

Version 3.1	Course Academic Plan	Course Code and Name: CEC403 Surveying I
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The academic resources available in PHCET, Rasayani

PHCET AMS	Evaluation and Assessment	PHCET Library	Value added courses and MOOC courses
Institute & Department Vision and Mission	Former IA question papers and solutions (prepared by faculty)	Former IA question papers solutions - hardcopy	Value Added Courses (VAC) are conducted throughout the semester & in the semester break -
Lesson Plan, Practical plan, Content delivery (Planned and Actual)	MU end semester examination question papers and solutions (prepared by faculty)	MU end semester exam question paper & solutions - by faculty, hardcopy	Online courses from NPTEL, Coursera etc. are pursued throughout the semester
Student attendance and performance	Class notes and Digital Content for the subject	All text books, reference books, e -books mentioned in the syllabus & AAP	Video recording of Lectures captured in Light board studio at PHCET is made available.
Student details	Comprehensive question bank, MCQ, GA, PPT, Class Test papers	Technical journals and magazines for reference	Interactive smart board facility is available and lectures are recorded.
Departmental Academic plan	Academic Administration Plan & Beyond Syllabus Activity report	PHCET library is member of IIT Bombay Library	Expert lectures by Industry/Academia

1.a Course Objectives (As per Blooms Taxonomy)

The student will be able to learn:

Sr No	Course Objectives
CE-C402.1	The basic principles and classification of surveying.
CE-C402.2	Various methods of measurements in surveying.
CE-C402.3	The appropriate techniques of surveying and skills of collecting field data for preparing drawings.
CE-C402.4	Advancements in instruments and methods of surveying
CE-C402.5	The methods of computing areas and volumes using the site specific data for various purposes.
CE-C402.6	The setting out techniques of curves.

1.b Course Outcome (CO) Mapping with Modules

Sr No	COs	Related Module/s
After the completion of the course, the learner will be able to		
CO1	Apply the principles of surveying and field procedures to conduct the various surveys	1,2,3,4,5
CO2	Use various methods for taking linear and angular measurements	1,3
CO3	Collect, record and analyse the field data for preparing drawings	1,2,3,4,5

CO4	Explain the advancements in instruments and methods	4
CO5	Calculate the area of land and volume of earthwork	5
CO6	Set out curves	6

1.c Mapping of COs with POs (mark 3: Strong, 2: Moderate, 1: Weak)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	2	2	2	2	3	2	1	2	2	2	2	2
CO 2	3	2	2	2	2	2	2	2	2	2	2	2
CO 3	2	2	2	2	3	2	1	2	2	2	2	2
CO 4	2	2	2	2	3	2	1	2	2	2	2	2
CO 5	2	2	2	2	2	2	2	2	2	2	2	2
CO 6	2	2	2	2	3	2	1	2	2	2	2	2

1.d Mapping of COs with PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	0	1	2	0	2
CO 2	2	0	3	0	3
CO 3	0	0	3	0	2
CO 4	0	0	3	0	2
CO 5	1	0	2	0	3
CO 6	2	0	3	0	3

1.e Core Competency of the course

Categories	Mathematics	Basic Science & General Engg.	Humanities & Soft Skill	Core Engg./ Technology - Design & Analysis	Multidisciplinary
Tick where applicable	√	√		√	

2.a Teaching Scheme (As specified by the University)

Contact Hours			Credits Assigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	03	-	03	1.5	-	4.5

2.b Module Wise Teaching Hours and % Weightage in University Question Paper

Module No.	Module Title and Brief Details	Teaching Hrs. for each module	% Weightage in University Question Papers
1	Introduction	5	17
2	Levelling and contouring	8	16
3	Theodolite surveying	8	16
4	Indirect and advanced methods of measurement	7	15
5	Plane table surveying, areas and volumes	5	16
6	Curves	6	20

2.c Prerequisite Courses

Sr. No.	Semester	Name of the course	Topics covered

2.d Relevance to Future Courses

Sr. No.	Semester	Name of the course
1.	VII	RS and GIS(Elective)

2.e Industry Application of the course

Sr. No	Application
1.	Setting out of works in field
2.	Project Survey for heavy structures like dams
3.	Alignments of transportation modes like highways, waterways etc
4.	Cadastral Surveying

3.a Past Results

Year	Division A		Division B	
	Initials of Teacher	% Result	Initials of Teacher	% Result
2019-20	Arya Vijayan		Arya Vijayan	
2018-19	Steffi Stephen	82.61	Steffi Stephen	93.33

