CURRICULUM

Technical School Leaving Certificate

Survey Engineering

(18 months program)

Council for Technical Education and Vocational Training

Curriculum Development Division

Sanothimi, Bhaktapur

Developed in 2008

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Introduction:

Nepal Government, Ministry of Education implemented the letter grading system in SLC from 2072 B.S. The door of TSLC programme is open for those students who have appeared in SLC exam and achieved any GPA and any grade in each subject. Focusing on such students the curriculum of TSLC of 29 months and 15 months have been converted into 18 months to create uniformity among different TSLC programme.

This Curriculum for "TSLC in Survey Engineering" is designed to produce basic level technical workforce having knowledge and skills in the field of survey engineering necessary to be TSLC graduates in the field so as to meet the need of such technicians in the necessity of the country.

Title:

The title of the programme is TSLC in Survey Engineering

Aim:

The program aims is preparing competent basic level workforce in the field of survey engineering.

Objectives:

After completing this curricular program, the students will be able to:

- To apply fundamental skills and knowledge of surveying
- To carry out survey drawings & computer aided design
- To establish control points for surveying
- To apply skills of cadastral survey and land administration
- To carry out engineering survey
- To carry out simple survey project
- To apply skills of basic construction
- To apply the skills of basic geographical information system (GIS)
- To carry out topographical survey
- To apply fundamental skills for entrepreneurship development

Programme Description:

This course is based on practical exposure in different areas as required. In every subject, topical explanations will be followed by demonstrations by instructors and in all tasks, trainees will be asked to practice by themselves through do-it-yourself/hands-on exercises so that they can internalize what they learn in the classroom.

There are ten subjects, which cover all related areas of the work of survey engineering. Though some basic and essential theoretical inputs have been included, yet the focus is given on enhancement of the required skills, enabling techniques and competency building.

Course Duration:

This course will be completed within 18 months. There will be 15 months (40 hours/week X 52 weeks a year = 2060 hrs. class plus 3 months (480 hrs) on the job training (OJT).

Entry criteria:

Individuals with following criteria will be eligible for this program:

- SLC with any grade and any GPA (Since 2072 SLC).
- SLC appeared (Before 2072 SLC)
- Pass entrance examination administered by CTEVT

Group size:

The group size will be maximum 40 (forty) in a batch.

Medium of Instruction:

The medium of instruction will be in English and/or Nepali language.

Pattern of Attendance:

The students should have minimum 90% attendance in theory classes and practical/performance to be eligible for internal assessments and final examinations.

Instructors' Qualification:

- Instructors should have bachelor degree in geomatics/survey engineering or diploma in geomatics engineering with minimum 5 years practical based experiences.
- The demonstrator should have diploma in geomatics engineering with minimum 2 years practical based experiences.
- Good communicative/instructional skills

Teacher and Student Ratio:

- Theory: 1:40
- Practical: 1:10
- Minimum 75% of the teachers must be fulltime

Instructional Media and Materials:

The following instructional media and materials are suggested for the effective instruction, demonstration and practical.

- Printed media materials (assignment sheets, handouts, information sheets, procedure sheets, performance check lists, textbooks, newspaper etc.).
- Non-projected media materials (display, photographs, flip chart, poster, writing board etc.).
- Projected media materials (multimedia/overhead transparencies, slides etc.).
- Audio-visual materials (films, videodiscs, videotapes etc.).
- Computer-based instructional materials (computer-based training, interactive video etc.)

Teaching Learning Methodologies:

The methods of teaching for this curricular program will be a combination of several approaches such as;

- Theory: lecture, discussion, assignment, group work, question-answer.
- Practical: demonstration, observation, simulation, guided practice and self-practice.

Evaluation Details:

- The marks distribution for theory and practical tests will be as per the marks given in the course structure of this curriculum for each subject. Ratio of internal and final evaluation is as follows:

S.N.	Particulars	Internal Assessment	Final Exam	Pass %
1.	Theory	50%	50%	40%
2.	Practical	50%	50%	60%

- There will be three internal assessments and one final examination in each subject. Moreover, the mode of assessment and examination includes both theory and practical or as per the nature of instruction as mentioned in the course structure.
- Every student must pass in each internal assessment to appear the final exam.
- Continuous evaluation of the students' performance is to be done by the related instructor/ trainer to ensure the proficiency over each competency under each area of a subject specified in the curriculum.
- The on-the-job training is evaluated in 300 full marks. The evaluation of the performance of the student is to be carried out by the three agencies; the concerned institute, OJT provider industry/organization and the CTEVT office of the controller of examinations. The student has to score minimum 60% for successful completion of the OJT.

Grading System:

The grading system will be as follows:

Grading	Overall marks
Distinction	80% or above
First division	75% to below 80%
Second division	65% to below 75%
Third division	Pass aggregate to below 65%

Certificate Awarded:

The council for technical education and vocational training will award certificate in "**Technical School Leaving Certificate in Survey Engineering"** to those graduates who successfully complete the requirements as prescribed by the curriculum.

Job Opportunity:

The graduate will be eligible for the position equivalent to Non-gazetted 2nd class/level 4 (technical) as Amin/Assistant Surveyor in the government related organizations, private company or as prescribed by the Public Service Commission.

Course Structure of TSLC in Survey Engineering

S. N.	Subject Title	Nature	Class/ Week	Total Class			Full Marks		
			Total	T	P	Total	T	P	Total
1.	Fundamentals of Surveying	T+P	6	100	212	312	60	120	180
2.	Survey Drawing & CAD Operations	P	5	20	240	260	00	140	140
3.	Control Surveying	T+P	5	55	205	260	20	120	140
4.	Cadastral Surveying & Land Administration	T+P	6	90	222	312	60	130	190
5.	Engineering Survey	T+P	3	30	126	156	20	80	100
6.	Survey Project Management	T+P	2	80	24	104	50	10	60
7.	Basic Civil Construction	T+P	2	80	24	104	50	10	60
8.	Basic GIS Operation	P	6	22	290	312	0	180	180
9.	Topographical Survey	T+P	3	40	116	156	20	80	100
10.	Entrepreneurship Development	T+P	2	40	64	104	20	30	50
	Sub Total		**40**	**557**	**1523**	**2080**	**300**	**900**	**1200**
	On the **J**ob **T**raining (3 Months)	P				480			300
	Total					**2560**			**1500**

Fundamental of Surveying

Description:	This subject provides the fundamental knowledge and skills about land surveying which consists of Mathematical concepts applied in Land Surveying, Introduction to surveying, map basics and introduction to measurement errors and adjustments.
Objectives:	▪ To develop capability in application of secondary level of mathematical concepts in land measurement ▪ To develop knowledge of surveying concepts, different types of surveying and principle of surveying. ▪ To develop skill on use of measurement units, and scale for representing land surface. ▪ To develop a 'feel' for map for understanding land and to develop map reading skill. ▪ To create awareness on inevitability of errors in measurements and to apply the ways to minimize them.

