GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: MINE SURVEYING - I
(Code: 3342201)

Diploma Programme in which this course is offered	Semester in which offered
Mining Engineering	4th Semester

1. RATIONALE:

The diploma holders in mining engineering are generally responsible for the mine developments. Being Mining Engineers, they must be able to understand and identify various features of mining field from mine plans, sections and predict future course of actions. The important matter in this course content is the theory and practical related to prepare plans, layouts, sections, topo sheets etc. and make them interpret as well. In this course one must give the maximum emphasis on learning by doing the practical part mainly the field exercises.

2. COMPETENCY:

The course content should be taught and curriculum should be implemented with the aim to develop required skills so that student is able to acquire following competency.

- **Survey and prepare drawings and interpret various mine plans and sections for mining operations**.

3. COURSE OUTCOMES (COs)

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

i. Describe construction and adjustments of Theodolite
ii. Draw a plan for each of methods for underground surveying
iii. Measure all the level differences from surface to underground working
iv. Solve problems related to geological configuration / Disturbances of ground

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
4	0	4	8	70	30	40	60	200

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** - Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I : Theodolite-I	1.a Describe construction and adjustments of Theodolite. 1a1. Define Terms used 1a2. List parts of a Theodolite 1.b Describe steps to measure the following listed using a Theodolite for surveying. 1b1.horizontal angle, 1b2. vertical angle, 1b3.bearings 1b4.Ranging 1b5. Establishing new station 1b6. List the steps for permanent adjustment.	1.1 **Survey equipment**-Theodolite: Parts-Terms used - Temporary Adjustments - Tachometers. 1.2 Measurements - such as ranging, Establishing new station, horizontal angle, vertical angle, bearings, and permanent adjustment.
Unit – II : Theodolite-II	2a. Enumerate the purpose of traversing first, second and Third order traverse by Theodolite closed open traverse Carry out open and closed traversing. 2b.List the steps to carryout traversing adjustments. 2c. Included and direct angles, Latitude, Departures, 2d Describe checks-corrections of the Traverse. 2d1. State the Bowditch rule and transit rule	2.1 Purpose of traversing first, second and Third order traverse, closed open traverse. 2.2 Included and direct angles, Latitude, Departures, checks-corrections of the Traverse- Bowditch rule and transit rule.
Unit – III : Dial Survey	3a. Draw a plan for each of methods for underground surveying 3b. Describe the steps to perform underground surveying using various methods. viz- dial surveying-Loose needle survey-Fast needle	1.1 Miners dial- Dial and telescopic Miners dial construction - temporary and permanent adjustment. Booking survey – Graphic. 1.2 Method. - Field & line Method. Setting out Underground road ways with the help of dial, Plotting by protector, Test for Miners dial, precautions to be taken. Methods used in dial surveying-Loose needle survey-Fast needle

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	survey. 3b1 List the different Method viz Field & line Method 3b2. Describe the precautions to be taken to perform underground surveying of various methods. viz- dial surveying-Loose needle survey-Fast needle survey. 3b3. Describe the steps to Test the Miners dial 3c.Describe construction - temporary as well permanent adjustment for miners dial and telescopic Miners dial 3d.List the steps for setting out underground road ways with the help of dial& Plotting by protector	survey.
Unit – IV : **Use of Level in Surface & Underground working**	4a.Measure all the level differences from surface to underground working.	4.1. Depth of shaft and other Working. 4.2. Underground bench mark - Datum – throw of fault - gradient of Underground road. 4.3. Subsidence.
Unit – V : **Dip Strike Problems**	5a.Solve problems related to geological configuration/ Disturbances of ground.	5.1. True and apparent dip and strike from bore hole data. 5.2. Deviation in the borehole drilling 5.3. Throw of fault and length of drift to cross The fault. 5.4 Bearings and dip of various mine working.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1.	Theodolite-I	10	05	04	05	14
2.	Theodolite-II	14	05	04	05	14
3.	Dial Survey	14	09	04	05	18
4.	Use of Level in Surface & Underground Working	16	05	02	03	10
5.	Dip Strike Problems	12	07	03	04	14

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
Total		**56**	**31**	**17**	**22**	**70**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's Revised taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICAL:

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Note*: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of* ***Course Outcomes*** *related to affective domain. Thus over all development of* ***Programme Outcomes (****as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

S. No.	Unit No.	Practical/Exercises (outcomes in psychomotor domain)	Approx. Hrs. Required
1	I, II	Perform Theodolite traverses survey by closed traversing and open traversing method and draw sheet.	10
2	I	Calculate latitude and departure of close traversing survey .	10
3	II	Check accuracy of close traversing and balancing by Bowditch rule & transit rule.	16
4	III	Draw schematic diagram of Miners Dial and describe its constructional features & adjustments.	06
5	IV	Perform depth measurement operation of a vertical shaft in field.	04
6	IV	Measure subsidence using levelling method of the ground.	04
7	V	Determine the true apparent dip & strike from bore hole data.	06
Total Hours			**56**

8. SUGGESTED LIST OF STUDENT ACTIVITIES:

i. Perform land survey work with the help of Theodolite and dials and prepare a sheet with all necessary checks and correction.
ii. Carry out small projects for subsidence measurement and finding out the strike and gradient of seam
iii. Visit of mine to use surveying equipment and prepare reports/maps.

9. SPECIAL INSRUCTIONAL STRETEGIES (If Any)

i. Video Film of surveying operations.
ii. Calculation and sheet preparation work from survey reading.
iii. Field works for different survey work like subsidence measurement levelling traversing, depth measurement etc.
iv. Interpretation of Survey Drawings

10. SUGGESTED LEARNING RESOURCES

A. List of Books:

S. No.	Title of Books	Author	Publication
1.	Surveying	Kanetakar	Latest
2.	Mine Surveying Vol-I,II,III	Ghatak	Lovely prakashan
3.	U.M.S.		Lovely prakashan

B. List of Major Equipment/Materials:

i. Theodolite.
ii. Miner's dial.
iii. Levels.
iv. Drawing sheets.
v. Drawing board.
vi. Ranging rods.
vii. Cross staff.
viii. Measuring tapes.

C List of Software/Learning Websites

i. http://en.wikipedia.org/wiki/Surveying
ii. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT ROORKEE/SURVEYING/home.htm
iii. http://freevideolectures.com/Course/98/Surveying
iv. http://www.whycos.org/fck_editor/upload/File/Pacific HYCOS/Surface_Waters/Levelling_and_surveying.pdf
v. www.nptel.com
vi. www.gsi.com
vii. YouTube survey video

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. S.G Srivastav,** I/c HOD, Department of Mining Engineering, G. P. Bhuj
- **Prof. R.G Prajapati,** Lecturer, Department of Mining Engineering, G.P. Bhuj

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. K .K Jain,** Professor and Dean, Department of Mechanical Engineering.
- **Dr. C. K. Chug**, Professor, Department of Mechanical Engineering.