Ref No:

SRI KRISHNA INSTITUTE OF TECHNOLOGY



COURSE PLAN

Academic Year 2019 - 2020

Program:	B E – Civil Engineering		
Semester :	4		
Course Code:	18cv45		
Course Title:	Advanced Surveying		
Credit / L-T-P:	3 / 3-0-0		
Total Contact Hours:	50		
Course Plan Author:	SHIVAPRASAD D G		

Academic Evaluation and Monitoring Cell

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Note : Remove "Table of Content" before including in CP Book Each Course Plan shall be printed and made into a book with cover page Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

A. COURSE INFORMATION

1. Course Overview

Degree:	BE	Program:	CV
Year / Semester :	2019/IV	Academic Year:	2019-20
Course Title:	Advanced Surveying	Course Code:	18CV45
Credit / L-T-P:	3/3-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	50	SEE Marks:	60 Marks
CIA Marks:	40	Assignment	1 / Module
Course Plan Author:	SHIVAPRASAD D G	Sign	Dt:
Checked By:		Sign	Dt:
CO Targets	78%	SEE Target:	70%

Note: Define CIA and SEE % targets based on previous performance.

2. Course Content

Content / Syllabus of the course as prescribed by University or designed by institute. Identify 2 concepts per module as in G.

Modul	Content	Teachi	Identified Module	Blooms
е		ng	Concepts	Learning
		Hours		Levels
1	Curves – Necessity – Types, Simple curves, Element Designation of curves, Setting out simple curves by linear methods (numerical problems on offsets from long chord & chord produced method), Setting out curves by Rankines 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).	10	Rankines deflection	L5
2	Geodetic Surveying : Principle and Classification of triangulation system, Selection of base line and stations, Orders of triangulation, Triangulation figures, Reduction to Centre, Selection and marking of stations Theory of Errors: Introduction, types of errors, definitions, laws of accidental errors, laws of weights, theory of least squares, rules for giving weights and distribution of errors to the field observations, determination of the most probable values of quantities.	10	Triangulation system	L3
3	Earth, celestial sphere, earth and celestial Coordinate systems, spherical triangle, astronomical triangle, Napier's rule Introduction, Uses,	10	Celestial coordinate system	L5
4	Aerial photographs, Definitions, Scale of vertical and tilted photograph (simple problems), Ground Co&ordinates (simple problems),Relief Displacements(Derivation),Ground control, Procedure of aerial survey, overlaps and mosaics, Stereoscopes, Derivation Parallax.	10	Aerial survey	L5
5	Introduction, Electromagnetic spectrum, Electromagnetic distance measurement, Total station, Lidar scanners for topographical survey. Remote Sensing: Introduction, Principles of energy interaction in atmosphere and earth surface features, Image interpretation techniques, visual interpretation. Digital	10	Electromagne tic spectrum	L5

Geographical Information System: Definition of GIS, Key Components of GIS, Functions of GIS, Spatial data, spatial information system Geo-spatial analysis, Integration of Remote sensing and GIS and Applications in Civil Engineering(transportation, town planning).	50	_	
image processing, Global Positioning system			

3. Course Material

Books & other material as recommended by university (A, B) and additional resources used by course teacher (C).

1. Understanding: Concept simulation / video ; one per concept ; to understand the concepts ; 15 – 30 minutes

2. Design: Simulation and design tools used – software tools used ; Free / open source

3. Research: Recent developments on the concepts – publications in journals; conferences etc.

Modul	Details	Chapters	Availability
es		in book	
A	Text books (Title, Authors, Edition, Publisher, Year.)	-	-
1, 2, 3, 4, 5	B.C. Punmia, "Surveying Vol.2", Laxmi Publications pvt. Ltd., New Delhi.	1, 2, 3, 4	In Dept
1, 2, 3,	Kanetkar T P and S V Kulkarni , Surveying and Levelling Part 2, Pune Vidvarthi Griha Prakashan	1,2, 3, 4	In dept
1, 2, 3,	K.R. Arora, "Surveying Vol. 1" Standard Book House, New Delhi.	1, 2, 3, 4	In Dept
4, 5 B	Reference books (Title Authors Edition Publisher Year)	-	-
1, 2	S.K. Duggal, "Surveying Vol.I & II", Tata McGraw Hi ll Publishing Co. Ltd. New Delhi.	1, 2, 3, 4	In Lib
1, 2	R Subramanian, Surveying and Leveling, Second edition, Oxford University Press, New Delhi.	1,2, 3, 4	Not Available
3, 4, 5	David Clerk, Plane and Geodetic Surveying Vol1 and Vol2, CBS publishers	1, 2, 3, 4	In lib
3, 4, 5	B Bhatia, Remote Sensing and GIS , Oxford University Press, New Delhi.	1, 2, 3, 4	In lib
С	Concept Videos or Simulation for Understanding	-	-
C1	https://youtu.be/GkFgysZC4Vc		
C2			
C3			
C4			
C5			
C6			
C7			
C8			
C9			
C10			
D	Software Tools for Design	_	_
<u> </u>			
E	Recent Developments for Research	-	-

F	Others (Web, Video, Simulation, Notes etc.)	-	-
?			

4. Course Prerequisites

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.

Students must have learnt the following Courses / Topics with described Content

Mod	Course	Course Name	Topic / Description Sem Remarks	Blooms
ules	Code			Level
1	17CV36	Basic	1. Knowledge on Surveying 3	L3
		Surveying	appications	

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.

Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Mod	Topic / Description	Area	Remarks	Blooms
ules				Level
-	_	-	-	-

B. OBE PARAMETERS

1. Course Outcomes

Expected learning outcomes of the course, which will be mapped to POs. Identify a max of 2 Concepts per Module. Write 1 CO per Concept.

Mod	Course	Course Outcome	Teach.	Concept	Instr	Assessme	Blooms'
ules	Code.#	At the end of the course, student	Hours		Method	nt	Level
		should be able to				Method	
1	18CV45.1	Set out simple curves by linear	5	Simple	Lecture	CIA and	L5
		methods		Circular		Assignme	Design
				Curve		nt	
1	18CV45.2	Reverse curve between two	5	Reverse	Lecture/	CIA and	L5
		parallel straights		curve	Tutorial	Assignme	Design
						nt	
2	18CV45.3	Understand the Triangulation	5	Triangulati	Lecture	CIA and	L5
		figures		ons		Assignme	Design
						nt	
2	18CV45.4	Understand the Theory of errors	5	Theory of	Lecture	CIA and	L5
				errors		Assignme	Design
						nt	
3	18CV45.5	Understand the celestial sphere of	5	Celestial	Lecture	CIA and	L5
		earth		Sphere		Assignme	Design
						nt	
3	18CV45.6	Understand the astonomical	5	astonomic	Lecture/	CIA and	L5
		triangle		al triangle	Tutorial	Assignme	Design
						nt	
4	18CV45.7	Understand the Scale of vertical	5	tilted	Lecture/	CIA and	L5
		and tilted photograph		photograp	Tutorial	Assignme	Design
				h		nt	
4	18CV45.8	Understand the aerial survey	5	aerial	Lecture/	CIA and	L5
				survey	Tutorial	Assignme	Design
						nt	
5	18CV45.9	Understand the Electromagnetic	5	Electroma	Lecture	CIA and	L5
		spectrum		gnetic		Assignme	Design
				spectrum		nt	

5	18CV45.10	Understand the Functions of GIS	5	GIS	Lecture	CIA and	L5
						Assignme	Design
						nt	
-	-	Total	50	-	-	-	L3-L4

2. Course Applications

Write 1 or 2 applications per CO.