Marks: Th 60 Pr 120 = 180	**Time: Th 100 hrs. + Pr 212 hrs. = 312 hrs.**

1. Mathematical concepts applied in Land Surveying

		Time (Hrs.)		
Tasks/Skills	**Related Technical Knowledge**	**Th.**	**Pr.**	**Tot.**
Revision of Secondary level mathematics and Science Apply simple Algebraic formulae. Acquire skill in Graphical plotting. Define Number System.	Simple Algebra (Factorization, Indices, Linear equations Graph of linear equations, Solution of Simultaneous Equations) Mensuration (Area and Perimeter of plane Figures, Area of walls, Ceiling and Floor, Area and cost Estimation) Area and volume of cube and Cubide. Calculation of percentage, simple unitary method. Types and properties of triangles (Introduction only) Introduction to Reflection of light and lens Formula (derivation not Required) Simple Algebraic Formulae, Cartesian system of representing point positions. Decimal, and Binary number system and their conversions-	40	36	76
State different types of Measurement Units Define meter. Make conversions of Units	Linear and angular units, Fundamental & Derived units for area and volume, Unitary conversions	4	24	28

Be familiar with the concepts of lines and angles and Geometry of Plane figures – Intersecting lines, Parallel lines Triangles, Parallelograms, Quadrilaterals, Polygons, Elements of simple circular Curves Use property of regular plane Geometric Figures	Theorems on Intersecting and Parallel straight lines, Different types of triangles, Congruent and Similar triangles, Elements and properties of triangles, Quadrilaterals, Parallelograms, Trapezium and Polygons	4	20	24
Define area, Determine area of regular and irregular plane figures	Formulae for Area of Triangles, Rectangles, Graphical Methods	2	12	14
Define volume, Define liter, Determine volumes of solids bounded by plane surfaces	Trapezoids	2	12	14
State/apply simple Trigonometric formulae in solving measurement problems related to Distances and Heights	Trigonometrical Functions, Trigonometrical relations, Properties of Triangles, Solution of Triangles, Angles of Elevations and Depressions	4	20	24
Apply Scientific Calculator in solving simple mathematical problems related to Area, Solution of Triangles, Heights and Distances	Calculator Key functions and operations	2	16	18
2. Introduction to Surveying and Geomatics				
Define Surveying and Geomatics	Definition of Surveying and Geomatics, Stages of Surveying	1		1
Classify Surveying	Types of Surveying	2		2
Employ Principles of Surveying	Principles of Surveying	1		1
State the importance and Scope of Surveying	Objectives, importance and Scope of Surveying	1		1
Present a brief history of Surveying	Brief History of Surveying	1		1
List and explain some important surveying concepts:	Distance and angles, Directions, Meridians and Bearings, Equator, Convergence of Meridians, Horizontal and Vertical, Spheroid and Geoid, Plane Rectangular Coordinates Systems, Latitude, Longitude and Altitude	3	11	14
Geomatics Concept, Basic concepts of web maps	Methods of land data acquisition, data types, data preparation, data processing, database, data presentation, sharing and dissemination, Demonstration of Google Earth and simple maps.	2	4	6

State/apply commonly used Surveying Instruments	Introduction to surveying Instruments (Conventional & Modern) and their uses	1	10	11
Scale Measured Distances for map Find Ground Equivalent of Map Distance	Map Scale, Different types of Map Scales, Their importance and uses, Scale Conversion	2	10	12
3. Map Basics				
Define 'Map' as outcome of Survey	Definition of a map	1		1
List and group various elements of map	Elements of Maps			
State the importance of maps	Map as a tool to analyze spatially distributed objects on Land	1		1
Acquire knowledge of map terminologies	Map references, Grid and Graticule, Neat line, Indices			
Classify maps	Types of Map on the basis of Scale, Object, Theme, Content	1		1
State/apply map symbols	Legend of map symbols	1		1
Read map properly- find one's position on map and compare map and ground positions	Map verification	2	20	22
Extract information from map	Map Body information and Marginal information	1		1
Apply maps in Field study	Map Reading	1		1
Estimate positional values (Coordinates) of any object shown in map	Map reference system	1		1
Perform various measurements on map (Distance, Direction and Area)	Directions, Distances, Areas, Height differences, map scale	2	14	16
Appreciate map value and reliability	Map History, map updates	1		1
Estimate altitude of a place shown on map	Representation of Height-Contours	1		1
4. Introduction to measurement errors and adjustments				
Enlist importance of redundant observation	Redundant observation	1		1
Enlist importance of significant figures in a number representing a quantity	Significant figures			
Define errors	Definition of error	1		1
Be familiar with causes of errors	Causes of error			
Be familiar with different types of errors	Types of error	1		1
Identify the sources of error and the remedies	Sources of error	1		1
Evaluate errors	Magnitude of errors	1		1
Be familiar with precision and accuracy	Precision and accuracy			
Eliminate errors	Errors and corrections	1		1
Apply tolerance limit for observational errors	Permissible limit of errors	1		1
Adjust errors of observation	Adjustment of error, taking mean	1		1

Revision and Tests			10	10
Total:		**100**	**212**	**312**

Facility:
Class room, White Board, Marker, OHP, Multimedia

List of Tools, materials and equipment:
Drawing Table, Drawing Board, Calculators, Graph Papers, Mathematical Instruments set, Topographical Maps, Set Square, Plane Table set, Sight Rule, Ruler, Pencil, Eraser etc.

Reading materials:
1. Lecture Notes
2. Introduction to surveying, by Andorson & Mikhail
3.प्रारम्भिक नापी (त्रि.वि.,पा. वि. के.), महेश्वर भट्टराई
4. Surveying for Engineers (ELBS) by J. Uren & W. F. Price
5. Fundamental of surveying (CTEVT)
6. Fundamental of Surveying by S.K Roy
7. Principal and use of surveying Instruments, J. Clendinning, J, G Oliver
8. Theory of Error and Adjustment, M.G. Arur

Survey Drawing & CAD Operations

Description	This subject consists of manual and computer aided drawing related to surveying and mapping.
Objectives	After completion of this course the students should be able: 1. To be familiar with the concept of Drawing 2. To state the tasks of drawing 3. To perform survey drawing 4. To draw surveying objects 5. To use CAD tools for drawing objects
Marks: Th 0+ Pr 140 =140	**Time: Th 20 hrs. + Pr 240 hrs. = 260 hrs.**

Tasks/Skills	**Related technical knowledge**	Time		
		Th.	**Pr.**	**Total**
Be familiar with drawing	Meaning, concept, types (survey, engineering), use and importance of drawing	1		1
Apply technique of drawing	Manual, mechanical and computer aided drawing	1		1
Identify drawing equipment	Drawing equipment, tools, materials, use, care and maintenance of drawing equipment	1		1
Perform tracing	Meaning, use, importance, tracing equipment and materials	1		1
Perform lettering	Meaning, types (Devanagari and Roman)	1	12	13
Draw lines	Different types and sizes of lines	1	12	13
Draw figures	Different types of plain figures (regular and irregular), solid figure	1	20	21
Draw symbols	Different types of map symbol, point, line and area	1	30	31
Draw sketches	Meaning of sketches, difference between maps and sketches, use and importance, method of sketching, estimation of direction and distance	1	12	13
Construct scale	Meaning and definition, types of scale	1	12	13
Apply scale	Finding scale of the map, measuring distances	1	12	13
Perform Enlargement and Reduction	Concept and meaning of enlargement and reduction, methods (graphical and photographic)	1		1
Carry out enlargement and reduction of map fragments	Different graphical methods of enlargement and reduction	1	12	13
Construct simple graphs and charts	Different types of graphs and charts (pie, bar, rectangular)	1	12	13
Perform CAD operations using AutoCAD software	Introduction to AutoCAD Set up AutoCAD on computer Start new drawing, opening an existing drawing	2	12	14

	Navigate interface, use zoom commands to adjust display of objects on screen Units, function keys, co-ordinate system			
Draw Objects	Lines, multilines and polylines Arc, circle and ellipse Co-ordinate input methods (absolute, relative) Polyline objects, splines Text (multi-line & single line / true type fonts) and text styles Hatch patterns and gradient fills	1	26	27
Modify Objects	Move, stretch, rotate and mirror Erase, trim, extend, break and explode Copy, offset, array, fillet and chamfer	1	25	26
Drawing Settings and Aids	Options, OSnap settings, grid and snap Dimensions and dimension styles Layers and Properties	1	12	13
Creating Outputs	Layouts, Legends, manipulate Viewports on layouts, Page setup, plot designs from layouts and model space Parcel subdivision and area calculation	1	21	22
Revision and Tests			10	10
Total:		**20**	**240**	**260**

Facilities:
Class room, Computer lab, Drawing Room, OHP, Multimedia

List of tools Materials and Equipment:
Compass, Divider, Set-square, T-Scale, Straight edge, Drawing boards, Drafting pens, pencil, pens, eraser, clip board, tracing papers, Graph paper, lettering sets, Drafting Film, Computer with AutoCAD software package, Printer, etc.

