1.Map is an orthogonal Projection	1. Aerial photograph is a central projection i.e perspective projection
2. Map has a single constant scale	2. Aerial photograph varies from point depending upon their elevations
3. The amount of detail on a map are selective.	3. In an aerial photograph information is more.
4. Due to symbolic representation of the clarity of details is more on maps.	4. No symbolic representation is there in the photo.

OR

4(a)	**Calculate** the ordinates at a 5m distances for a circular curve having the long chord of 40m and a versed sine of 2m.	5
Sol.	**Solution:** Given data O0 =2m R= 40m Ox = 5m For the ordinates or from the long chord produced method of setting out of the curve, the versed sine is given by $O_0 = R - \text{sqrt}(R^2 - (L/2)^2)$ $2 = R - \text{sqrt}(R2 - (40/2)^2)$ $R^2 - (20)^2 = (R-2)^2$ $R^2 - (20)$ $2 = R^2 + 4 - 4R$ R = (404/4) = 101 m **R= 101m**	02
	By Exact Method: To calculate the ordinate from the long chord produced for the exact method is given by O_x= sqrt $(R^2 - (x)^2) - (R - O0)$ O_0= sqrt $(101^2 - (0)^2) - (101 - 2) = 2$ m. O_{10}= sqrt $(101^2 - (10)^2) - (101 - 2) = 1.50$ m. O_{20}= sqrt $(101^2 - (20)^2) - (101 - 2) = 0$ m. 4. By Approximate method: $Ox = x(l-x)\ 2R$ $O_0 = 0(40-0)\ 2X101 = 0.19$ m. $O_{10} = 10(40-10)\ 2X101 = 1.48$ m $O_{20} = 20(40-20)\ 2X101 = 1.98$ m.	03
(b)	**Define** remote sensing and **explain** the principles of remote sensing.	5
Sol.	**Remote sensing** is the science and art of obtaining information about object, area, or phenomenon through the analysis of data acquired by a device that is not in contact with the object, area, or phenomenon under investigation. **Principles of Remote sensing** **Data acquisition:** 10. Energy source (sun) 11. Propagation of energy through the atmosphere	02

	12. Energy interactions with earth surface features 13. Retransmission of energy through the atmosphere 14. Airborne and space borne sensors record reflected electromagnetic energy 15. Resulting sensor data in pictorial and/or digital form 16. Use various viewing and interpretation devices to analyze pictorial data or computer to analyze digital sensor data. Reference data assists analysis (to determine information on type, extent, location, condition of resources). 17. Compile information in form of maps/tables/layers (for GIS) 18. Present information to users for decision making.	03

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DEPARTMENT OF CIVIL ENGINEERING

SESSION: 2022-2023 (ODD SEMESTER)

III SESSIONAL TEST QUESTION PAPER

SET-B

USN										

Degree	:	B.E	Semester :	III
Branch	:	Civil Engineering	Course Code :	21CV32
Course Title	:	Geodetic Engineering	Date :	28 /03/2023
Duration	:	60 Minutes	Max Marks :	20

Note: Answer ONE full question from each part.

Q No.	Question	Marks	K-Level	CO mapping
	PART-A			
1(a)	**Calculate** the ordinates at a 10m distances for a circular curve having the long chord of 40m and a versed sine of 2m.	5	K3 Applying	CO4
(b)	**Define** remote sensing and **explain** the principles of remote sensing.	5	K2 Understanding	CO5
	OR			
2(a)	Two straights BA and AC are intersected by a line EF. The angle BEF and EFC are 140^0 and 145^0 respectively. The radius of the first curve is 600m and that of second arc 400m. **Find** the chainage of the tangent points and point of compound curvature given that the chainage of intersection point A is 3415 m.	5	K3 Applying	CO4
(b)	**Define** GIS. **Explain** the components of GIS.	5	K2 Understanding	CO5
	PART-B			
3(a)	**Calculate** the necessary data for setting out of the curve by Rankien's Method and prepare the curve table. Two tangents intersects at chainage (59+60), the deflection angle being 50^0 30'. Radius of the curve 15 chains peg interval 100 links length of chain being 20m (100 links). Theodolite least count is 20".	5	K3 Applying	CO4
(b)	**Explain** the applications of GIS and Remote Sensing in transportation.	5	K2 Understanding	CO5
	OR			
4(a)	**Calculate** the necessary data for setting out of a circular curve with the following data: Angle of Intersection = 144^0 ,chainage of P.I = 1390m, Radius of Curve = 300m. The curve is to be set out by the offset from chord produced with an peg interval of 20m chainage.	5	K3 Applying	CO4
(b)	**Explain** the types of Electronic Measurement Distance Instrument.	5	K2 Understanding	CO5