Topics which affect results negatively	Module Number	Recommendations to overcome these issues & improve result in future
Tacheometry	4	More numerical to be solved

4. Learning Resources – Books and E-Resources

4.a List of Text Books

Sr. No.	Text book titles	Authors	Publisher	Edition	Module No
1.	Surveying	R. Agor	Khanna Publishers, New Delhi	Fifteenth	1,2,3,4,5,6
2.	Surveying and levelling, Vol: I & II	Dr. B.C. Punmia,	Laxmi Publications	Seventeenth	1,2,3,4,5,6
3.	Surveying and Levelling	N N. Basak,	TataMcGraw Hill, New Delhi	Second	1,2,3,4,5,6
4.	Surveying and Levelling, Vol.-I& II:	S K.Duggal.	TataMcGraw Hill, New Delhi	Seventh	1,2,3,4,5,6

4.b List of Reference Books

Sr. No.	Referencebook titles	Authors	Publisher	Edition	Module No
1.	Fundamentals of Surveying	S.K. Roy	Prentice Hall India, New Delhi	First	1,2,3
2.	Surveying: Vol I	Dr. K.R. Arora	Standard Book House		1,2,3,4,5,6

4.c List of E – Books

Sr. No.	E book titles	Authors	Publisher	Edition	Module
1.	Surveying and levelling, Vol: II https://easyengineering.net/surveying-volume-ii-by-punmia/	Dr. B.C. Punmia,	Laxmi Publications	Fifteenth	1,2,3,4,5,6
2.	Surveying and Levelling https://easyengineering.net/surveying-and-levelling-basak-book/	N N. Basak,	TataMcGraw Hill, New Delhi	First	1,2,3,4,5,6
3.	Fundamentals of Surveying https://easyengineering.net/fundamentals-of-surveying-book-pdf-by/	S.K. Roy	Prentice Hall India, New Delhi	First	1,2,3,4,5,6

4.d Web Links and Names of Magazines, Journals, E-journals

Sr. No.	Web-Links and Names of Journals and E-Journals Recommended	Web-Links and Names of Magazines Recommended	Module Nos.

5. Concept Inventory

Sr. No.	Chapter	Concepts		Text Book	Start Page	End Page	No. of Pages	App. Effort in Min	App. Marks
1	Introduction	Definition, necessity and various types of surveying	Definition, object of surveying and primary divisions: plane and Geodetic surveying	B1	1	2	1	15	20
		Classifications, uses	Based on the nature of field survey, object of survey and instruments used	B2	3	3	1	5	
		Principles of surveying		B2	4	5	1	15	
		Linear measurements	Approximate, Direct, Optical and Electronic method	B2	35	36	1	5	
		Different types of instruments for measuring	Tapes, Ranging ,chains, steel bands	B2	36	44	8	10	
		Corrections	Tape Corrections	B3	24	36	12	30	
		Ranging	Direct and Indirect	B2	44	46	2	15	
		Chain surveying	Introduction	B1	75	78	3	5	
			Offsets	B2	84	85	1	10	
			Minor instruments for setting out right angles	B2	91	94	3	10	
			Errors in chaining	B2	55	56	1	10	
			Error due to incorrect chain length	B2	48	50	2	30	

			Chaining on uneven ground	B2	51	54	3	15	
			Obstacles to chaining	B2	96	100	4	20	
		Introduction	Basic definitions, meridians and designation of bearings	B2	105	113	8	15	
		Theory of magnetic compass	Concept of dip, declination and its variations	B2	113	115	2	20	
		Compass types	Surveyor's and Prismatic	B1	124	126	2	10	
		Traverse computations	Types and plotting of compass survey by different methods	B1	160	168	8	30	
			Local attraction	B1	169	178	9	30	
2	Levelling	Definitions	Levelling and related terms	B2	192	193	1	15	20
			Principle of levelling	B1	260	260	1		
		Levelling instruments	Types of level and levelling staffs	B1	253	258	5	15	
		Adjustments	Temporary adjustments	B1	262	264	2	15	
			Permanent adjustments	B1	274	278	4	15	
		Levelling	Reduction of level	B1	268	273	5	120	
			Gradient line , cross section etc.	B1	273	283	10	60	
		Corrections	Curvature, Refraction and distance to visible horizon	B2	221	224	3	60	
		Reciprocal Levelling	Levelling across rivers	B2	225	228	3	60	
		Other types of levelling	Profile Levelling and cross-sectioning	B2	228	232	4	20	
	Contouring	Contour	Definitions, contour interval, equivalent, characteristics	B1	350	355	5	20	
		Contouring Methods	Direct and Indirect	B2	254	258	4	60	
		Grade Contouring	Definitions, use and setting out in field	B1	370	371	1	20	
3	Theodolite Surveying	Transit	Various parts, Definitions and axis	B1	506	512	6	60	20
			Temporary and permanent adjustments	B1	514	521	7	60	
			Horizontal and vertical angles, method of repetition and reiteration	B1	523	533	10	60	
			Methods of theodolite traverse	B1	553	559	6	120	
			Traverse Computations	B1	563	571	8	60	
			Gales traverse table	B2	171	171	1	30	
		Omitted measurements	Explanation and types	B2	175	189	14	60	