Reading Materials:

1. Lecture Notes
2. Fundamental of Engineering Drawing Warven J. Cauzadder (2001)
3. Engineering drawing and AutoCAD, K. Venugopal (2001)
4. Basic Cartography Vol I, International Cartographic Association
5. Elements of Cartography, H. Robison
6. Cartography for Mapping, Rabin Kaji Sharma

Control Surveying

Description:	This subject consists of Introduction to control surveying, Linear Measurements, Theodolites and Angular Measurements, horizontal and vertical controls.
Objectives:	• To introduce the different types of controls for surveying • To develop skill in measuring distances and choosing appropriate method for different situations • To develop skill in precise measurement of horizontal and vertical angles • To develop the ability to establish horizontal and vertical controls for survey by different methods

Marks: Th 20 +Pr 120 = 140	**Time: Th 55+ Pr 205 = 260 hrs.**

		Time (Hrs.)		
Tasks/Skills	**Related Technical Knowledge**	**Th.**	**Pr.**	**Tot.**
1. Introduction to control surveying				
Be familiar with control points in surveying List the need of survey controls	▪ Introduction to Control Survey • Equipment used in Control Surveying • Purpose of Control Survey	1		1
Differentiate horizontal and vertical controls for surveying	• Types of Control Survey	2		2
Be familiar with different methods of control survey	• Different methods of Control Surveying			
Identify/select appropriate methods of control survey	• Classification of Survey Controls	1		1
Prepare Description card for Survey controls	• Component of D-Card.	1	5	6
Prepare a diagram of survey controls in a grid square	• Control Charts and Diagrams	1	5	6
2. Linear Measurements				
Find out distance by taping	• Slope distance • Horizontal distance • Vertical distance • Telescopes, tapes, EDMs	1	4	5
Find out distance by optical distance measurement		1	9	10
Find out distance using electronic distance meters		1		1
Find out distance by base line method		1	4	5
3. Angular Measurements				
Measure angles between any two directions	• Directions and angles	1		1

	• Reference axes • Reference planes			
Be familiar with different types and various parts of a theodolite	• Component of Theodolite • Types of Theodolite	2	4	6
Measure horizontal angles	• Horizontal angles	2	9	11
Measure vertical /zenithal angles	• Vertical, Zenithal angles	1	8	9
Use Total Stations	• Total Stations and Accessories	2	20	22
4. Horizontal Controls				
a. <u>Triangulation:</u> • Be familiar with Related terminologies • Carry out reconnaissance • Perform monumentation • Prepare D-card • Make Observation • Perform Computation and adjustment of a net of four points • Plot the coordinates in diagrams	• Introduction to Triangulation • Principles of triangulation • Classification and Specifications • Reconnaissance • Station marks and signals • Observation procedure for fourth order triangulation • Computation of triangulation • Charts and Diagrams	8	30	38
b. <u>Traversing:</u> • Carryout reconnaissance • Perform monumentation • Make Observation • Perform Computation and adjustment of an ordinary traverse line with about five points • Plot the coordinates in diagrams	Introduction and principle of traverse survey Types of traverse survey Field procedure of ordinary traversing Traverse computation	5	46	51
c. <u>Trilateration:</u> • Make Observation • Perform Computation and adjustment of a single triangle	Introduction to trilateration Principle of trilateration Electronic distance measurements Trilateration Computation	3	10	13
5. Vertical Controls				
a. <u>Introduction to Levelling</u> : • Be familiar with importance of vertical controls (benchmarks) and Description card for BM • Be familiar with different methods of altimetry • Name different kinds of Levels and list their characteristics	Basic Terminologies in Levelling Bench marks Different methods of heightening/levelling Leveling instruments Precision required for Leveling	6	10	16

• List various parts of a level				
b. <u>Differential Levelling</u> : • Establish benchmarks • Level by rise and fall method • Level by height of plane of collimation method • Draw Profiles	Methods of Differential levelling and applications	3	35	38
c. <u>Trigonometric Levelling</u> : • Make Observation - Horizontal and Vertical (zenithal) angles • Measure horizontal distances between consecutive pegs • Perform Computation for heights of some four points	Trigonometric heightening	2	6	8
Revision and Tests		10		10
Total		**55**	**205**	**260**

Facilities:
Class room, Computer lab, Drawing Room, OHP, Multimedia

List of tools Materials and Equipment:
Compass, Divider, Set-square, T-Scale, Straight edge, Drawing boards, Drafting pens, pencil, pens, eraser, clip board, tracing papers, Graph paper, lettering sets, Drafting Film, Computer with AutoCAD software package, Printer, etc.

Cadastral Surveying and Land Administration				
Description:	This subject consists of Cadastral Surveying, Land Administration and Management and Land laws.			
Objectives:	After the completion of the course the trainees will able: • To acquire theoretical and Practical knowledge in Cadastral Survey and mapping • To carryout cadastral surveying, mapping and map updating task • To acquire basic understanding of Land Laws • To acquire theoretical and Practical knowledge of Land administration and management activities			
Marks: Th 60 + Pr 130 =190		**Hour: Th 90 + Pr 222 = 312 hrs.**		
Tasks/Skills	**Related Technical Knowledge**	**Th.**	**Pr.**	**Tot.**
1. Cadastral Surveying				
Be familiar with basics of cadastral surveying	Definition and concept, brief history, importance of cadaster and cadastral survey, different types of cadastre, cadastral records.	5		5
Be familiar with Cadastral system in Nepal	Cadastral development, Free sheet and trig sheet, scale, control points, projection and sheet numbering, different types of cadastral maps and documents, parcel, parcel number, boundary and its type, analogue and digital system.	5	20	25
Be familiar with Graphical Cadastral surveying technique	Identifying control points, locating and checking control points, densifying control points, Plane tabling: setting, centering, levelling, orientation, detailing, radiation, intersection, resection, traverse, map plotting, area computation by using various techniques such as graph, plain-meter, grid and computing scale, tile, applying formula, independent check.	10	50	60
Be familiar with Digital Cadastral Surveying technique	Total station and its function, sketching, data acquisition, downloading, plotting, editing, mapping, attribute assigning, database preparation, parcel split and merge, report generation, checking and verifying every step, brief introduction to other recent technological development in cadastral surveying.	10	50	60
Get acquainted with Administrative and legal procedure	Information publish, adjudication, recording, notification, dispute settlement, registration.	5		5
Knowing about Documentation procedure	Sketch management, map inking, initial terij, area computation form, field book, land	5	20	25