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DEPARTMENT OF CIVIL ENGINEERING

SESSION: 2022-2023 (ODD SEMESTER)

III SESSIONAL TEST SCHEME & SOLUTION

SET-B

USN										

Degree	:	B.E	Semester :	III
Branch	:	Civil Engineering	Course Code :	21CV32
Course Title	:	Geodetic Engineering	Date :	28/03/2023
Duration	:	60 Minutes	Max Marks :	20

Note: Answer ONE full question from each part.

Q No.	Questions with Scheme & Solution	Marks
	PART-A	
1(a)	**Calculate** the ordinates at a 10m distances for a circular curve having the long chord of 40m and a versed sine of 2m.	5
Sol.	**Solution:** Given data O0 =2m R= 40m Ox = 5m For the ordinates or from the long chord produced method of setting out of the curve, the versed sine is given by O_0 = R – sqrt ($R^2 - (L/2)^2$) 2 = R – sqrt (R2 – (40/2)^2) $R^2 - (20)^2 = (R-2)^2$ $R^2 - (20)$ 2 =R^2 + 4-4R R = (404/4) = 101 m **R= 101m** **By Exact Method:** To calculate the ordinate from the long chord produced for the exact method is given by O_x= sqrt ($R^2 - (x)^2$) – (R- O0) O_0= sqrt ($101^2 - (0)^2$) – (101- 2) = 2 m. O_{10}= sqrt ($101^2 - (10)^2$) – (101- 2) = 1.50 m. O_{20}= sqrt ($101^2 - (20)^2$) – (101- 2) = 0 m. 4. By Approximate method: Ox = $x(l-x)\ 2R$ O_0 = 0(40−0) 2X101 = 0.19 m. O_{10} = 10(40−10) 2X101 = 1.48 m O_{20} = 20(40−20) 2X101 = 1.98 m.	02 03
1(b)	**Define** remote sensing and **explain** the principles of remote sensing.	5
Sol.	**Remote sensing** is the science and art of obtaining information about object, area, or phenomenon through the analysis of data acquired by a device that is not in contact with the object, area, or phenomenon under investigation. **Principles of Remote sensing** **Data acquisition:** 1. Energy source (sun) 2. Propagation of energy through the atmosphere	02