Students should be able to employ / apply the course learnings to ...

Mod	Application Area	CO	Level
ules	Compiled from Module Applications.		
1	Understanding the surveying applications	CO1	L3
1	Students are able to Design curves	CO2	L5
2	Understanding the surveying applications	CO3	L5
2	Understanding the surveying applications	CO4	L5
3	Measure and calculations of earth and celestial coordinates	CO5	L5
3	Measure and calculations of earth and celestial coordinates	CO6	L5
4	To conduct aerial survey	CO7	L5
4	To conduct aerial survey	CO8	L5
5	Usage of modern surveying instruments	CO9	L5
5	Usage of modern surveying instruments	CO10	L5

3. Mapping And Justification

CO – PO Mapping with mapping Level along with justification for each CO-PO pair.

To attain competency required (as defined in POs) in a specified area and the knowledge & ability required to accomplish it.

Mod ules	Мар	ping	Mapping Level	Justification for each CO-PO pair	Lev el
-	СО	PO	-	'Area': 'Competency' and 'Knowledge' for specified 'Accomplishment'	-
1	CO1	PO1	1	Engineering knowledge on setting of curves	L3
1	CO1	PO2	1	Analyses of problems on setting on curves	L4
1	CO2	PO1	1	Engineering knowledge on design and implement the different types of curves for deviating type of alignments.	L5
2	CO2	PO2	1	Analyses of problems on design and implement the different types of curves for deviating type of alignments.	L5
2	CO3	PO1	1	Engineering knowledge on geometric- principles to arrive at surveying problems.	L5
2	CO3	PO2	1	Analyses of problems on geometric- principles to arrive at surveying problems.	L5
2	CO4	PO1	1	Engineering knowledge on geometric- principles to arrive at surveying problems.	L5
2	CO4	PO2	1	Analyses of problems on geometric- principles to arrive at surveying problems.	L5
3	CO5	PO1	1	Engineering knowledge on capture geodetic data to process and perform analyses for survey problems with the use of electronic instruments.	L5
3	CO5	PO2	1	Analyses of problems on capture geodetic data to process and perform analyses for survey problems with the use of electronic instruments.	L5
3	CO6	PO1	1	Engineering knowledge on capture geodetic data to process and perform analyses for survey problems with the use of electronic instruments.	L5
3	CO6	PO2	1	Analyses of problems on capture geodetic data to process and perform analyses for survey problems with the use of electronic instruments.	L5
4	CO7	PO1	1	Engineering knowledge on use modern instruments to obtain geo- spatial data and analyze the same to appropriate engineering problems.	L5
4	CO7	PO2	1	Analyses of problems on use modern instruments to obtain geo-	L5
18CV4	5/A			Copyright ©2017. cAAS. All rights reserv	ed.

				spatial data and analyze the same to appropriate engineering problems.	
4	CO8	PO1	1	Engineering knowledge on use modern instruments to obtain	L5
				geo- spatial data and analyze the same to appropriate engineering problems.	
4	CO8	PO2	1	Analyses of problems on use modern instruments to obtain geo- spatial data and analyze the same to appropriate engineering problems.	L5
4	CO9	PO1	1	Engineering knowledge on use modern instruments to obtain geo- spatial data and analyze the same to appropriate engineering problems.	L5
4	CO9	PO2	1	Analyses of problems on use modern instruments to obtain geo- spatial data and analyze the same to appropriate engineering problems.	L5
5	CO10	PO1	1	Engineering knowledge on use modern instruments to obtain geo- spatial data and analyze the same to appropriate engineering problems.	L5
5	CO10	PO2	1	Analyses of problems on use modern instruments to obtain geo- spatial data and analyze the same to appropriate engineering problems.	L5

4. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

-	-	Course Outcomes		Program Outcomes						-								
Mod	CO.#	At the end of the course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PS	PS	PS	Lev
ules		student should be able to	1	2	3	4	5	6	7	8	9	10	11	12	O1	02	03	el
1	18CV45.1																	
1	18CV45.2	Reverse curve between two parallel straights	2	3	-	-	-	-	-	-	-	-	-	-				L4
2	18CV45.3	Understand the Triangulation figures	2	3	-	-	-	-	-	-	-	-	-	-				L2
2	18CV45.4	Understand the Theory of errors	2	3	-	-	-	-	-	-	-	-	-	-				L4
3	18CV45.5	Understand the celestial sphere of earth	2	3	-	-	-	-	-	-	-	-	-	-				L2
3	18CV45.6	Understand the astronomical triangle	2	3	-	-	-	-	-	-	-	-	-	-				L4
4	18CV45.7	Understand the Scale of vertical and tilted photograph	2	3	-	-	-	-	-	-	-	-	-	-				L2
4	18CV45.8	Understand the aerial survey	2	3	-	-	-	-	-	-	-	-	-	-				L4
5	18CV45.9	Understand the Electromagnetic spectrum	2	3	-	-	-	-	-	-	-	-	-	-				L2
5	18CV45.10	Understand the Functions of GIS	2	3	-	-	-	-	-	-	-	-	-	-				L4
-	18CV45PC	Average attainment (1, 2, or 3)	2	3														-
-	PO, PSO	1.Engineering Knowledge; 2.Probl 4.Conduct Investigations of Compl Society; 7.Environment and St 10.Communication; 11.Project N S1.Software Engineering; S2.Data E	lem lex usta 1an Base	Ai Proi aina age e Me	naly bler Ibilit eme ana	vsis; ms; ty; ent iger	3.l 5.M 8.E ar nen	Desi Iode Ithic Id It; S	gn ern s; Fir 3.W	7 Too 9.11 nand eb 1	Dev L Us ndiv ce; Des	velc sage vidu 12 ign	pm e; 6. al Life	ent The an e-lo	of e En d ong	Sc Igin Tea Le	əluti eer ımw zarr	ons; and ork; ning;

5. Curricular Gap and Content

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Mod	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
ules					
1					
2					
3					
4					
5					

 1	1	L	1	

6. Content Beyond Syllabus

Topics & contents required (from A.5) not addressed, but help students for Placement, GATE, Higher Education, Entrepreneurship, etc.