	ownership records and certificate preparation, misil (file) management and dissemination.			
Get acquainted with cadastral record updating procedure	लिखत अध्ययन, लिखत बमोजिम नक्शामाकित्ताकाट,प्लट रजिष्टर कायम गर्ने, फिल्डमा कित्ताकाट, टायल चेक, नक्सा ट्रेस, फिल्डबुक उतार, प्लट रजिस्टर उतार, प्लट रजिस्टर अध्यावधिक, फिल्ड रेखांकन, हाल साबिक भिडाउने, फायल नक्शा बनाउने, पार्सल नक्शा बनाउने, दुरी नाप्ने, लगतकट्टा गर्ने, कित्ता एकीकरण गर्ने, नक्शामा घर बाटोजनाउने	5	50	55
Be familiar with basic practical (legal and administrative) function	सूचना लेख्ने, म्याद काट्ने, म्यादतामेल गराउने,तारेख पर्चा लेख्ने, मुचुल्का उठाउने, सिनाख्त गराउने,लिखत तयार गर्ने, भर्पाइ गराउने, बयान गराउने, टिप्पणी उठाउने, फिल्ड प्रतिबेदन लेख्ने, फायल पन्जिका बनाउने	5	32	37
2. Land Administration and Management				
Be familiar with basics of land administration	Concept of land administration, Definition, objective, function, importance	5		5
Be familiar with land administration procedure in Nepal	Basics introduction on Land tenure, land rights and ownership, land registration, land records and their management, transfer of land and property rights, land valuation, land tax, land reform	4		4
Be informed on land administration organization in Nepal	Ministry of Land Reform and Management, Department of Survey, Department of Land Reform and Management, Department of Land Information and Archive, National projects related to Land Use, Guthi Corporation, Land Management Training Centre, Other stakeholders such as District Administration Office, VDC/Municipality, Functions and jurisdiction of these organizations	5		5
Get acquainted with land management functions and tools	Basic concept of land use, land development, land pooling, land acquisition, land readjustment, plotting, land consolidation	5		5
3. Land Laws				
Be familiar with land (survey measurement) Act and rules	जग्गानाप जांच ऐन जग्गानाप जांच नियमावली	5		5
Be familiar with Land Revenue acts and rules	मालपोत ऐन मालपोत नियमावली	3		3
Be familiar with land related acts and rules	भुमि सम्बन्धि ऐन भुमि सम्बन्धि नियमावली	3		3
Be familiar with relevant articles of Mulukiain	मुलुकी ऐन २०२० का सम्बन्धित महलहरु	4		4
Be familiar with department directives	कित्तानापीतथा नापी कार्यालयहरुको निर्देशिका जग्गा प्रशाशन निर्देशिका	4		4
Be familiar with National land use policy	राष्ट्रिय भू उपयोग नीति	2		2
Total		**90**	**222**	**312**

Facility:
Class Room, OHP, Multimedia, Open area divided into parcels.

List of tools materials, and equipment:
Chain, tape, arrow, wooden pegs, Prismatic compass, Field book, Pencil, eraser, Plan table set, PT level, Plumbing fork, Trough compass, sight rule. Telescopic alidade, staff, ranging rods, plotting scale, Drawing paper, hard pencil, total station set with accessories, prism, computer, GIS software, etc.

Reading materials:
1. Surveying Volume I, II, S.K Duggel
2.कित्ता नापी निर्देशिका, नापी विभाग
3.नापी शाखा एवं नापी गोश्वाराको कार्यविधि, नापी विभाग
4.कित्ता नापी, बेखालाल श्रेष्ठ
5.कित्ता नापी, बाबुराम आचार्य
6. Land registration and Cadastral System, Gerhard Hursson
7. Plane Surveying, David Clark
8. भूमिलगत रजिष्ट्रेशन र कित्तानापी, बेखालाल श्रेष्ठ
9. सम्बन्धित ऐन, नियम तथा निर्देशिकाहरु

Engineering Survey

Description:	This subject consists of technical knowledge and skills related to surveying in the engineering structures such as road survey, water supply survey, bridge survey and computation of surveyed data.
Objectives:	To impart the theoretical and practical knowledge and skills of surveying in the engineering works.
Marks: Th 20 + Pr 80 = 100	**Time: Th 30 + Pr 126 = 156 hrs.**

		Time (Hrs.)		
Tasks/skills	**Related technical knowledge**	**Th.**	**Pr.**	**Tot.**
1. Be familiar with Route Survey	• Introduction to Surveying of different engineering works of route nature	1		1
Perform Road Survey	• Procedures for carryout the road survey • Reconnaissance • Alignment fixing and chain aging the route • Identification and establishment of control points • Perform detail Survey of the route • Perform L-section and cross section survey • Computation of survey data • Preparation of plan and profile	3	12	15
Perform Water supply Survey	• Procedures for watersupply Survey • Reconnaissance • Selection of source/intake site • Alignment fixing • Detail survey and L-Section of route • Surveying of intake, transmission main,reservoirsiteanddistributionline • Computation of survey data • Plotting the plan and profile	3	12	15
2. Perform Bridge Survey • Bridge Site Selection • Upstream, Down stream • Discharge/Velocity of river • High Flood Level • Flood Level	• Procedures for carry out the bridge survey • Selection of bridge axis • Establishment of control/reference points • Perform detail survey of the site covering upstream and downstream • Cross Sectioning of the bridge axis site • Discharge measurement of the river • Computation and plotting of surveyed data	3	22	25

3. Perform Setting out Survey	• Study of design elements • Aims of setting out • Tools and Techniques of setting outs • Method of setting out the building • Method of setting out the pipe line	2	18	20
4. Set out Simple Circular Curve	• Types of curves • Elements of simple circular curve • Calculation of chainage of curve • Deflection angle • Calculation of setting out data • Methods of setting out simple circular curve	2	13	15
5. Perform Construction Survey	• Different method of construction Survey • Survey for the large scale plan of the site • Site survey for Construction area	2	23	25

6. Calculate Area	• Methods of determining areas in the field
	• Measuring area of regular and irregular figures.
	  • Dividing the area into regular geometrical figure
	  • Coordinates method
	  • Mid Ordinate Rule
	  • Average ordinate method
	  • Trapezoid method
	  • Simpson's Rule
	• Methods of determining the area from map/plan
		2	13	15

7. Calculate Volume	• Knowledge about cutting and filling
	• Formula for calculation of volume of different solid shapes (Cube, Sphere, Cone, Cylinder)
	• Methods of measuring volume:
	  o from cross section
	  o from spot heights
	  o from contours
		2	13	15

Revision and Tests		10		10
Total		**30**	**126**	**156**

Survey Project Management				
Description	This course provides priminilary concepts of management, and its application in surveying projects.It includes basic knowledge and skills for surveying projects management.This course further offers basic knowledge and skills in dealing with community and Environment.			
Objective	After completion of this course the students should be able: • To state the basic concept of management, explain the tasks of management, manage the simple surveying task, prepare simple work plan, time schedule, budget and TORs • To explain basic knowledge of community skills • To explain basics of environment, human interaction with environment, implication in human life and society			
Marks: Th 50 + Pr 10 = 60		**Time: Th 80 + Pr 24 = 104 hrs.**		
Tasks/Skills	**Related Technical Knowledge**	**Time**		
		Th.	**Pr.**	**Total**
1. Understanding Survey Management				
Be familiar with the concept of Management	Basic Concept of management, definition of management, tasks of management	2		2
Be familiar with the concept of project	Basic Concept of project, definition of project, characteristics of project, project stages, project cycle	2		2
Assess the need of surveying	Purpose of survey, Types of survey, Location of survey.	2		2
Be familiar withTOR	Terminology, condition, limitation, rights and duties, specifications, deliverable	2		2
Prepare work plan	Identify survey tasks, Prepare time schedule, Prepare budget	3	7	10
Perform team building and task distribution	Human resource, personal capacity, personnel selection, knowledge of technology, communication skills	3		2
Identify the required tools, equipment, material and other accessories and choose appropriate one	General knowledge of methods of surveying, survey technologies, survey tools, equipment and other accessories	2		2
Check the instruments	Methods of checking, Standardization, Calibration	2	2	4
Adjust the instrument	Adjustment, care and maintenance of simple survey instruments	2	2	4
Instrument Handling	Methods of handling and using the instruments	1	3	4
Carry out Survey	Order of survey tasks, standards, specifications, observation, recording, documentations	2	2	4
Be familiar with safety management	Safety management • Personal safety	2		2

