



**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**Bachelor of Engineering**  
**Subject Code: 3152206**  
**UNDERGROUND COAL MINING**  
**B.E. 5<sup>th</sup> SEMESTER**

**Type of course:** Undergraduate

**Prerequisite:** Zeal to learn the subject

**Rationale:**

The course is designed to help the student in understanding the different coal mining methods, their applicability conditions, merits and demerits, various stowing methods, ventilation and transportation system. This course is helpful to select suitable and economical method of coal mining and also to gain knowledge about the various difficulties arise during the workings of coal mine.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

**Content:**

Sr. No.	Topics	Teaching Hrs.	% Weightage
1	<b>Introduction:</b> Origin, Coal formation, Coal measuring rocks and their characteristics, Rank of coal. Characteristics of Indian coal deposits. Major coal producing areas in India. Classification of coal seam as per thickness, Depth and Inclination, Factors affecting choice of coal mining methods.	08	14
2	<b>Coal Mine Development:</b> Practices of opening up coal deposits in major coalfields. Design and Development of panel. Mechanized development layout Transport and Ventilation arrangements to and from the panel. Classification of mining methods. Type of machinery, cycle of operation	10	17
3	<b>Bord and Pillar Method of Working:</b> Applicable conditions, Size of Panel, Pillars, Barrier and Headings. Percentage of extraction during development. Unit operations of winning, Loading and Haulage. Methods of pillar extraction. Problems and Issues in depillaring, Extraction by caving and Stowing methods. Possible mechanisation in Bord and Pillar method. Work arrangement and Calculation of production. Related mine regulations.	14	23
4	<b>Longwall Mining:</b> Applicable conditions. Development within the panel in advancing and Retreating system. Optimum length of faces. Single and Double unit longwall faces. Working in dip, Strike and Rise directions. Cyclic and Non-cyclic operations. Mechanised cutting and Loading operations. Application of DERDS, SERDS, Armoured Face Conveyor, Work organisation and Calculation of production.	14	23
5	<b>Roof Supports and Stowing Practice:</b> Timber props and cogs; friction/hydraulic props and chocks; other steel supports; types of roof bolts; function, applicability and advantage of roof bolting and cable bolting, Systematic supporting rules. Stowing methods; Principle, hand packing (Packwalls), mechanical, Pneumatic, Hydraulic; Merits and Demerits with applicability, Collection and Preparation, Transport, Handling and Storage. Arrangement for stowing on the surface and Underground. Shrinkage of stowing material and its effect.	14	23

**Suggested Specification table with Marks (Theory):**

<b>Distribution of Theory Marks</b>
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R Level	U Level	A Level	N Level	E Level	C Level
12	15	18	09	09	07

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create 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. D. J. Deshmukh; Elements of Mining Technology, Vol I; Central Techno Publications, Nagpur.
2. R. D. Singh; Principles and Practices of Modern Coal Mining; New Age International.
3. S. K. Das; Modern Coal Mining Technology; Lovely Prakashan Publishers.
4. J. G. Singh; Underground Coal Mining Methods; Braj Kalpa Publishers, Varnasi.
5. SME Mining Engineers Handbook on Underground Coal Mining.
6. H. L. Hartman; Introductory Mining Engineering; John Wiley, New York.

#### Course Outcome:

The student after undergoing this course will be able to:

1. Explain characteristics & development of coal seams in India.
2. Select suitable underground mining method of coal.
3. Design ventilation and transportation circuits.
4. Select safe stowing practices and roof support.

#### List of Experiments:

Following experiments are suggested for Laboratory work

1. Study & Layout of a board & pillar Method of working.
2. Determination of size of pillar & panel in board and pillar method.
3. Determination of Percentage extraction of coal in a development area.
4. Study & layout of longwall Method of working.
5. Determination of size of panel in longwall method of mining.
6. Study of Stowing Organization system used in mines.
7. Study of different types of roof support in underground coal mine.

#### 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:

Visit to an underground coal mine to study various underground coal mining methods.

#### Major Equipment:

1. Mining Models.
2. Various charts of ventilation, transportation system and stowing operation.

#### List of Open Source Software/learning website:



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1. [http://en.wikipedia.org/wiki/Underground\\_mining\\_\(soft\\_rock\)](http://en.wikipedia.org/wiki/Underground_mining_(soft_rock))
2. <http://scienceandtech.cmpdi.co.in/PDF%20Files/Mining%20Methods.pdf>
3. [http://en.wikipedia.org/wiki/Longwall\\_mining](http://en.wikipedia.org/wiki/Longwall_mining)
4. <http://www.slideshare.net/sankarsulimella/pillar-design-in-coal-mines>
5. [http://www.undergroundcoal.com.au/fundamentals/06\\_overview.aspx](http://www.undergroundcoal.com.au/fundamentals/06_overview.aspx)
6. <https://www.britannica.com/technology/coal-mining/Underground-mining>
7. [Undergroundcoal.com](http://Undergroundcoal.com)