Roll No. | | | | | | | | | | |

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	L1
2	Define 'Blasting agents' with an example.	2	CO1	L2
3	Mention any four differences between 'conventional blasting' and 'cast blasting' in the surface bench blasting operation.	2	CO2	L3
4	What do you mean by 'Absolute Bulk Strength' and 'Actual Weight Strength'?	2	CO2	L1
5	What do you understand by 'Deep hole blasting'?	2	CO3	L4
6	What do you mean by 'Cup Density'?	2	CO3	L4
7	Write down the four objectives of maintaining a 'delay interval' in the blast layouts prepared for the blasting operations.	2	CO4	L5
8	List out four potential causes of the misfire produced from the blasting.	2	CO4	L3
9	Write a short note on 'Baby decking'.	2	CO5	L2
10	Specify four advantages and disadvantages of 'Sleeping holes'.	2	CO5	L3

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	L1
	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	L1
	(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	L6
	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	L6
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 **poor quality of floor level** and **uncharacteristic bench height** being resulted from the blasting operations. You are instructed to handle the situation to provide the information on the following:		CO3	L4
	(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 **against premature blast of Site Mixed Emulsion (SME)/Site Mixed Slurry (SMS) explosive** as per the **DGMS Circular No: 14 of 2020?**	9	CO3	L4
	(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	L5
	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^3 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:		CO4	L5
	(i) Fundamental reasons for the aforesaid complaints	7		
	(ii) Approaches & Mitigating measures to resolve the problems.	6		
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	CO5	L3
	(ii) Write a short note on 'Danger zone'.	4		L3
	OR			
15 (b)	(i) Write down the Kuzentsov Equation and Model for predicting the fragmentation with limitations of Kuz-Ram Model.	4	CO5	L3
	(ii) Discuss the factors influencing the fragmentation in the blasting in detail.	9		

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	L4