	• Equipment safety • Data safety			
Carry out supervision and Independent check of survey tasks	Supervision, monitoring and evaluation process	2		2
Prepare checklist of possible expenditure	List of personnel, material, transport, rent, time, logistic and other	1	2	5
Keep accounts	A/C, Bill, Vouchers	1	3	4
Prepare map and plan	Detail plotting, Profiling, Maps and plans	1	2	6
Write report	Report writing	1	5	6
Present report	Report Presentation	1	4	6
2. Community Skills				
Motivate users group	• Define community (with feature, types: rural and urban context) • Motivation • Methods of motivation	4		4
Form user group	• Different role of group work • Different indigenous knowledge • Facilitation skill • Role of catalyst	4	1	5
Conduct user group meeting	• Digging deeply in discussion • Real life related problems • Root causes of problem • Prepare Action plan	5	2	9
Conduct group discussion	• Types of group discussion method • Purpose of group discussion • Reasons for group discussion	2		2
Encourage community participation	• Concept of community participation • Find basic human needs • Concept of brain storming (need, methods /rules of doing brain storming)	2	1	3
Coordinate with general public	• Define coordination • Communication and its types: formal and informal, one way and two way communication • Process of communication	2		2
Conduct training	• Define training and its need • Basic idea of 4 C (Cooperation, collaboration, communication, and culture)approach • Basics of Adult learning • Use of visual aids • Platform skill	7		7
3. Environment				
List the changes in environment	• changes in environment and its effect on habitat, resources, climate adaptation	3		3

Be familiar with landslides	• causes and effect of landslide • preventive methods	2		2
Be familiar with flood	• causes and effect of floods • preventive methods	2		2
Be familiar with earthquake	• causes and effect of earthquake • Methods of minimizing hazard due to earthquake	2		2
Be familiar with air pollution	• composition of atmospheric air • air pollutants and sources • effect of pollution • preventive measures	2		2
Be familiar with water pollution	• causes and effects of water pollution • preventive methods	1		1
Be familiar with land (soil) pollution	• causes and effects of soil pollution • preventive methods	1		1
Total		**80**	**24**	**104**

Facility:
Class Room, White Board, OHP, Multimedia

List of tools, materials, and equipment:
Chart paper, Marker, Paper, drawing sheet, card board etc.

Reading materials:

1. Lecture Notes
2. Various community development reports prepared by GoN and I/NGO,
3. Samudayik Bikas, Nepali Sandharva by Krishna Bahadur K.C, Published by: Society for community development Professionals, 1990.
4. S.V.S. Rana, 2003, Essentials of Ecology and Environmental Science, Prentice- Hall of India P. Ltd, New Delhi
5. P. Minakshi, 2005, Elements of Environmental Science and Engineering, Prentice-Hall of India P. Ltd, New Delhi

Basic Civil Construction

Description:	This course provides basic knowledge and skills about the basic construction of civil engineering structures. As the students may work in team of engineers (designers) for survey work of different engineering structures such as water supply system; road and bridge; they must be familiar with different terms in those areas. This course is designed to fulfill general needs of basic survey student who are supposed to work as survey team member in engineering structures.
Objectives	After completion of this course the students will be able to: ▪ Use basic engineering terms related with building, water supply and roads during communication. ▪ Realize methods and importance of engineering construction. ▪ Draw information from civil design and plans to estimate quantity of items of work and cost of simple engineering structures. ▪ Supervise small scale civil construction projects. ▪ Perform basic skills related with masonry construction and plumbing work. ▪ Work as survey team member to collect land data for engineering projects such as water supply and irrigation.

Marks: Th 50 + Pr 10 = 60 | **Time: Th 80 + Pr 24 = 104 hrs**

		Time (Hrs.)		
Tasks/skills	**Related Technical Knowledge**	**Th.**	**Pr.**	**Tot.**
1. Simple engineering structures and their components				
2. Be familiar with Reservoir tank	▪ Definition and purpose ▪ Components of reservoir tank	2		2
3. Be familiar with Bridge and Culverts.	▪ Definition ▪ Types of bridge and culvert and their components	3		3
4. Be familiar with Manhole.	▪ Definition and purpose ▪ Components of manhole	2		2
5. Construct small canal. 6. Construct track and trail. 7. Implement small river training works/slope conservation plan. 8. Supervise the constructional activities	▪ Sketch drawing, Blue print ▪ Line ▪ Level ▪ Plumb ▪ Layout tools ▪ 3,4,5 method ▪ Survey equipment ▪ Construction drawing	6		6

2. Building Construction				
Layout simple building using measuring tape as per given drawing.	3-4-5 method	1	2	3
Be familiar with Foundation and super structure	▪ Definition and its purpose ▪ Description of types of foundation (shallow and deep with examples) ▪ Thumb rule for design	4		4
Be familiar with Stone masonry	▪ Concept of stone and its type ▪ Uses of stone ▪ Dressing of stone and list of tools used for dressing ▪ Definition and description of types of stone masonry (Rubble stone masonry and Ashlars masonry) Environmental impact after taking out of stone from quarry	4		4
Be familiar with Brick Masonry ▪ Familiar with Types of bond ▪ Construct brick footing foundation. ▪ Perform brick soling.	▪ Concept of brick and its properties for construction ▪ English and Flemish bond wall ▪ Purpose of brick soling work	4	3	7
Perform Plain Cement Concreting (PCC) and Reinforced Cement Concreting (RCC) work.	▪ Concept of cement concrete and their components ▪ Properties of sand, cement, aggregates, steel rods and water ▪ Process involved in cement concreting work	4		4
Be familiar with Shuttering and centering work (Form work) for concreting	▪ Definition and requirements of shuttering and centering work ▪ Description of types of shuttering and centering work according to the materials used	2		2
Be familiar with Earthquake resistant structures	▪ Basic concept of Earthquake resistance	1	2	3
3. Rural Water supply System				
Be familiar with Gravity flow water supply system	▪ Concept of gravity flow water supply system ▪ Description of different components of gravity flow water supply system. ▪ Types of water demand in the community. ▪ Population forecast	4		4

Measure discharge of spring/tap	▪ Definition of discharge ▪ Bucket and stop watch method of measuring discharge	1		1
Estimate the flow of stream.	▪ Velocity-Area method of estimating flow of stream.	1		1
Be familiar with Sources of water ▪ Surface water supply. ▪ Ground water supply	▪ List of sources of water ▪ Description of surface sources of water ▪ Description of ground sources of water ▪ Factors to be considered for source selection.	1		1
Be familiar with intake structures	▪ Definition of intake and its components ▪ Description of spring intake and stream intake	1		1
Be familiar with pipes used in rural water supply ▪ Join polythene pipes. ▪ Install pipe fittings	▪ Description of GI, HDPE and PVC ▪ List of tools and their purposes for joining polythene pipes ▪ Procedure for joining HDPE ▪ Introduction to various tools used in plumbing works	2		2
Be familiar with ferro- cement tank	▪ Concept of Ferro-cement tank ▪ Reasons for using Ferro-cement tank in rural water supply system	2		2
4. Road Construction				
Be familiar with classification of roads	▪ Classification as of Nepal Road Standard 2027 and other classifications	1		1
Be familiar with Structure of roads	▪ Sub-grade, base, wearing course	2		2
Be familiar with Road Geometrics	▪ Cross section elements, sight distance characteristics, curves	5		5
Be familiar with Road Alignment	▪ Establishing center line of proposed road in plan, factors affecting selection of alignment	3	3	6
Be familiar with retaining structures	▪ Retaining wall, gabion wall, breast wall	1		1
Be familiar with Road Drainage	▪ Surface and sub-surface drainage	1		1
5. Estimating and Costing				
▪ Estimate earth work in cutting and filling in a canal, road and foundation of simple building. ▪ Estimate stone masonry for retaining wall, boundary	▪ Concept of Estimating and costing ▪ Types and purposes of estimation ▪ Description of rough estimate and detail estimate with example	12	14	26