Mod	Gap Topic	Area	Actions Planned	Schedule	Resources	PO Mapping
ules				Planned	Person	
1						
1						
2						
2						
3						
3						
4						
4						
5						
5						

C. COURSE ASSESSMENT

1. Course Coverage

Assessment of learning outcomes for Internal and end semester evaluation. Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

Mod	Title	Teachi		No. o	f quest	ion in	Exam		CO	Levels
ule		ng	CIA-1	CIA-2	CIA-3	Asg	Extra	SEE		
#		Hours					Asg			
1	Curve Surveying	10	4	-	-	1	1	2	CO1, CO2	L2,L4,L
										5
2	Geodetic Surveying and Theory of	10	4	-	-	1	1	2	CO3,CO4	L2,L4,L
	Errors									5
3	Introduction to Field Astronomy	10	-	4	-	1	1	2	CO5, CO6	L2,L4,L
										5
4	Aerial Photogrammetry	10	-	4	-	1	1	2	CO7, CO8	L2,L4,L
										5
5	Modern Surveying Instruments	10	-	-	8	1	1	2	CO9, CO10	L2,L4,L
										5
-	TOTAL	50	8	8	8	5	5	10	-	-

2. Continuous Internal Assessment (CIA)

Asse	Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.						
Mod	Evaluation	Weightage in	СО	Levels			
ules		Marks					
1,2	CIA Exam – 1	30	CO1, CO2, CO3, CO4	L2, L3, L2, L4			
3,4	CIA Exam – 2	30	CO5, CO6, CO7, C08	L2, L4, L2, L4			
5	CIA Exam – 3	30	CO9, CO10	L2, L4			
1,2	Assignment - 1	10	CO1, CO2, CO3, CO4	L2, L3, L2, L4			

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3,4	Assignment - 2	10	CO5, CO6, CO7, CO8	L2, L4, L2, L4
5	Assignment - 3	10	CO9, CO10	L2, L4
	Final CIA Marks	40	-	-

D1. TEACHING PLAN - 1

Module - 1

Title:	Curve Surveying	Appr	16 Hrs
		Time:	
a	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	Set out simple curves by linear methods	CO1	L5
2	Reverse curve between two parallel straights	CO2	L5
b	Course Schedule	-	-
Class N	o Module Content Covered	CO	Level
1	Curves – Necessity – Types, Simple curves, Element Designation of curves,	C01	L3
2	Setting out simple curves by linear methods (numerical problems on offsets from long chord & chord produced method)	C01	L3
3	Setting out curves by Rankines deflection angle method (numerical problems). Compound curves,	C01	L3
4	Elements, Design of compound curves, Setting out of compound	C01	L3
5	numerical problems	C01	L5
6	Reverse curve between two parallel straights	C01	L3
7	numerical problems on Equal radius and unequal radius	C01	L5
8	Transition curves Characteristics	C01	L3
9	numerical problems on Length of Transition curve	C01	L5
10	Vertical curves –Types – (theory).	C01	L3
С	Application Areas	CO	Level
1	Understanding the surveying applications	CO1	L3
d	Review Questions	-	-
1	Explain the following along with a neat sketch :	CO1	L2
	i) Forward tangent ii) Point of curve iii) Deflection angle iv) Apex distance.		
2	Two tangents intersect at a chainage of 1 l 90m, the deflection angle 36°.	CO1	L3
	Compute all the data necessary to set out a curve of radius 300m by		
	deflection angle method. The peg interval is 30m. Tabulate the results.	<u> </u>	
3	A reverse curve is to be set out to connect two parallel railway line 30m apart.	CO2	L4
	I ne distance between the tangent points is 150m. Both the arcs have the		
	same radius. The curve is set out by method of ordinates from long chord	1	

	taking a peg interval of 10m. Calculate the necessary data for setting the curve		
4	List the requirements of a transition curve (any four).	CO2	L3
5	With a neat sketch, list any four vertical curves.	CO2	L3
6	Define curve ? Establish the relationship between degree of a curve and its radius	CO2	L3
7	Two tangents intersect each other at a chainage of 50+60, deflection angle being 50*30' its required to connect two tangents by a simple curve of 15 chain radius. Taking peg inetrval of 100 links, calculate the necessary data for setting out the curve by Rankines method of deflection angle. Take length of the chain as 20m= 100 links. Also write brief procedure for setting out the curve.	CO2	L5
8	Distinguish between a compound curve and reverse curve with neat sketches.	CO2	L3
9	A compound curve consists of two simple circular radii 350m and 500m respectively and is to be laid out between two tangents T1I and IT2. PQ is common tangent and D is the point of compound curvature. The angles <ipq 1800.00m,="" 25°="" 55°="" <iqp="" and="" are="" as="" calculate="" chainage="" d.<="" given="" intersection="" of="" point="" respectively.="" t1,t2="" td="" the=""><td>CO2</td><td>L5</td></ipq>	CO2	L5

Module – 2

Title:	Geodetic Surveying and Theory of Errors	Appr	10 Hrs
		Time:	
A	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	Understand the Triangulation figures	CO3	L3
2	Understand the Theory of errors	CO4	L4
b	Course Schedule	-	-
Class No	Module Content Covered	CO	Level
11	Geodetic Surveying: Principle and Classification of triangulation system	CO2	L3
12	Selection of base line and stations	CO2	L3
13	Orders of triangulation, Triangulation figures	CO2	L3
14	Reduction to Center, Selection and marking of stations	CO2	L3
15	Theory of Errors: Introduction, types of errors	CO2	L3
16	definitions, laws of accidental errors	CO2	L3
17	laws of weights, theory of least squares	CO2	L3
18	rules for giving weights and distribution of errors to the field observations	CO2	L3
19	determination of the most probable values of quantities.	CO2	L3
20	determination of the most probable values of quantities.	CO2	L3
С	Application Areas	CO	Level
1	Understanding the surveying applications	CO1	L3
2	Students are able to Design curves	CO2	L4
d	Review Questions	-	-
10	Mention the points to be considered in the selection of triangular	CO3	L1
	station		
11	Triangulation station B was used in measuring angles and the	CO3	L3
	main station B at a distance of 12 2111 from it. The line BS bisects the		
	exterior angle A B C and the angles ASB and BSC were observed to		
	be 20° 20° 20° and 20° 45° 6". When the station B was observed angles		
	CAB and ACB were observed to be 50° 18' 26" and 60° 26' 12" The side		
	AC computed to be $42485m$ from the adjacent triangle. Determine the		
	correct value of the angle ABC.		
12	Explain the three kinds of errors.	CO3	L3
13	The observed values of P. Q and Rat a station the angles being	CO318'	L4
		0	
	subjected to the condition that P +Q = R.		