		Use	Prolongation of Straight line and setting out an angle	B1	533	535	2	30	
4	Indirect and advanced methods of measurement	Tacheometric Surveying	Principle, uses, advantages and suitability	B1	652	654	2	20	20
			Stadia method	B1	654	663	9	180	
			Movable hair method	B1	690	694	4	20	
			Tangential Method	B1	694	698	4	20	
			Subtense method	B1	712	714	2	20	
			Stadia diagrams and tables	B1	708	709	1	20	
			Applications to plane tabling	B1	717	718	1	20	
		Electronic Distance Measurement	Working principle, types and its applications in surveying	B3	4	6	2	30	
		Total Station	Working principle, applications in surveying	B1	953	955	3	30	
		Global Positioning System (GPS):	Basic principles, GPS segments, receivers, computations of coordinates. Applications in surveying	B1	1114	1117	4	30	
			Computations of coordinates. Applications in surveying	B1	1117	1117	1	30	
5	Plane table surveying, Areas and Volumes	Definitions	Plane table, Alidade, Spirit level etc	B1	209	212	3	10	20
		Advantages	Advantages of plane table surveying	B1	236	237	1	15	
		Surveying using plane table	Temporary adjustments and different methods of plane table surveying	B1	213	236	23	60	
			Errors	B1	237	239	2	10	
		Area of irregular figures	By Average ordinate rule, Trapezoidal rule, Simpsons rule, Various coordinate methods	B1	395	399	4	60	
		Planimeter	Types, area of zero circle and use	B2	360	362	2	30	
			Digital planimeter	B3	516	518	2	15	
		Computation of Volume	Prismoidal Formula and Trapezoidal Formula	B2	310	317	7	60	
			Volume from spot levels	B2	317	322	5	20	
			Volume from Contour plans	B2	322	325	3	20	
6	Curves	Curves-Horizontal	Definitions of different terms	B1	669	670	2	10	20
		Types of curves and their properties	Simple circular curves	B1	670	675	6	5	
			Compound curves	B1	742	750	9	5	
			Reverse curves	B1	768	773	6	5	
			Transition curves	B1	783	787	5	5	
		Simple Circular	Linear methods	B1	675	679	5	90	

		Curves	Two theodolite method	B1	686	687	2	10
			Rankine's deflection angle method	B1	683	686	4	60
		Vertical curves	Definitions	B1	828	832	4	10
			Geometry and types	B1	832	834	3	10
			Tangent correction and chord gradient methods	B1	835	850	16	120
			Sight distance on vertical curve	B1	854	856	3	30

Book Code	Title	Author	Publisher
B1	SURVEYING AND LEVELLING	R.Agor	KHANNA PUBLISHERS
B2	SURVEYING vol.1	Dr.B.C.Punmia	LAXMI PUBLICATIONS(P)LTD.
B3	SURVEYING vol.1	N.N Basak	Tata McGraw-Hill

6. Web Links for Online Notes/YouTube/ Digital Content/Lecture Capture/NPTEL Videos

Sr. No.	Websites/ Links	Module No
1.	https://youtu.be/S9baGIAMB2I	1
2.	https://youtu.be/JvOphyhwV44	1
3.	https://youtu.be/p0eikt9OSZI	2
4.	https://youtu.be/L4nZh29IjOI	3
5.	https://youtu.be/mlNUNlhNJKc	4
6.	https://youtu.be/05o6y67YDg8	5
7.	https://youtu.be/ZFDrgfT0GH4	5
8.	https://www.youtube.com/watch?v=DOPq4UOxTLY	6
9.	https://www.youtube.com/watch?v=LxsAg8WWpVs	6

7. Recommended MOOC Courses like Coursera / NPTEL / Swayam/ edX etc.

Sr. No.	MOOC course link	Resource Person	Course duration	Certificate (Y/N)
1.	Modern Surveying Techniques https://nptel.ac.in/courses/105/104/105104100/	Dr. Onkar Dikshit IIT Kanpur	45 weeks	N

