4296 - UNDERGROUND MINING METHODS

Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)			
Lectures	Practical	Credits			Theory		Practical Ex.	Total
3	2	5	25	25	3 Hrs	100	-	150

Pre-requisite	Source
4293	MIN

Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	50	-	150

Rationale: Person intending to work in underground coal mines & metal mines requires advance knowledge of various methods. This course is designed to give exposure to the student of the methods of underground mining.

COURSE CONTENTS	Hrs	Mks
1. INTRODUCTION Classification of coal seam with respect to thickness, depth and inclination, classification of mining methods. Bord & Pillar method. A quick revision of development.	2	4
Depillaring: Types of depillaring, Preparatory arrangements before depillaring, Methods of pillar extraction, layout of Bord & Pillar, Machine and Man-power requirement production, calculation, various depillaring operations, depillaring with caving and stowing, systematic support rules, different layouts. Stowing: Conditions favouring depillaring with stowing, Methods, selection of material, hydraulic stowing, stowing plant, stowing pipes and their layout U/G stowing arrangements and operations Pneumatic and Mechanical stowing problems in stowing. Bord & Pillar under special conditions. Coal Mines Regulations: 100,111,113,115.	6	15
2. LONGWALL MINING Applicable conditions, development, setting of longwall face, working of longwall face, advantages and disadvantages of longwall advancing and retreating. Factors affecting longwall face.	7	16
Classification of methods in longwall mining: (a) Cyclic operations. (b) Non cyclic operations: Preparation of face, Hydraulic support, mechanised loading and cutting operations; DERDS & SERDS. CMR REG:- 100(A). Methods of cutting, sumping: Mode of transportation AFC, Parts of an AFC, working.	13	30
3. SPECIAL METHODS IN COAL MINING Thick seam mining. Classification of seams, definition of thick seam, problems and difficulties in thick seam, Method - with stowing and without stowing.		
Thick seam working by Bord & Pillar method, thick seam working by longwall method in several slices, sublevel caving, blasting gallery method, shield mining. CMR REG: 104,105,106,107	13	25
4. CLASSIFICATION OF METAL MINES METHODS Application, Development, extraction, mechanisation, support, ventilation comparison advantages and disadvantages. Overhand, underhand stopings, Breast stopings, Room & Pillar, Long hole stoping, Sub level stoping , Shrinkage stoping		
Cut and fill stoping (filling materials & techniques), Square set Mining - filled and non-filled, Block caving, Sub level Caving, Top slicing.	7	10
5. SPECIAL METAL MINING METHODS Application, Development, extraction, mechanisation, support, ventilation comparison advantages and disadvantages. Combined methods, Blast hole stoping, Vertical crater method, Post pillar stoping, Working of narrow vein, Deep Mining associated problem granite packing, chathy stoping, Back hole stoping etc. MMR REG:- 107,108,109,110,111,114,116,117,118,		
Total	48	100

PRACTICALS:

1. A coal seam of __ mts. in thickness having inclination of __ is to be mined using panel system, using LHD/SDL and conveyor belt. Give a layout for the same explaining the support system ventilation on the face and sequence of operation.
2. Describe a suitable method for extraction of pillars in a district with 30-m x 30-m huy 76 centre to centre pillars. What percentage of recovery you will expect in the method.
3. Sketch and study hydraulic stowing operation in depillaring.
4. Sketch a block diagram of DERDS. Explain the significance of each part, types of cutting, types of sumping.
5. Sketch and study the constructional features of an armoured face conveyor.
6. Sketch and study various types of hydraulic supports used in a mechanised longwall mining
7. A coal seam of __ mts in thickness having an inclination of __ is to be worked with longwall retreating with caving. Describe the method with suitable sketch giving details of sequence of operation, support, and transport system. Production expected from the face.
8. Sketch & study working a thick seam by slices in a descending order, which includes sublevel caving.
9. Sketch and study Horizon mining.
10. A thick coal seam developed by bord & pillar method is to be extracted by blasting gallery method. Describe the method with suitable sketches giving details of sequence of operation, drilling, loading, transport system, support, production expected from the face. Assume your own conditions.
11. Sketch and study room & Pillar stoping method.
12. Sketch & study sublevel stoping method.
13. Sketch & study cut & fill stoping method.
14. Sketch & study top slicing method.

REFERENCE BOOKS:

1. Elements of Mining Technology, Vol-2 by D. J. Deshmukh.
2. Mining Engineering Handbook Vol –1 & 2 by Pele.
3. S.M.E. by Hartman.
4. Mining of Mineral Deposits by L. Shevyakov.
5. Blasting Techniques by S. K. Das.
6. Mining of Ores & Non-metallic Minerals by Agoshkov, Borisov.