wall or foundation wall of building ▪ Estimate brick masonry ▪ Estimate concrete works ▪ Estimate plastering and pointing. ▪ Estimate reinforcement work. ▪ Estimate Enamel Painting works. ▪ Analyze rate of brick masonry, stone masonry and PCC work ▪ Calculate cost of simple engineering construction	▪ Measuring units for different items of work in a building, water supply, road and canal work ▪ Detail estimate form ▪ Abstract of cost form ▪ Government Norms. ▪ Latest district rate. ▪ Drawing interpretations. ▪ Drawing scale.			
Tests and Revision		10		10
Total		**80**	**24**	**104**

Facility:
Class Room, White Board Marker, OHP, Multimedia

List of Tools, Materials and Equipment:
Drawing paper, Plumb Bob, Sight rule, Pencil, Ruler, Bricks

Reading Materials:
1. Lecture Notes
2. Building Construction, Sushil Kumar
3. भवन निर्माण, (CTEVT)
4. ग्रामीण सामुदायिक खानेपानी, (CTEVT)
5. Engineering Costing and Supervision (CTEVT)
6. Estimating & Costing , M.Chakraborty

Basic GIS Operation

Description:	This course is designed to impart the basic knowledge and skills on Geographic Information System. This course intends to deal with exploring, acquiring and developing knowledge on Geographic Information System, geo-referencing, digitizing and creating map layout.
Objectives	After completion of this course the students will be able to: 1. Understand the concept of Geographic Information System 2. Georeferenced scanned map and digitize features 3. Create map layout for printing

Marks: Th + Pr 180 = 180	**Time: Th 32 + Pr 280= 312 hrs.**

Tasks/skills		**Related Technical Knowledge**	**Time (hrs.)**		
S.N.	**Task statements**	**Related technical knowledge**	**Th.**	**Pr.**	**Tot.**
1	Introduce Basic Computer System	• Components (Desktop, Taskbar, Icons ,My computer ,Start Button, Programs, Window control Buttons, Menus and dialog boxes, File Management)Saving files and Documents ,MS-Excel Toolbars, Creating a work Sheet, power point, e-mail and internet	3	30	33
2	Introduce GIS	• Definition of GIS • Developments of GIS • Components of GIS • Application of GIS	5		5
2	Geographic Information and Spatial Data Types	• Nature of geographic phenomenon • Geographic fields and objects • Computer representations of geographic phenomenon • Topology • Stages of spatial data handling	5	10	15
3	Introduce Basics of Map Projection and Coordinate System	• Define map projection, coordinate system • Types of Projection • Elements of Projection • Projections used in Nepal • Types of coordinate system	5	12	17
4	Introduce Arc Map and Arc Catalog	• Installation of Arc GIS software • Basics of Arc Map • Basics of Arc Catalog		12	12

5	Explore Arc Catalog	• Define Geodatabases, Feature Dataset, Feature Classes, Shape files • Create Geodatabases, Feature Dataset, Feature Classes, Shape files • Create, select and Import Projection • Copy, Move, Rename, delete feature class and shape files • Difference between shape files and feature classes		15	15
6	Explore Arc Map	• Explore Arc Map Application window (Table of contents, Arc Toolbox, View window, Menu bar, Toolbars) • Open, save and load arc map documents • Working with data frames, datasets (layers) and tables • Using Arc GIS Desktop Help		20	20
7	Learn to scan a hard copy map	• Process of scanning • Concepts of resolution, pixel • Scanning settings • Importance of scanning • Quality assessment	1	15	16
8	Georeferencing a scanned map	• Define georeferencing • Georeferencing from raster, georeferencing from vector • Georeference (at least one) scanned topographical map • Georeference (at least one) scanned cadastral map • Quality assessment of georeferencing (in terms of RMSE)	2	15	17
9	Be familiar with GPS	• Basic GPS applications • Operation of hand held GPS • Data downloading from GPS	2	10	12
10	Be familiar with Imageries	• Basics of satellite imageries and aerial photographs • Basics of image interpretation	1	6	7
11	Digitizing features	• Concept of digitizing • Digitizing point, line and polygon features • Digitizing (at least one) complete topographical sheet • Digitizing (at least one) complete cadastral sheet • Adding attributes to the features	2	25	27

12	Georeferencing a scanned free sheet cadastral map	• Creating a TFW file • Georeferencing a free sheet cadastral map • Adding attributes • Calculate area of polygon features	2	15	17
13	Symbolizing spatial data	• Importance of symbols • Single symbol, Unique values, Graduated colors/symbols	2	15	17
14	Basic GIS Operation	• Opening attribute table • Use of Zoom, Pan, Identify tool • Selection by attributes • Selection by location • Field Calculator • Export selected features • Defining Topology • Validating Topology	1	15	16
15	Preparing Map Layout	• Creating a layout • Adding a data frame to a layout • Adding a legend to a layout • Adding a north arrow to a layout • Adding a scale bar to a layout • Adding text and other graphics to a layout • Exporting and printing a map	1	20	21
16	Preparing maps from data collected by Total Station	• Downloading the data from Total Station • Converting data to suitable format (.txt, .csv) • Adding data to Arc Map • Editing data (Use of basic editing tools: create line, create polygon, cut polygon, autocomplete polygon) • Creating shapefiles • Preparing layout and print		45	45
	Total:		**32**	**280**	**312**

Facility:
Class Room, OHP, Multimedia, Open area divided into parcels.

List of tools materials, and equipment:
Compass, Divider, Set-square, T-Scale, Straight edge, Drawing boards, Drafting pens, pencil, pens, eraser, clip board, tracing papers, Graph paper, lettering sets, Drafting Film, Computer with AutoCAD software package, Application of GIS, Printer, cadastral map, Arc Map and Arc Catalog, Arc Catalog, GPS.

Topographical Survey				
Description:	This subject consists of Chain survey, Compass survey, Plane table survey, Topographical survey, Tacheometry.			
Objectives:	After the completion of the course the trainees will able : To acquire theoretical and practical knowledge in Chain survey, compass survey, Plane table survey, Topographical survey, Tacheometry.			
Marks: Th 20 + Pr 80 = 100	**Time: Th 40 hrs. + Pr 116 hrs. = 156 hrs.**			
Tasks/Skill	**Related Technical Knowledge.**	**Th.**	**Pr.**	**Tot.**
1. Chain Survey				
1. Be familiar with Chain Survey	Definition: chain survey, survey station, survey line, tie line, check line, offset	1		1
2. Be familiar with principle of chain Survey, equipment and field book required.	Explaining: Principle of chain survey, name of equipment and field book required.	1		1
3. Be familiar with types of chain and 3-4-5 method, carryout field works and plotting chain survey.	Explaining types of chain, use of optical square and 3-4-5 method, carry out reccee, Field work, plotting and completion, errors in chain survey.	3	12	15
2. Compass survey				
1. Be familiar with Compass survey. Be familiar with principle of compass survey	Definition: Compass survey, Bearing, declination, WCB, RB, back and fore bearing, conversion, Calculating of bearing from angle, angle from bearings	4	4	8
2. Be familiar with equipments required for compass Survey	Describe Prismatic Compass and its parts.	1		1
3. Cary out fieldwork and completion work in compass survey.	Recce, fieldwork and completion of compass survey, Errors in compass survey.	2	12	14
3. Plane Tabling				
1. Be familiar with Plane tabling and Topographical Survey	Definition: Plane tabling, Topo-graphical Survey.	1		1
2. Enlist plane table equipment	Describe plane table equipment and accessories.	1		1
3. State working principle of plane tabling. 4. Apply method of plane tabling.	Fixing, setting, leveling, centering, orientation and sighting points. Radiation, Intersection, Resection, PT Traverse.	5	30	35