	Find the most probable value of P, Q and R.		
14	Explain the probability curve.	CO3	L2
15	What are important factors considered to be in selection of site for a base line ?	CO4	L3
16	From a triangulation sat elite stations Q 5.80m away from the main station A , the following observations were observed ; A = 0°0'0", B=132°18'30", 232°24'6",D=296°6'11", the inter connected base line AB. AC & AD were measured as 3265.50m,4022.20m and 3086.40m respectively. Determine the directions of AB, AC, AD	CO4	L5
17	Define the terms: a) true error b) residual error c) conditioned equation d) indirect observation.	CO4	L2
18	The observed angles α , β and γ from a station P with probable errors of measurement are given below; α = 78°12'12"±12", β = 136°48'34"±4", γ + 144°59'8"±5" determine their corrected values.	CO4	L5
е	Experiences	-	-
1			
2			

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs (Code	18CV45	Sem:	4	Marks:	30	Time: 75	minute	S	
Cour	se:	Advanced	surveying							
-	-	Note: Ansv	ver any 2 qu	estions, eac	h carry equ	al marks.		Marks	со	Level
1	а	Explain t	he following	along with a	a neat sketc	h:		8	CO1	L2
		i) Forward tangent ii) Point of curve iii) Deflection angle iv) Apex distance.								
	b	A reverse curve is to be set out to connect two parallel railway line 30m 7 CO2 I						L4		
		apart. The	apart. The distance between the tangent points is I 50m. Both the arcs							
		have the sa	ame radius. 1	he curve is	set out by n	nethod of ord	dinates from			
		long chord setting the	taking a peo curve	g interval of	10m. Calcul	ate the nece	ssary data for			
2	а	With a nea	at sketch, list	any four vei	tical curves			7	CO1	L3
	b	Two tang	ents interse	ct each oth	er at a cha	inage of 50 [.]	+60, deflectior	n 8	CO2	L4
		angle bein	g 50*30'. its r	equired to c	onnect two	tangents by	a simple curve	Ś		
		of 15 chain	radius. Takin	g peg inetrv	/al of 100 lin	ks, calculate	the necessary	'		
		data for se	etting out the	e curve by	Rankines n	nethod of de	eflection angle			
		lake lengt	h of the chai	n as 20m= :	100 links. Al	so write brief	f procedure for			
		setting out	the curve.						<u> </u>	
3		Mention tr	ne points to t	pe considere	ea in the set	ection of tria	ngular station	/	CO3	L2
	a	Inangulal	ion station B	was used in	measuring	angles and L	ine instrument	8	CO4	L4
		as necessa	of 12 2111 fro	a salellile si mit Tho ling	D DS bisocto	the exterior	anglo A P C			
		a distance	ales ASR and		observed to	$he 20^{\circ} 20^{\prime} 20^{\prime}$	α ingle A, D, C			
		6" When th	e station B	vas observe	d angles C4	B and ACB	were observed			
		to be 59° 18	B' 26" and 60	26' 12". The	side AC cor	nputed to be	24248.5m from			
		the adjace	nt triangle. D	etermine th	e correct va	lue of the an	gle ABC.			
4	а	What are i	mportant fac	tors conside	ered to be ir	n selection of	f site for a	7	CO3	L2
		base line ?								
	b	The obser	ved angles d	ι,β and γ froi	m a station l	^{>} with probal	ole errors of	8	CO4	L4
		measurem	ent are giver	n below;						
		α= 78°12'12	2"±12", β= 136°	48'34"±4", γ•	· 144°59'8"±5	,				
		determine	their correc	ted values.						

b. Assignment -1

Note: A distinct assignment to be assigned to each student.

				N	Aodel A	Assignmen	t Questio	ons				
Crs C	ode:	18CV45	Sem:	4		Marks:	10 / 10	Tir	ne:	90 - 120	minute	S
Cours	se:	Advance	d surveying									
Note:	Each	student t	o answer 2-3	assig	nment	s. Each ass	signment	carries	equal ma	ark.		
SNo		USN			Assig	nment De	scription	ו		Marks	со	Level
1			Explain th	e follo	owing a	along with	a neat ske	etch :		10	CO2	L2
			i) Forward	tange	ent ii) Po	pint of curv	re iii) Defle	ection a	angle			
			IV) Apex di	stance) .						<u> </u>	
2			I wo lange	ents in	nersec	t at a chair amputo all	the data	l gom, l	ne Sany ta cat	. 10	01	L3
	out a curve of radius 200m by defloction angle method							ethod Th				
			peg interv	al is 30	om. Tab	pulate the	results.	ingle m				
3			A reverse	curve	is to be	e set out to	connect	t two pa	arallel	10	CO2	L3
			railway line	e 30m	apart.	The distan	ice betwe	een the	tangent			
			points is I !	50m. E	Both the	e arcs have	e the sam	ne radiu	is. The			
			curve is se	et out k	by met	hod of ord	inates fro	om long	chord			
			taking a pe	eg inte	erval of	10m. Calc	ulate the	necess	sary data			
			for setting	the cl	urve	of a tranciti		(app) fo		10	<u> </u>	
4				equirer at ckot	teh liet				ur).	10	CO2	
6			Define cu	rve ? F	-stablis	:h the relat	ionshin h	n ves. Det weer	n dearee (of 10	CO_2	
			a curve an	d its ra	adius				rucgice			
			Two tang	ents ir	ntersec	t each oth	ner at a c	hainag	e of 50+6	0. 10	CO2	L3
7			deflection	angle	e being	g 50*30'. its	s require	d to co	onnect tw	0		
			tangents k	oy a s	imple	curve of 1	5 chain r	adius. ⁻	Taking pe	g		
			inetrval of	100 lir	nks, ca	lculate the	e necessa	ary data	for settin	g		
			out the	curve	by Rar	nkines m	ethod of	deflec	tion angl	e.		
			lake lengt	h of th	he cha	in as 20m	i= 100 link	ks. Also	write brie	ef		
0	procedure for setting out the curve.						10	<u> </u>				
0			with neat s	sketch	ween a ies.	compour				e 10		
9			A compo	ound o	curve d	consists o	f two sin	nple ci	rcular rad	dii 10	CO2	L3
			350m and	500m	n respe	ectively and	d is to be	i laid ou	ut betwee	n		
			two tange	ents T1	ll and I	T2. PQ is (common	tanger	nt and D	is		
			the point o	of com	pound	l curvature	. The ang	gles <ip< td=""><td>Q and <ic< td=""><td>P</td><td></td><td></td></ic<></td></ip<>	Q and <ic< td=""><td>P</td><td></td><td></td></ic<>	P		
			are 55° ar	nd 25°	respe	ectively. G	iven chai	inage o	of point (of		
			and D	n ds	1000.0	om, calcu	late the	Chaina	ge of fi,	2		
10			Mention	tho r	oints t	to he cons	sidered ir	n the si		of 10	CO1	13
10			triangular	statio	n							
11			Triangula	ation s	station	B was u	sed in m	neasuri	ing angie	es 10	CO1	L3
			and the i	nstrur	ment a	as necess	ary to sl	hift to	a satellit	e		
			station S	due s	south	of main s	tation B	at a d	listance o	of		
			12.2111 fro	m it. T	The line	e BS bised	cts the ex	kterior a	angle A, I	3,		
			C and the	angle	es ASE	3 and BSC	were ob	oserveo	d to be 30	C°		
			20' 30" an	d 29°	45' 6".	When the	e station	B was	observe	d		
			angles CA	AB and		were obse	erved to I	be 59° :	18' 26" an	d		
			60° 26' 12"	. The s	side AC	compute	ed to be ⊿	4248.5r	n from th	e		
			adjacent	triang	gle. De	etermine t	ine corre	ect val	ue of th	e		
10				2.	oo kin-	le of orrea				10	<u> </u>	
12			Explain tr				s. d Data ai	tation +	ho and -	10		
13				iveu \	values	or P, Q and	u Kala Si n that D i		ne angle			_ ∟3
								$\mathbf{Q} = \mathbf{R}.$				
			P = 30 12	28.2	Q = 35	48 12.6"	к = 66° О	44.4 [°]				
			Find the r	nost p	probab	ole value c	of P, Q an	id R.				