	3. Energy interactions with earth surface features 4. Retransmission of energy through the atmosphere 5. Airborne and space borne sensors record reflected electromagnetic energy 6. Resulting sensor data in pictorial and/or digital form 7. Use various viewing and interpretation devices to analyze pictorial data or computer to analyze digital sensor data. Reference data assists analysis (to determine information on type, extent, location, condition of resources). 8. Compile information in form of maps/tables/layers (for GIS) 9. Present information to users for decision making.	03
	OR	
2(a)	Two straights BA and AC are intersected by a line EF. The angle BEF and EFC are 140^0 and 145^0 respectively. The radius of the first curve is 600m and that of second arc 400m. **Find** the chainage of the tangent points and point of compound curvature given that the chainage of intersection point A is 3415 m.	**5**
Sol.	**Given Data:** RL = 600m, Rs = 400m The deflection angle of the curves: $\Delta 1 = 1800 - 1400 = 400$ $\Delta 2 = 1800 - 1450 = 350$ $\Delta = \Delta 1 + \Delta 2 = 400 + 350 =$ **750** T1E = ED = tL = RL x tan ($\Delta 1/2$) = 600 x tan (400/2) = **218.38 m.** T1F = DF = tS = RS x tan ($\Delta 2/2$) = 400 x tan (350/2) = **126.12 m.** EF = ED + DF = 218.38 + 126.12 = **344.50 m.** From triangle AEF , Applying sine rule, EF/ Sin 750 = AE/ Sin 350 = AF/ Sin 400 Therefore AE = (344.50/ Sin 750) X Sin 350 = **204.57 m.** And AF= (344.50/ Sin 750) X Sin 400 = **229.25 m.** Length of the first arc, l1= (πR1Δ1/180) = (πx 600 x 400/180) = 418.93m. Length of the Second arc, l2= (πR2Δ2/180) = (πx 400 x 350/180) = 244.38m. TS= AE+ tL= 204.57 + 218.38 = 422.95m. TL= AF+ tS= 229.25 + 126.12 = 335.37m. Chainage @ T1 = Chainage @ A – Tangent Length (TL) = 3415 – 422.95 = **2992.05** m. Chainage @ D = Chainage @ T1 + l1 = 2992.05 + 418.93 = **3410.980 m.** Chainage @ T2 = chainage @ D + l2 = 3410.98 + 244.38 = **3655.36 m.**	**02** **03**
2(b)	**Define** GIS. **Explain** the components of GIS.	**5**
Sol.	Geographic Information System (GIS) is defined as an integrated tool, capable of mapping, analyzing, manipulating and storing geographical data in order to provide solutions to real world problems and help in planning for the future. Components of a GIS: **1. Hardware**: It consists of the equipments and support devices that are required to capture, store process and visualize the geographic information. These include computer with hard disk, digitizers, scanners, printers and plotters etc.	**01**

	2. Software: Software is at the heart of a GIS system. The GIS software must have the basic capabilities of data input, storage, transformation, analysis and providing desired outputs. ArcGIS by ESRI is the widely used proprietary GIS software. **3. Data:** The data is captured or collected from various sources (such as maps, field observations, photography, satellite imagery etc) and is processed for analysis and presentation. **4. Procedures:** These include the methods or ways by which data has to be input in the system, retrieved, processed, transformed and presented. **5. People:** This component of GIS includes all those individuals (such as programmer, database manager, GIS researcher etc.) who are making the GIS work, and also the individuals who are at the user end using the GIS services, applications and tools.	**04**
	PART-B	
3(a)	**Calculate** the necessary data for setting out of the curve by Rankien's Method and prepare the curve table. Two tangents intersects at chainage (59+60), the deflection angle being 50^0 30'. Radius of the curve 15 chains peg interval 100 links length of chain being 20m (100 links). Theodolite least count is 20".	**5**
Sol.	**Solution:** Length of one link = 0.2 m. Chainage @ intersection (B) = (59 x 20 + 60x0.2) = 1192 m. Radius of curve = 15x 20 = 300 m. Deflection Angle , $\Delta = 50^0 30'$ Tangent Length (T) = R.tanΔ/2 = 300 x tan 50030'/2 = **141.48m** **T= 141.48m.** Length of the curve (L) = $\pi R\Delta/180 = \Pi x300x50^0 30'/180$ **L= 264.45m.** Chainage @ T1 = chainage @ P.I – tangent length (T) = 1192-141.48 **Chainage @ T1 = 1050.52 m.** Chainage @ T2 = chainage @ T1+ Length of the curve = 1050.52+ 264.45 **Chainage @ T2 = 1314.97 m.** Chainage @ peg 1 = 1060 m. Chainage of last peg = 1300 m. Number of full chords = (chainage @ last peg- chainage@ peg1) / (peg interval) = (1300-1060)/20 Number of full chords = 12 Nos. Therefore the total number of chords = 1+12+1= 14 Nos. Length of the first sub chord = 1060- 1050.52 = 9.48m. Length of Last sub chord = 1314.97-1300.00= 14.97m. Length of normal chords = 20m.	**01** **02** **02**