8. Study Material Distributed among Students

GA	Notes (Hand Written)	Digital content	PPT	MCQ	Other
	√	√	√		

9. Lesson Plan

Week	Lecture no.	Module No.	Lecture Topics / IA 1 and IA 2 / BSA planned to be covered	Actual date of Completion	Mapping with COs	Recommended Prior Viewing / Reading	
						Lecture No. (on LMS)	Chapter / Page/ Books/ Web Site
	1	1	Introduction to Surveying-I				
	2	1	Definition, Objectives,				

			classification				
	3	1	Principles, uses and necessity				
	4	1	Linear measurement-introduction				
	5	1	Ranging and its types				
	6	1	Correction to incorrect measurements				
	7	1	Tape corrections				
	8	1	Chaining-introduction, principle, technical terms and instruments				
	9	1	Obstacles to chaining				
	10	1	Compass survey- introduction, technical terms etc				
	11	1	Declination, dip, local attraction				
	12	1	Numerical on local attraction				
	13	1	Numerical on local attraction				
	14	1	Interior angle calculation				
	15	1	Interior angle calculation				
	16	1	Closing error numerical				
	17	2	Introduction to levelling				
	18	2	HI method numerical				
	19	2	HI method numerical				
	20	2	Rise and fall method numerical				
	21	2	Rise and fall method numerical				
	22	2	Computation of missing data				
	23	2	Corrections due to curvature and refraction				
	24	2	Corrections due to curvature and refraction				
	25	2	Reciprocal levelling				
	26	2	Reciprocal levelling				
	27	2	Other types of levelling				
	28	2	Other types of levelling				
	29	2	Contouring- introduction, terms and characteristics				
	30	2	Contouring- methods				
	31	3	Theodolite traversing-introduction and				
	32	3	Different methods for traversing				
	33	3	Latitude and departure calculations - Bowditch's rule				
	34	3	Latitude and departure calculations- Transit rule				
	35	3	More numerical				
	36	3	Gales traverse table and associated theory				
	37	3	Use of theodolite for various works				
	38	3	Omitted measurements				
	39	3	Omitted measurements				
	40	3	Omitted measurements				
	41	4	Tacheometric surveying- introduction				
	42	4	Stadia method				
	43	4	Stadia method				
	44	4	Movable hair method				
	45	4	Subtense bar method				
	46	4	Stadia diagram , tables and applications				
	47	4	EDM - principle, type and				

			application to surveying				
	48	4	Total Station				
	49	4	GPS- Terminology and Concepts				
	50	4	GPS- Concepts				
	51	5	Plane table surveying- introduction and methods				
	52	5	Plane table surveying- methods				
	53	5	Area computation using different methods				
	54	5	Area computation using different methods				
	55	5	Volume calculation using different methods				
	56	5	Volume calculation using different methods				
	57	6	Curves - definition and terminology				
	58	6	Simple Curves- Linear method of setting out				
	59	6	Simple Curves- Linear method of setting out				
	60	6	Simple Curves-Angular method of setting out				
	61	6	Simple Curves-Angular method of setting out				
	62	6	Vertical Curves- Tangent Correction				
	63	6	Vertical Curves- Chord Gradient				
	64	6	Sight distance Criterion for Vertical Curves				

10. Rubric for Grading and Marking of Term Work

Lecture + Practical (% Attendance) & Marks	Assignments	Tutorial	Lab / Practical Performance	Lab Journal Assessment	Mooc Course	Total

11.a Practical Plan

Practical No.	Module no.	Title of Practical	Mapping with COs
1	1	Chain and cross staff surveying.	1,2,3
2	1	Measuring bearings of a closed traverse with prismatic compass and computation of interior angles.	1,2,3
3	2	Simple and compound levelling	1,3
4	3	Measurement of horizontal and vertical angles.	1,2,3
5	4	Finding constants, heights and distances using tachometry.	1,3
6	6	Setting out a simple curve by Rankine's method.	6

11.b Assignment Plan

Assignment No.	Module no.	Title of assignment	Mapping with COs
1	1	Chain and compass survey	1,3
2	2,5	Levelling, Plane table, contours, areas and volumes	1,3,5

3	3,4	Theodolite Surveying and Tacheometric Surveying	1,3,4
4	6	Curves	6

12. Beyond Syllabus Activities for Gap Mitigation

No	Type of the Activity	Activities	Details – no of attendees, guest, feedback, mark sheet, report

Academic Plan prepared by

Name of Faculty: Steffi Stephen
Sign:

Domain Co-ordinator	SIG Coordinator	HOD