9	Explain the probability curve.	10	CO2	L3
10	What are important factors considered to be in selection of site for a base line ?	10	CO2	L3
11	From a triangulation sat elite stations Q 5.80m away from the main station A , the following observations were observed ; A = 0°0'0", B=132°18'30", 232°24'6",D=296°6'11", the inter connected base line AB. AC & AD were measured as 3265.50m,4022.20m and 3086.40m respectively. Determine the directions of AB, AC, AD	10	CO2	L3
12	Define the terms: a) true error b) residual error c) conditioned equation d) indirect observation.	10	CO2	L3
13	The observed angles α , β and γ from a station P with probable errors of measurement are given below; α = 78°12'12"±12", β = 136°48'34"±4", γ + 144°59'8"±5" determine their corrected values.	10	CO1	L3

D2. TEACHING PLAN - 2

Module - 3

Title:	Introduction to Field Astronomy	Appr Time:	16 Hrs
а	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	Understand the celestial sphere of earth	CO5	L5
2	Understand the astonomical triangle	CO6	L5
b	Course Schedule		
Class No	Module Content Covered	CO	Level
1	Introduction about Earth	CO5	L5
2	celestial sphere	CO5	L5
3	earth and celestial coordinate systems	CO5	L5
4	celestial coordinate systems	CO5	L5
5	celestial coordinate systems	CO6	L5
6	spherical triangle	CO6	L5
7	astronomical triangle	CO6	L5
8	Napier's rule	CO6	L5
9	Numerical problems	CO6	L5
10	Numerical problems	CO6	L5
С	Application Areas	CO	Level
1	Measure and calculations of earth and celestial coordinates	CO3	L4
d	Review Questions	-	-
1	Define the following terms :	CO3	L3
	i) Zenith and Nadir ii) Prime vertical iii) Hour angle.		
2	Mention the properties of a spherical triangle.	CO3	L3
3	Find the shortest distance between two points A & B, given	CO3	L3
	A latitude - 18° 24' N longitude 36° 18 E		
	B latitude - 68' 32' N longitude 126' 34 E.		
4	Define the following : i) Vertical circle ii) Azimuth iii) Altitude.	CO3	L3
5	Explain Ecliptic and Solstices	CO3	L3
6	Find the shortest distance between two places A & B given that the	CO3	L5
	longitudes of A and B are 15. O'N and 12 · 6'N and longitudes are 50'		
	12 E dilu 54 U E l'espectively.	<u> </u>	
	I) celestial sphere ii) hour angle iii) prime vertical iv) latitude of a place	03	L3

8	Find the shortest distance between two places A and B given that their latitudes are 12°N and 13°04'N with respective longitudes 72°32'E and 80°12'E	CO3	L4
9	Briefly explain the solution of spherical triangle by napiers rule of circular parts	CO3	L3
10	The standard time meridian in India is 80°30'E . if the standard time of place is 20 ^H 24 ^M 06 ^s , find the local mean time of two places having the longitudes as 20°E and 20°W respectively.	CO3	L5
е	Experiences	-	-
1			
2			

Module – 4

Title:	Aerial Photogrammetry	Appr Time	16 Hrs
а	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	capture geodetic data to process and perform analyses for survey	C07	L4
	problems with the use of electronic instruments.	,	
2		CO8	L5
b	Course Schedule		
Class No	Module Content Covered	CO	Level
1	Introduction, Uses,, Definitions,	CO4	L2
2	Aerial photographs	CO4	L2
3	Scale of vertical photograph	CO4	L4
4	Scale of tilted photograph	CO4	L4
5	simple problems	CO4	L3
6	Ground Co-ordinates (simple problems)	CO4	L3
7	Relief Displacements (Derivation)	CO4	L3
8	Ground control, Procedure of aerial survey, overlaps	CO4	L3
9	mosaics, Stereoscopes	CO4	L2
10	Derivation Parallax	CO4	L3
С	Application Areas	CO	Level
1	To conduct aerial survey	CO4	L3
d	Review Questions	-	-
1	Define the following terminologies	C07	L3
	i) Exposure station ii) Picture plane iii) Perspective centre.		
2	Mention the general features of Photographic images.	C07	L3
3	Find the number of photographLrs (size 250 x 250mm) required to	C07	L3
	cover over a area of 20km X I 6km of the longitudinal overlap is 60%		
4	and the side overlap is 30% scale the photograph is tom= 150m.	CO7	
4	Eveloin the precedure for cerial curvey.	<u> </u>	
5	Explain the procedure for denal survey.	<u> </u>	L3
0	A vertical photograph was taken at a attitude of 1200 meters above	0	L3
	Determine the scale of the photograph for a torrain lying at elevations		
	of 80 meters and 200 meters if the focal length of the campra is 15 cm		
7	With a neat skatch derive the expression for the scale of a vortical	C07	2
	photograph.	007	S
8	A line AB 2.00 KM long, laying at an elevation of 500m measure 8.65cm	CO7	L3