	Calculation of Tangential angle $\Delta 1$ = 1718.9 x 9.48 /300 x60 = $0^0$54'19.03" $\Delta 2$ = 1718.9 x20/60x300 = $1^0$54'35.6" $\Delta 3$ = 1718.9x 14.97/60x30 = $1^0$25'46.39" **Result of tabulation:** Arithmetic check = Δ / 2 = 50030'/2 = $25^0$15'00"	
(b)	**Explain** the applications of GIS and Remote Sensing in transportation.	**5**
Sol.	The for GIS in transportation planning include the following: • Executive information system. • Pavement management system. • Bridge management. • Maintenance management. • Safety management. • Transportation system management (TSM) • Travel demand forecasting • Corridor preservation and right-of-way	**05**
	OR	
4(a)	**Calculate** the necessary data for setting out of a circular curve with the following data: Angle of Intersection = 144^0 ,chainage of P.I = 1390m, Radius of Curve = 300m. The curve is to be set out by the offset from chord produced with an peg interval of 20m chainage.	**5**
Sol.	**R= 300m Δ= 1800-1440 = 360 P.I = 1390m Normal chord = peg interval = 20m.** Tangent Length (T) = R.tanΔ/2 = 300 x tan 360/2 = 97.48m **T= 97.48m.** Length of the curve (L) = πRΔ/180 = Πx300x36/180 **L= 188.52m.** Chainage @ T1 = chainage @ P.I – tangent length (T) = 1390-97.48 **Chainage @ T1 = 1292.52 m.** Chainage @ T2 = chainage @ T1+ Length of the curve = 1292.52+ 188.52 **Chainage @ T2 = 1481.04 m.** **Chainage @ peg 1 = 1310m.** **Chainage of last peg = 1470m.** Number of full chords = (chainage @ last peg- chainage@ peg1) / (peg interval) = (1470-1310)/20 **Number of full chords = 8 Nos.** Therefore the total number of chords = 1+8+1= 10 Nos. Length of the first sub chord = 1310-1292.52 = 17.48m. Length of Last sub chord = 1481.01-1470= 11.04m. Length of normal chords = 20m. Length of first offset, O1 = (C2/2R) = (17.482/2X300) = 0.51m. Length of second offset, O2 = C/2R (c+C) = (20 /2x300)x (17.48+20) = 1.25m. Length of O3,O4,O5,O6, O7,O8, O9 = (C2/R) = 202/300 = 1.33m. Length of Last sub chord, O10 = c'/2R (C+c') =(11.04 /2x300)x (20+11.04) = 0.57m.	**02** **03**
(b)	**Explain** the types of Electronic Measurement Distance Instrument.	**5**
Sol.	**1. Microwave Instruments:** These instruments make use of microwaves. They are also known	**01**

	as Tellurometers. Tellurometers can be used in day as well as in night. The range of these instruments is up to 100 km. It consists of two identical units. One unit is used as master unit and the other as remote unit. Just by pressing a button, a master unit can be converted into a remote unit and a remote unit into a master unit. **2. Infrared Wave Instruments:** In this instrument amplitude modulated infrared waves are used. Prism reflectors are used at the end of line to be measured. These instruments are light and economical and can be mounted on theodolite. With these instruments accuracy achieved is ± 10 mm. The range of these instruments is up to 3 km. These instruments are useful for most of the civil engineering works. **3. Visible Light Wave Instruments:** These instruments rely on propagation of modulated light waves. This type of instrument was first developed in Sweden and was named as Geodimeter. During night its range is up to 2.5 km while in day its range is up to 3 km. Accuracy of these instruments varies from 0.5 mm to 5 mm/km distance. These instruments are also very useful for civil engineering projects.	**02** **02**

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