5. Carry out field work in plane tabling	Reccee, Control extension, picking details, Advantages and disadvantages of plane tabling	2	22	24
6. Be familiar with relief representation methods	Definition: contour, characteristics of contours, contour interval, other methods of relief representation, definition of DEM	3	6	9
7. Apply the methods of topographical survey	Explaining methods of topographical survey	2		2
8. Apply the methods of contouring	Explaining direct and indirect methods of countering.	2		2
9. Be familiar with interpolation of contour	Explaining methods of interpolating contours.	1		1
10. List uses of contour	Explaining uses of contour	1		1
11. Carry out field work of topographical survey	Preparation, Reccee, control survey, detail survey, accessory work, computation	2	18	20
4. Tacheometric Survey				
1. Be familiar with tacheometry, 2. Be familiar with stadia method, formula used, Determine multiplying & additive constants.	Definition and advantage of Tacheometry, Equipment. Stadia principle, formula and determination of multiplying & additive constants	2	6	8
3. Carry out tacheometric field work. Complete and plot tacheometric survey. Measure area in tacheometric survey.	Reccee, field work, Errors in tacheometry. Computation and plotting tachometric survey. Measuring parcel area by coordinates.	3	6	9
Revision and Tests		4		4
Total		**40**	**116**	**156**

Facility:
Class Room, OHP, Multimedia, Open area divided into parcels.

List of tools materials, and equipment:
Chain, tape, arrow, wooden pegs, Prismatic compass, Field book, Pencil, error, Plan table set, PT level, Plumbing fork, Trough compass, sight rule. Telescopic alidade, plotting scale, Drawing paper, hard pencil, Theodolite, Total station and accessories Staff etc.

Reading materials:
1. Surveying Volume I, II, S.K. Duggel
2. प्रारम्भिक नापी (त्रि. वि./पा. वि. के.), महेश्वर भट्टराई

Entrepreneurship Development					
Description:	This course is designed to impart the knowledge and skills on formulating business plan and managing small business in general. This course intends to deal with exploring, acquiring and developing enterprising competencies, identification of suitable business idea and developing of business plan.				
Objectives:	After the completion of the course the trainees will able : 1. Understand the concept of business and entrepreneurship 2. Explore entrepreneurial competencies 3. Analyze business ideas and viability 4. Formulate business plan				
Marks: Th 20 + Pr 30 = 50		**Time: Th 40 hrs. + Pr 64 hrs. = 104 hrs.**			
S.No.	**Task statements**	**Related technical knowledge**	**Time (hrs)**		
			T	**P**	**Tot**
Unit 1: Introduction to Entrepreneurship			**10**	**6**	**16**
1	Introduce business	Introduction of business: • Definition of business/enterprise • Types of business • Classification of business • Overview of MSMEs(Micro, Small and Medium Enterprises) in Nepal	2		2
2	Define entrepreneur/entrepreneurship	Definition of entrepreneur: Definition of entrepreneur Definition of entrepreneurship Entrepreneurship development process	1	1	2
3	Describe entrepreneur's characteristics	Entrepreneur's characteristics: Characteristics of entrepreneurs Nature of entrepreneurs	1	1	2
4	Assess entrepreneur's characteristics	Assessment of entrepreneur's characteristics: List of human characteristics Assessment of entrepreneurial characteristics	1	1.0	2
5	Compare entrepreneur with other occupations	Entrepreneur and other occupations:	1.0		1.0

		Comparison of entrepreneur with other occupations Types and styles of entrepreneurs			
6	Differentiate between entrepreneur and employee	Entrepreneur and employee: Difference between entrepreneur and employee Benefit of doing own business	1	1	2
7	Assess "Self"	"Self" assessment: Understanding "self" Self-disclosure and feedback taking	2	1	3
8	Entrepreneurial personality test: Assess "Self" inclination to business	Entrepreneurial personality test: Concept of entrepreneurial personality test Assessing self-entrepreneurial inclination	1	1	2
Unit 2: Creativity and Assessment			**7**	**6 .0**	**13**
9	Create viable business idea	Creativity: Concept of creativity Barriers to creative thinking	2	1	3
10	Innovate business idea	Innovation: Concept of innovation SCAMPER Method of innovation	1	1	2
11	Transfer ideas into action	Transformation of idea into action: Concept of transferring idea into action Self-assessment of creative style	1.0	1	2
12	Assess personal entrepreneurial competencies	Personal entrepreneurial competencies: Concept of entrepreneurial competencies Assessing personal entrepreneurial competencies	1	1.0	2
13	Assess personal risk taking attitude	Risk taking attitude: Concept of risk Personal risk taking attitude Do and don't do while taking risk	1	1.0	3
14	Make decision	Decision making: Concept of decision making Personal decision making attitude	1.0	1	2

		Do and don't do while making decision			
Unit 3: Identification and Selection of Viable Business Ideas			**2**	**5**	**7**
15	Identify/ select potential business idea Analyze strength, Weakness, Opportunity and Threat (SWOT) of business idea	Identification and selection of potential business: Sources of business ideas Points to be considered while selecting business idea Business selection process Potential business selection among different businesses Strength, Weakness, Opportunity and Threats (SWOT) analysis of business idea Selection of viable business idea matching to "self"	2	5	7
Unit 4: Business Plan			**21**	**47**	**68**
16	Assess market and marketing	Market and marketing: Concept of market and marketing Marketing and selling Market forces 4 Ps of marketing Marketing strategies	2	2	4
17	Business exercise: Explore small business management concept	Business exercise: Business exercise rules Concept of small business management Elements of business management Planning Organizing Executing Controlling	3	2	5
18	Prepare market plan	Business plan/Market plan Concept of business plan Concept of market plan Steps of market plan	2.0	3 .0	5 .0
19	Prepare production plan	Business plan/Production plan: Concept of production plan Steps of production plan	2	2	4
20	Prepare business operation plan	Business plan/Business operation plan: Concept of business operation plan	3	5	8

		Steps of business operation plan Cost price determination			
21	Prepare financial plan	Business plan/Financial plan: Concept of financial plan Steps of financial plan Working capital estimation Pricing strategy Profit/loss calculation BEP and ROI analysis Cash flow calculation	5	9	14
22	Collect market information /prepare business plan	Information collection and preparing business plan: Introduction Market survey Precaution to be taken while collecting information Sample questions for market survey Questions to be asked to the customers Questions to be asked to the retailer Questions to be asked to the stockiest/suppliers Preparing business plan	2	15.0	17.0
23	Appraise business plan	Business plan appraisal: Return on investment Breakeven analysis Cash flow Risk factors	1	6	7
24	Maintain basic book keeping	Basic book keeping: Concept and need of book keeping Methods and types of book keeping Keeping and maintaining of day book and sales records	2	3	4
	Total:		**40**	**64**	**104**

Text book:

क) प्रशिक्षकहरुका लागि निर्मित निर्देशिका तथा प्रशिक्षण सामग्री, प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्, २०६९

ख) प्रशिक्षार्थीहरुका लागि निर्मित पाठ्यसामग्री तथा कार्यपुस्तिका, प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्, (अप्रकाशित), २०६९

Reference book:

- Entrepreneur's Handbook, Technonet Asia, 1981.