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	on a vertical photograph of focal length of 20cm. Determine the scale of the photograph at an average elevation of 800m.		
9	Define the terms: I) Tilt ii) Exposure stations iii) Principal point iv) ISO centre.	CO7	L3
10	Mention the reasons for photograph over lap. Justify the same.	CO7	L3
е	Experiences	-	-
1			L2
2			
3			

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code		18CV45	Sem:	4	Marks:	30	Time: 7	75 minute	S	
Cour	se:	Advanced S	Surveying							
-	-	Note: Answ	/er any 2 que	estions, eac	h carry equ	al marks.		Marks	СО	Level
1	а	Mention th	ne propertie	s of a sphe	rical triangl	e.		8	CO3	L2
	b	Find the s	hortest dista	ance betwe	en two poir	nts A & B, giv	ven	7	CO3	L4
		A latitude -	- 18° 24' N lo	ngitude 36°	' 18 E					
		B latitude -	- 68° 32' N la	ngitude 12	6° 34 E.					
2	а	Find the s	hortest dista	ance betwe	en two plac	ces A & B giv	ven that the	8	CO3	L5
		longitudes	of A and B a	are 15° 0' N	and 12°. 6' I	N and longit	udes are 50°			
		12' E and 5	4° O' E respe	ectively.						
	b	Define the	terms:					7	CO3	L2
		I) celestial	sphere ii) hoi	ur angle iii) j	orime vertic	al iv) latitude	of a place			
3	а	Mention th	ne general fe	eatures of F	Photograph	ic images.		8	CO4	L3
	b	Find the n	umber of ph	notography	(size 250 x	250mm) req	uired to cov	er 7	CO4	L4
		over a area	a of 20km x I	6km of the	longitudin	al overlap is	60% and the	Э		
		side overla	ap is 30% sca	ale the pho ⁻	tograph is l	cm= 150m.				
4	а	A line AB 2	.00 KM long,	laying at ar	n elevation o	of 500m mea	asure 8.65cm	8	CO4	L5
		on a vertica	al photograph	h of focal le	ngth of 20cr	n. Determine	e the scale of			
		the photog	raph at an av	verage eleva	ation of 800	m.				
	b	Define the	terms: I) Tilt	ii) Exposu	re stations			7	CO4	L2
		iii) Principa	al point iv)	ISO center.						

b. Assignment – 2

Note: A distinct assignment to be assigned to each student.

	Model Assignment Questions										
Crs C	ode:	18CV45	Sem:	Ш	Marks:	10 / 10	Time:	90 - 120	– 120 minutes		
Cours	Course: Advanced Surveying										
Note:	Each	student t	o answer 2-3	assignment	ts. Each as	signment ca	rries equal ma	ark.			
SNo		USN		Assig	nment Des	scription		Marks	СО	Level	
1			Define the fo	ollowing ter	rms :			10	CO3	L3	
			i) Zenith and	Nadir ii) Pri	me vertica	al iii) Hour ar	ngle.				
2			Mention the	properties	of a sphe	rical triangle	<u>).</u>	10	CO3	L3	
3		Find the shortest distance between two points A & B, given					n 10	CO3	L3		
			A latitude - 1	8° 24' N lon	gitude 36°	' 18 E					
			B latitude - 6	68° 32' N lor	ngitude 12	6° 34 E.					
4			Define the fo	ollowing : i)	Vertical ci	rcle ii) Azim	uth iii) Altitude	e. 10	CO3	L3	
5			Explain Eclip	otic and Sol	stices			10	CO3	L3	
6			Find the sho	ortest distar	nce betwe	en two plac	es A & B give	n 10	CO3	L3	
			that the long	itudes of A	and B are	15° 0' N and	d 12° [,] 6' N and				
			longitudes a	re 50° 12' E	and 54° O'	E respectiv	ely.				
7			Define the te	rms:				10	CO3	L3	
			I) celestial sp	ohere ii) hou	ır angle iii)	prime vertic	al iv) latitude (of			
			a place								
8			Find the sho	rtest distan	ce betwee	n two place:	s A and B give	n 10	CO4	L3	

	that their latitudes are 12°N and 13°04'N with respective longitudes 72°32'E and 80°12'E			
9	Briefly explain the solution of spherical triangle by napiers rule of circular parts	10	CO4	L3
10	The standard time meridian in India is 80°30'E . if the standard time of place is 20 ^H 24 ^M 06 ^S , find the local mean time of two places having the longitudes as 20°E and 20°W respectively.	10	CO4	L3
11	Define the following terminologies i) Exposure station ii) Picture plane iii) Perspective centre.	10	CO4	L2
12	Mention the general features of Photographic images.	10	CO4	L2
13	Find the number of photographLrs (size 250 x 250mm) required to cover over a area of 20km x I 6km of the longitudinal overlap is 60% and the side overlap is 30% scale the photograph is lcm= 150m.	10	CO4	L5
9	Derive an expression for relief displac~ment on a vertical photograph.	10	CO4	L3
10	Explain the procedure for aerial survey.	10	CO4	L3
11	A vertical photograph was taken at a altitude of 1200 meters above mean sea level. Determine the scale of the photograph for a terrain lying at elevations of 80 meters and 300 meters if the focal length oft he camera is 15cm.	10	CO4	L5
12	With a neat sketch, derive the expression for the scale of a vertical photograph.	10	CO4	L3
13	A line AB 2.00 KM long, laying at an elevation of 500m measure 8.65cm on a vertical photograph of focal length of 20cm. Determine the scale of the photograph at an average elevation of 800m.	10	CO4	L4
14	Define the terms: I) Tilt ii) Exposure stations iii) Principal point iv) ISO centre.	10	CO4	L2
15	Mention the reasons for photograph over lap. Justify the same.	10	CO4	L3

D3. TEACHING PLAN - 3

Module – 5

Title:	Modern surveying instruments	Appr	16 Hrs
		Time:	
a	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	use modern instruments to obtain geo- spatial data and analyze the	CO5	L4
	same to appropriate engineering problems.		
b	Course Schedule		
Class No	Module Content Covered	CO	Level
1	Introduction, Electromagnetic spectrum, Electromagnetic distance	CO5	L2
	measurement, Total station,		
2	Lidar scanners for topographical survey. Remote Sensing:	CO5	L3
	Introduction,		
3	Principles of energy interaction in atmosphere and earth surface	CO5	L3
	features		
4	Image interpretation techniques, visual interpretation.	CO5	L4
5	Digital image processing	CO5	L2
6	Global Positioning system Geographical Information System	CO5	L4
7	Definition of GIS, Key Components of GIS, Functions of GIS, Spatial	CO5	L4
	data,		
8	spatial information system Geo-spatial analysis	CO5	L4

