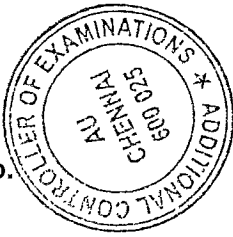


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ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS (ARREARS), NOV/DEC 2024

MINING ENGINEERING

Eighth Semester

MI 5012 – ADVANCED ROCK BLASTING TECHNOLOGY

(Regulation 2019)

Time: 3hrs

Max. Marks: 100

- CO1 Understand the recent developments in blasting techniques adopted in surface and underground mines.
- CO2 The students will learn about theories of rock breakage indicating the mechanics of rock fragmentation.
- CO3 Learn the usage of modern instrumentation and software for monitoring and analyzing the blast performance.
- CO4 Control the environmental effects due to blasting and design the blast accordingly as per the statutory provisions.
- CO5 Understand the basic concepts of novel blasting techniques adopted surface and underground construction projects

BL – Bloom's Taxonomy Levels

(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

**PART- A (10x2=20 Marks)**

(Answer all Questions)

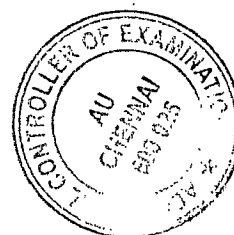
Q.No	Questions	Marks	CO	BL
1	Distinguish between 'True Bottom Priming' and 'Multi-point Priming.'	2	CO1	<u>L1</u>
2	Define 'Blasting agents' with an example.	2	CO1	<u>L2</u>
3	Mention any four differences between 'conventional blasting' and 'cast blasting' in the surface bench blasting operation.	2	CO2	<u>L3</u>
4	What do you mean by 'Absolute Bulk Strength' and 'Actual Weight Strength'?	2	CO2	<u>L1</u>
5	What do you understand by 'Deep hole blasting'?	2	CO3	<u>L4</u>
6	What do you mean by 'Cup Density'?	2	CO3	<u>L4</u>
7	Write down the four objectives of maintaining a 'delay interval' in the blast layouts prepared for the blasting operations.	2	CO4	<u>L5</u>
8	List out four potential causes of the misfire produced from the blasting.	2	CO4	<u>L3</u>
9	Write a short note on 'Baby decking'.	2	CO5	<u>L2</u>
10	Specify four advantages and disadvantages of 'Sleeping holes'.	2	CO5	<u>L3</u>

**PART- B (5x 13=65 Marks)**

(Restrict to a maximum of 2 sub divisions)

Q.No	Questions	Marks	CO	BL
11 (a)	Discuss various bulk explosive systems used in the mines in detail with reference to its composition, characteristics, applicability, advantages and limitations.	13	CO1	<u>L1</u>
OR				
11 (b)	(i) Give an account of characteristics, advantages & disadvantages, and applications of the initiation sequence layouts with neat sketches of (a) Row-by-row (b) V initiation.	8	CO1	<u>L1</u>
	(ii) Enumerate any five reasons for usage of delay detonators in both the surface and underground blasting operations.	5		
12 (a)	Enumerate the various theories of rock breakage explaining the mechanism of blasting. Discuss any three theories of rock breakage with the suitable and neat sketches.	13	CO2	<u>L6</u>
OR				
12 (b)	Describe the cast blasting technique adopted in dragline benches with a neat sketch indicating the methodology, applications, advantages and disadvantages.	13	CO2	<u>L6</u>
13 (a)	You are appointed as a blasting engineer of an open pit hard rock mine handling total excavation of 7 lakh cu.m comprising both ore and waste annually using the conventional cyclic mining system of electric rope shovel and trucks. But, there are severe complaints on the <b>poor quality of floor level</b> and <b>uncharacteristic bench height</b> being resulted from the blasting operations. You are instructed to handle the situation to provide the information on the following:		CO3	<u>L4</u>
	(i) Major reasons & causes for the above complaints.	7		
	(ii) Strategies to resolve the aforesaid issues.	6		
OR				
13 (b)	(i) What are the precautionary measures to be observed <b>against premature blast of Site Mixed Emulsion (SME)/Site Mixed Slurry (SMS) explosive</b> as per the <b>DGMS Circular No: 14 of 2020?</b>	9	CO3	<u>L4</u>
	(ii) Write a short note on 'Stemming Plug' in blasting operation.	4		
14 (a)	Describe the drilling and blasting practices being adopted in the developed galleries of open cast coal mine with neat sketches along with specifying the precautionary measures as stipulated by the DGMS.	13	CO4	<u>L5</u>

OR



- 14 (b) You are appointed as a Mines Manager of an open pit hard rock mine producing 2 Million Tonnes of Iron ore with a stripping ratio of 1:4.5 using the conventional cyclic mining system of hydraulic excavator of 6 m<sup>3</sup> and trucks of 85 t. Here, a village is located at a distance of 800 m from the boundary and there were complaints on flyrock produced from the blasting damages the structure of the houses and agricultural lands. You are instructed to handle the situation to provide the information on the following:
- (i) Fundamental reasons for the aforesaid complaints 7
- (ii) Approaches & Mitigating measures to resolve the problems. 6
- CO4 L5
- 15 (a) (i). Discuss in detail about the controlled blasting techniques adopted for quarry considering the blast design parameters and safety precautions to be adopted during such blasting operation. 9
- (ii) Write a short note on 'Danger zone'. 4
- CO5 L3
- OR
- 15 (b) (i) Write down the Kuzentsov Equation and Model for predicting the fragmentation with limitations of Kuz-Ram Model. 4
- (ii) Discuss the factors influencing the fragmentation in the blasting in detail. 9
- CO5 L3

**PART- C (1x 15=15 Marks)**

(Q.No.16 is compulsory)

Q.No	Question	Marks	CO	BL
16.	Explain the various blasting methods & cut types used in the excavations carried out in the underground metal mines indicating its characteristics, charging practices, applications, advantages and disadvantages.	15	CO3	<u>L4</u>