References

1. Elementary plane and mine surveying (Mir Publisher Moscow), V. Borshsh - Komponiets, B. Fedorov, M. Kolesnikova
2. Elementary Surveying (Harper & Row Publisher), J. E. Fryrer, M. H. E. (Fick, C. Brinker)
3. Elements of cartography (John wiley and sons), Robinson, R. Sale, J.Morrisson
4. प्रारम्भिक नापी (त्रि. वि./ पा. वि. के.), महेश्वर भट्टराई
5. Geodetic Surveying (Mir Publisher Moscow), A. V. Maslov, A. V. Gordoov, Yu. C. Batrokov)
6. Plane and Geodetic Surveying - Vol I (Asid Publishing)
7. Practical Field Surveying and Computations (William Heinemann Ltd), A. L. Allan, J. R. Hollway, J. H. B. May)
8. Principles and use of surveying Instruments (ELBS), J. Clendinning, J. G. Olliver
9. Surveying (Tata McGraw Hill Publishing Co. Ltd) , Narinder Singh
10. Surveying for Construction (Mc Graw Hill Book Company), William Irrine
11. Triangulation Instruction Book (HMG/Survey Dept., Geodetic Survey Bra)
12. Surveying (ELBS), Bannister and Raymond
13. Elements of Plane Surveying (McGraw Hill), Benton and Taetz
14. Practical Guide to surveying (Mir Publisher Moscow), V. L. Assur, A. M. Filatov
15. Fundamentals of Survey Measurements and Analysis (William Collins Son and Co.), M. A. R. Cooper
16. Computer and Common Sense (PHI), Roger Hunt & John Shelly
17. Engineering Surveying Manual , American Society of Civil Engineering
18. Manual of Map Reading (London Her Majesty's Service), Ministry of Defense
19. Principles of Surveying (Blackie and Son Ltd./ELBS), J. Clendinning & J. G. Olliver
20. Introduction to surveying, Andorson & Mikhail
21. Surveying for Engineers (ELBS), J. Uren & W. F. Price

On the Job Training (OJT)

Full Marks: 300 **Practical: 12 weeks/480 Hrs.**

Description:
On the Job Training (OJT) is a 3 months (12 weeks/72 working days) program that aims to provide trainees an opportunity for meaningful career related experiences by working fulltime in real organizational settings where they can practice and expand their classroom based knowledge and skills before graduating. It will also help trainees gain a clearer sense of what they still need to learn and provides an opportunity to build professional networks. The trainee will be eligible for OJT only after attending the final exam. The institute will make arrangement for OJT. The institute will inform the CTEVT at least one month prior to the OJT placement date along with plan, schedule, the name of the students and their corresponding OJT site.

Objectives:
The overall objective of the On the Job Training (OJT) is to make trainees familiar with firsthand experience of the real work of world as well as to provide them an opportunity to enhance skills.

The specific objectives of On the Job Training (OJT) are to;

- apply knowledge and skills learnt in the classroom to actual work settings or conditions and develop practical experience before graduation
- familiarize with working environment in which the work is done
- work effectively with professional colleagues and share experiences of their activities and functions
- strengthen portfolio or resume with practical experience and projects
- develop professional/work culture
- broaden professional contacts and network
- develop entrepreneurship skills on related occupation.

Activity:
In this program the trainees will be placed in the real work of world under the direct supervision of related organization's supervisors. The trainees will perform occupation related daily routine work as per the rules and regulations of the organization.

Potential OJT Placement Sites:
The nature of work in OJT is practical and potential OJT placement site should be as follows;

- Survey department
- Department of land information and archive
- Land management training center
- National land use project
- Nepal electricity authority (NEA)
- Municipality
- Relevant engineering firms/consultancy

Requirements for Successful Completion of On the Job Training:

For the successful completion of the OJT, the trainees should;

- submit daily attendance record approved by the concerned supervisor and minimum 72 working days attendance is required
- maintain daily diary with detail activities performed in OJT and submit it with supervisor's signature
- prepare and submit comprehensive final OJT completion report with attendance record and diary
- secured minimum 60% marks in each evaluation

Complete OJT Plan:

SN	Activities	Duration	Remarks
1	Orientation	2 days	Before OJT placement
2	Communicate to the OJT site	1 day	Before OJT placement
3	Actual work at the OJT site	12 weeks/480 hours	During OJT period
4	First-term evaluation	one week (for all sites)	After 2 to 3 weeks of OJT start date
5	Mid-term evaluation	one week (for all sites)	After 8 to 9 weeks of OJT start date
6	Report to the parental organization	1 day	After OJT placement
7	Final report preparation	5 days	After OJT completion

- First and mid-term evaluation should be conducted by the institute.
- After completion of 6 months OJT period, trainees will be provided with one week period to review all the works and prepare a comprehensive final report.
- Evaluation will be made according to the marks at the following evaluation scheme but first and mid-term evaluation record will also be considered.

Evaluation Scheme:

Evaluation and mark distribution are as follows:

S.N	Activities	Who/Responsibility	Marks
1	OJT Evaluation (should be three evaluation in three months –one evaluation in every month)	Supervisor of OJT provider	200
2	First and mid- term evaluation	The Training Institute	100
	Total		**300**

Note: Trainees must secure 60 percent marks in each evaluation to pass the course.

OJT Evaluation Criteria and Marks Distribution:

- OJT implementation guideline will be prepared by the CTEVT. The detail OJT evaluation criteria and marks distribution will be incorporated in the guidelines.
- Representative of CTEVT, Regional offices and CTEVT constituted technical schools will conduct the monitoring & evaluation of OJT at any time during the OJT period.

List of Tools, materials and equipment

SN	Name	SN	Name
1	Altimeters	44	Mathematical Instruments set
2	Arrow	45	Measuring tape
3	Axe	46	Markers
4	Auto levels	47	Masonry tools
5	Brunton Compass	48	Optical squares
6	Barometers	49	Paper
7	Scientific calculators	50	Pencil
8	Card board	51	Pens
9	Chain	52	Pick
10	Chart paper	53	Plane table set
11	Clip board	54	Plotting scale
12	Clinometer Compass	55	Plumb Bob
13	Compass	56	Plumbing fork
14	Cross staff	57	Printer
15	Computer with AutoCAD software package	58	Prismatic compass
16	Cutting tools	59	PT level
17	Divider	60	Ranging rods with stand
18	Digital levels	61	Reservoir pens
19	Drafting Film	62	Ruler
20	Drafting pens	63	Scanner
21	Drawing Board	64	Shovel
22	Drawing ink	65	Scythe
23	Drawing paper	66	Seal-O-tape
24	Drawing sheet	67	Set Square
25	Drawing Table	68	Sight rule
26	Dumpy levels	69	Staff
27	Electronic Distance Meter (EDM)	70	Staves
28	Eraser	71	Straight edge
29	Field book	72	Swivel pens
30	GIS software	73	Station maker
31	Graph papers	74	Stop watches
32	Gunter Scale	75	Tape
33	Hammer	76	Telescopic alidade
34	Hand held GPS receivers	77	Theodolite
35	Hand GPS	78	Thermometers
36	Hard pencil	79	Topographical maps
37	Internet	80	Total station set
38	Lettering sets	81	Tracing papers
39	Level	82	Triangular scales
40	Level Machine	83	Trough compass
41	Level tripods	84	T-Scale
42	Line pens	85	T-squares
43	Marker	86	Wooden pegs