9	Integration of Remote sensing and GIS and Applications in Civil Engineering(transportation, town planning)	CO5	L4
10	Integration of Remote sensing and GIS and Applications in Civil Engineering(transportation, town planning)	CO5	L4
с	Application Areas	со	Level
1	Usage of modern surveying instruments	CO5	L3
d	Review Questions	_	_
1	Mention the advantages of total station and also discuss the working principles of the same.	CO5	L1
2	Define Remote sensing. Explain the stages of idealized remote sensing system.	CO5	L3
3	What is GIS? Enumerate on GIS applications in civil engineering.	CO5	L2
4	Explain the basic principles of GPS and its application in surveying.	CO5	L4
5	Define and explain EDM?	CO5	L2
6	Explain the working of remote sensing equipment.	CO5	L5
7	What are the advantages of LIDAR technology.	CO5	L2
8	Explain the working of total station.	CO5	L3
9	Explain the civil engineering applications in GIS and remote sensing.	CO5	L4
е	Experiences	-	-
1		-	-
2			
3			

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs (Code: 18CV45 Sem: 4 Marks: 30 Time: 7						75 minutes						
Cour	rse:	Advanced s	surveying										
-	-	Note: Answ	er any 2 qu	estions, eac	h carry equ	al marks.		Marks	CO	Level			
1	а	Mention th	ne advantag	es of total s	station and	also discuss	s the workin	g 8	CO5	L3			
		principles o	nciples of the same.										
	b	Define Rer	note sensin	7	CO5	L2							
		sensing sys											
2	а	What is GI	S? Enumera	ate on GIS a	pplications	in civil engi	neering.	8	CO5	L2			
	b	Explain the	e basic prind	ciples of GF	PS and its ap	oplication in	surveying.	7	CO5	L3			
3	а	Explain the	working of	remote sen	sing equipm	ient.		8	CO5	L3			
	b	What are th	ne advantag	es of LIDAR	technology			7	CO5	L4			
4	а	Define and	explain EDN	1?				7	CO5	L3			
	b	Explain the	working of	total station				8	CO5	L3			

b. Assignment – 3

Note: A distinct assignment to be assigned to each student.

	Model Assignment Questions											
Crs C	Crs Code: 18CV45 Sem: 4 Marks: 10 / 10 Time: 9						90 – 120 minutes					
Course: Advanced surveying												
Note:	lote: Each student to answer 2-3 assignments. Each assignment carries equal mark.											
SNo	USN Assignment Description							Marks	СО	Level		
1			Mention the	10	CO5	L3						
			the working	orinciples o	of the same.							
2			Define Remo	ote sensing	. Explain the	e stages of	idealized	10	CO5	L2		
	remote sensing system.											
3	What is GIS? Enumerate on GIS applications in civil 10 CO5 Li								L2			

	engineering.			
4	Explain the basic principles of GPS and its application in	10	CO5	L3
	surveying.			
5	Define and explain EDM?	10	CO5	L3
6	Explain the working of remote sensing equipment.	10	CO5	L3
7	What are the advantages of LIDAR technology.	10	CO5	L4
8	Explain the working of total station.	10	CO5	L3

F. EXAM PREPARATION

1. University Model Question Paper

Course:		Advanced surveying Month /						∕ Year	May /2018	
Crs Code:		18CV45	Sem:	4	Marks:	100	Time:		180 m	inutes
-	Note	Answer all F	IVE full ques	tions. All qu	uestions carry ed	qual marks.		Marks	CO	Level
1	a	Explain the	e following a	long with a	a neat sketch :			8	CO1	L1
		i) Forward ta	ngent ii) Poir	nt of curve	iii) Deflection and	gle iv) Apex d	istance.			
	b	A reverse cu	irve is to be	set out to c	connect two para	allel railway lii	ne 30m	8	CO2	L5
		apart. The di	stance betw	een the tar	ngent points is l	50m. Both the	e arcs			
		nave the san	ne radius. Th aking a pag	ie curve is s	set out by metho	of or or or on a te	es from data for			
		sotting the c	aking a peg i	intervat or 1	iom. Calculate tr	le necessary	uala iui			
			uive		OR					
2	а	With a neat	sketch list a	ny four ver	tical curves			8	CO1	3
	b	Two tanger	ats intersect	each othe	er at a chainage	e of 50+60 (deflection		CO2	15
		angle being	50*30' its rec	auired to co	onnect two tang	ents by a sim	ple curve		002	
		of 15 chain ra	adius. Taking	peg inetrv	al of 100 links, c	alculate the r	ecessary	,		
		data for sett	ing out the	curve by F	Rankines metho	od of deflecti	on angle			
		Take length	of the chain	as 20m= 1	.00 links. Also wi	ite brief proc	edure for	-		
		setting out th	ne curve.							
3	a	Mention the	points to be	e considere	d in the selectio	n of triangula	r station	8	CO3	L1
	b	Triangulation	n station B w	as used in	measuring angi	es and the ins	strument	8	CO4	L3
		as necessary	/ to shift to a	satellite st	ation S due sout	h of main sta	tion B at			
		a distance of	12.2111 from	n it. The line	BS bisects the	exterior angle	A, B, C			
		and the angl	.es ASB and	BSC were (observed to be 3	0 20 30 and	129 45 boom cod			
		b. when the	Station B Wa	as observed	d angles CAB an side AC comput	CACB were C	Doservea 2 cm from			
		the adjacent	zo and ou z	torming the	side AC compute	f the angle Al				
			thangle. De				DC.			
1	a	W/hat are im	portant fact	ors conside	ered to be in sele	ection of site (for a	8	0.03	12
-		base line ?							005	
	b	The observe	ed angles α,	3 and γ fror	n a station P with	n probable er	rors of	8	CO4	L3
		measureme	nt are given	below;						
		α= 78°12'12"±	±12", β= 136°48	3'34"±4", γ+	144°59'8"±5"					
		determine t	heir correcte	ed values.						
				<u> </u>	OR			-	00-	1.
5	a	Mention the	<u>e properties</u>	of a spher	ical triangle.			8	CO5	L3
	a	Find the sh	ortest distar	ICE DETWE	en two points A	& B, given		8	C06	L3
		A latitude - :	18 24 N lon	igitude 36	18 E					
		B latitude -	68 32 IN LOP	ngitude 120	0 34 E.					
6	2	Montion the		aturaa of D	UR			0	COF	
0	d b		<u>e general le</u>	atures or P	nolographic im	ages. ages) required	ta aava	0	C05	
		Find the hu		Skm of the	longitudinal av	orlan is 60%	and the	°		L5
		side overlap is 20% coale the photograph is long. 1500% and the								
	-	Find the pri	$\frac{15}{30}$ scal			10011	ad to	0	C07	1 4
/	a		area of act	m v l élm	of the lengitud		50 10 5 60%			∟4
		and the side	aica ui 20r	20% scale	the photograph	is lcm- 150r	300% n			
	h	Dorivo on o	voroccion f	sur roliof dia	nlacument en a	Vortical pha	toaranh	R	COS	12
1		LINE UNE di le	VD162210111C		plac~ment off d	vertical prio	iugiapii.			I L3

