GUJARAT TECHNOLOGICAL UNIVERSITY

MINING ENGINEERING (22)

SURFACE MINE PRODUCTION

SUBJECT CODE: 2142206

B.E. 4th SEMESTER

Type of course: Under Graduate level

Prerequisite: Zeal to learn the subject

Rationale:

The subject surface mine production gives general plan, design & extraction of mineral in surface mine workings. It gives knowledge of Drilling, Blasting, Excavation and loading of minerals which further extends the idea about development and transportation of mineral including the safety of environment and human kind.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Topics	Teaching Hours	Module Weightage
1.	**Surface mining:** General information, Basic definition, Surface mining, Quarrying strip mining, Open pit mining, Open cast mining, Terms: Advantages and disadvantages. Determination of main parameters, Major dimensions, Heights and widths and benches, Slop angles.	04	09%
2.	Opening up of mines by surface methods, Driving of ingoing trenches, laying of communication routes, System of disposal of overburden, Removal of cover rocks, Factors influencing selection and characteristics of opencast work.	04	08%
3.	General surface mining method, Basis layouts, Choice of mining method.	03	07%
4.	Major operations in surface mining.	02	04%

5.	**Ground Preparation :** Bull dozing, Scrapping, Grading, Ripping.	04	08%
6.	**Drilling:** Criteria for selection and performance of different types of drilling equipments, Drilling patterns: Inclined drilling.	04	08%
7.	**Blasting:** Explosives, Multi row blasting, Twin bench blasting: Coyote blasting, Secondary blasting, Overcastting by explosives.	04	08%
8.	**Excavation and loading:** Factors influencing choice of excavating and loading machines, their performance in different condition of ground, Power shovel, Dragline, BWE, Front end loaders, Backhoes, Surface miner.	05	11%
9	**Transport:** Comparative study of different transport system in opencast mines, Factors influencing choice of a system, Optimization of load haul system, Dumpers, Coal haulers, Belt conveyer, Pipe line transportation.	05	11%
10	**Storage:** Stock piling and rehandling, Spreaders, Reclaimers.	03	07%
11	**Reclamation:** Planning methods of reclamation for different types of opencast mines.	03	07%
12	**Drainage:** Sources of water assessment of drainage requirements drainage patterns, Slope Stability: Factors influencing stability of slopes, Mechanics of slope failures, Stability analysis, Methods of improving stability of slopes, Protection and monitoring, Influence of pit slope on mine economics.	05	11%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
08	14	20	10	18

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's 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

Reference Books:

1. Elements of Mining Tech. (Vol- I), D. J. Deshmukh.
2. Surface Mining Technology, Samir Kumar Das.
3. Heavy Earth Moving Machines, Amitosh de.
4. U M S

Course Outcome:

After learning the course the students should be able to:

1. To know about opening different surface mine with its suitability & its cycle of operation of excavating
   Minerals like drilling, blasting etc.
2. To know different transportation system adopted in Surface mine with its suitability.
3. To have an idea about reclamation work & drainage system.

List of Experiments:

Following experiments are suggested for Laboratory work

1. Observe the use of different types of explosives used in open cast mining, and prepare a report.
2. Observe and prepare report of Constructional features & Working methods of Bucket Wheel Excavator.
3. Observe sketch of different types of drilling patterns used in O/C Mines.
4. Observe different methods of secondary blasting in open cast mining, and prepare a report.
5. Observe and prepare report on draglines, power shovel.
6. Study of different transportation methods.

Important Note:

80 % From above suggested laboratory work should be covered and remaining 20 % is as per facility available at Department.

Design based Problems (DP)/Open Ended Problem:
All above performance are to be carried out in the laboratory and students will prepare experiments and note down reading and conclusion. The can prepare for calibration and compare results with existing and with alternate methods of measurements. At least 5 open ended problems are proposed for better understanding the subject and to apply real life application. The projects are listed below:

1. Cycle of operations of various machineries.
2. Comparison of different types of transportation machineries.
3. Design and prepare surface mine layout.
4. Experiment for different types of drilling pattern & explosive and fragmentation.

Major Equipment:

1. Working Model of different types of machineries.
2. Model of different types of drilling patterns.
3. Study and observe model of surface mine.

List of Open Source Software/learning website:

1. http://en.wikipedia.org/wiki/Mining
2. www.youtube.com
3. http://www.mining-journal.com/
4. http://www.miningiq.com/
5. http://www.mining-technology.com/
6. www.nptel.com

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.