		OR			
8	а	A line AB 2.00 KM long, laying at an elevation of 500m measure 8.65cm	8	CO7	L4
		on a vertical photograph of focal length of 20cm. Determine the scale of			
		the photograph at an average elevation of 800m.			
	b	Define the terms: I) Tilt ii) Exposure stations	8	CO8	L2
		iii) Principal point iv) ISO centre.			
9	а	Mention the advantages of total station and also discuss the working	8	CO9	L3
		principles of the same.			
	b	Define Remote sensing. Explain the stages of idealized remote	8	CO10	L2
		sensing system.			
		OR			
10	a	Explain the working of remote sensing equipment.	8	CO9	L4
	b	What are the advantages of LIDAR technology.	8	CO10	L3

2. SEE Important Questions

Course:		Advanced surveying Month	/ Year	May /2	2018
Crs (Code:	18CV45 Sem: 4 Marks: 100 Time:		180 mi	nutes
	Note	Answer all FIVE full questions. All questions carry equal marks.	-	-	
Mo dul e	Qno.	Important Question	Marks	со	Year
1	1	Explain the following along with a neat sketch : i) Forward tangent ii) Point of curve iii) Deflection angle iv) Apex distance.	16 / 20	CO1	2016
	2	Two tangents intersect at a chainage of 1 l 90m, the deflection angle 36°. Compute all the data necessary to set out a curve of radius 300m by deflection angle method. The peg interval is 30m. Tabulate the results.		CO1	2016
	3	A reverse curve is to be set out to connect two parallel railway line 30m apart. The distance between the tangent points is I 50m. Both the arcs have the same radius. The curve is set out by method of ordinates from long chord taking a peg interval of 10m. Calculate the necessary data for setting the curve		CO2	207
	4	List the requirements of a transition curve (any four).		CO2	2017
	5	With a neat sketch, list any four vertical curves.		CO2	2016
2	1	Triangulation station B was used in measuring angles and the instrument as necessary to shift to a satellite station S due south of main station B at a distance of 12.2111 from it. The line BS bisects the exterior angle A, B, C and the angles ASB and BSC were observed to be 30° 20' 30" and 29° 45' 6". When the station B was observed angles CAB and ACB were observed to be 59° 18' 26" and 60° 26' 12". The side AC computed to be 4248.5m from the adjacent triangle. Determine the correct value of the angle ABC.	16 / 20	CO3	2016
	2	Explain the three kinds of errors.		CO3	2016
	3	The observed values of P, Q and Rat a station the angles being subjected to the condition that P +Q = R. P = 30° 12' 28.2" Q = 35° 48° 12.6" R = 66° O' 44.4" Find the most probable value of P, Q and R.		CO3	2017
	4	Explain the probability curve.		CO4	2017
	5	Triangulation station B was used in measuring angles and the instrument as necessary to shift to a satellite station S due south of main station B at a distance of 12.2111 from it. The line BS bisects the exterior angle A, B, C and the angles ASB and BSC were observed to be 30° 20' 30" and 29° 45' 6". When the station B was observed angles CAB and ACB were observed to be 59° 18' 26" and 60° 26' 12". The side AC computed to be 4248.5m from the adjacent triangle. Determine the correct value of the angle ABC.		CO4	2017

3	1	Find the shortest distance between two points A & B, given	16 /	CO5	2016
		A latitude - 18° 24' N longitude 36° 18 E	20		
		B latitude - 68° 32' N longitude 126° 34 E.			
	2	Define the following : i) Vertical circle ii) Azimuth iii) Altitude.		CO5	2016
	3	Explain Ecliptic and Solstices		CO5	2015
	4	Find the shortest distance between two places A & B given that the		CO6	2015
		longitudes of A and B are 15° O' N and 12° 6' N and longitudes are 50°			
		12' E and 54° O' E respectively.			
	5	Define the terms:		CO6	2015
		I) celestial sphere ii) hour angle iii) prime vertical iv) latitude of a place			
4	1	Find the number of photographLrs (size 250 × 250mm) required to	16 /	CO7	2017
		cover over a area of 20km x I 6km of the longitudinal overlap is 60%	20		
		and the side overlap is 30% scale the photograph is lcm= 150m.			
	2	Derive an expression for relief displac~ment on a vertical photograph.		CO7	2015
	3	Explain the procedure for aerial survey.		CO8	2016
	4	A vertical photograph was taken at a altitude of 1200 meters above		CO8	2015
		mean sea level.			
		Determine the scale of the photograph for a terrain lying at elevations			
		of 80 meters and 300 meters if the focal length oft he camera is 15cm.			
	5	With a neat sketch, derive the expression for the scale of a vertical		CO8	2016
		photograph.			
5	1	Define Remote sensing. Explain the stages of idealized remote	16 /	CO9	2015
		sensing system.	20		
	2	What is GIS? Enumerate on GIS applications in civil engineering.		CO9	2016
	3	Explain the basic principles of GPS and its application in surveying.		CO9	2017
	4	Define and explain EDM?		CO10	2016
	5	Explain the working of remote sensing equipment.		CO10	2017
	6	What are the advantages of LIDAR technology.		CO10	2016

Course Outcome Computation

Academic Year:																
Odd / Even	Odd ∕ Even semester															
INTERNAL TEST				T1			T2					Тз				
Course Outcome	CO1		CO2		CO3		CO4		CO5		CO6		C07		CO8	
QUESTION NO	Q1	LV	Q2	LV	Q3	LV	Q1	LV	Q2	LV	Q3	LV	Q1	LV	Q2	LV
MAX MARKS																
USN-1																
USN-2																
USN-3																
USN-4																
USN-5																
USN-6																
Average CC Attainment)															

LV Threshold : 3:>60%, 2:>=50% and <=60%, 1: <=49% CO1 Computation :(2+2+2+3)/4 = 10/4=2.5

PO Computation

Program Outcome Weight of CO - PO	PO1	PO3	PO3	PO1	PO12	PO12	PO6	PO1
Course Outcome	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
Test/Quiz/Lab		T1			T2		Т	3
QUESTION NO	Q1	L Q2 LV V	Q3 LV	Q1 LV	Q2 LV	Q3 LV	Q1 LV	Q2 LV
MAX MARKS								
USN-1								
USN-2								
USN-3								
USN-4								
USN-5								
USN-6								
Average CO Attainment								