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

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APR / MAY 2025

MINING ENGINEERING
Fourth Semester
MI23403 - MINING MACHINERY - I
(Regulation 2023)

Time:3hrs Max.Marks: 100

CO1	Obtain basic knowledge on motive power used in mines, pumping
CO2	Understand the basic concepts related to rope haulage and face haulage
CO3	Learn the design and constructional features of primary equipment used for loading and transportation in the underground mines
CO4	Enhance the knowledge on concepts related to pumping & conveying transport systems
CO5	Learn fundamental knowledge about mine electrical engineering in all statutory aspects

BL – Bloom's Taxonomy Levels
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A(10x2=20Marks)
(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Distinguish between preventive and predictive maintenance.	2	CO1	L3
2	Depict techno-economic indices for selection of machineries in mines	2	CO1	L3
3	Calculate the safe working load for locked coil winding rope of 34mm diameter, weight of 22.2kN and breaking strength of 982.6kN deployed in shaft sinking for the depth of 350m. Assume any missing data.	2	CO2	L4
4	List any five safety devices in a haulage roadway with neat sketches.	2	CO2	L1
5	Write short notes on diesel exhaust conditioner.	2	CO3	L2
6	Illustrate the salient features of gravity transport system.	2	CO3	L3
7	Mention the significance of hydraulic gradient.	2	CO4	L3
8	Elaborate the working mechanism of centrifugal pump.	2	CO4	L2
9	Explain the term 'RFD' in mine communication system.	2	CO5	L3
10	State the necessity for flameproof equipment deployed in underground mines.	2	CO5	L2

PART- B(5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	Describe the various transportation system adopted in mines. Discuss the salient features of each mode of transportation system indicating its merits, demerits and limitations.	13	CO1	L2
	OR			
11 (b)	Discuss in detail of compressed air distribution in mines with neat layouts.	13	CO1	L2

12 (a)	Classify different types of wire ropes. Describe the construction of stranded and non-stranded ropes. Discuss the selection and examination of wire ropes with neat schematic diagrams.	**13**	CO2	L2
	OR			
12 (b)	Explain with neat diagrams the principle and operation of direct and endless rope haulages with merits, demerits and fields of application with neat schematic diagrams.	**13**	CO2	L2
13 (a)	Explain in detail of constructional features of bi-cable ropeway indicating different parts with merits, demerits, limitations and scope of applicability.	**13**	CO3	L3
	OR			
13 (b)	Discuss the types of locomotive used in mines indicate the scope of application, merits and demerits of each locomotive. Also, describe in detail of charging room layout deployed for battery locomotive.	**13**	CO3	L3
14 (a)	Discuss in detail of tensioning device and driving gear required for belt conveyor system on uphill and downhill conditions with schematic diagrams.	**13**	CO4	L3
	OR			
14 (b)	Classify the types of scraper haulage used in mines and explain the construction feature and scope of applications of each type of scraper haulage system with neat sketches	**13**	CO4	L3
15 (a)	Give a layout for electrical power distribution network in underground workings and explain in detail of underground district transformer substation and distribution switchgear.	**13**	CO5	L3
	OR			
15 (b)	Discuss in detail of electrical distribution layout adopted for rope haulage system with neat sketches.	**13**	CO5	L3

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	An endless rope haulage system operates using a 75 H.P. electric motor to transport mineral along an inclined plane with a gradient of 1 in 12 and a total length of 1,200m. Each tub used has an empty mass of 800 kg and a carrying capacity of 1.6 tonnes. The coefficient of friction for the tubs is 1/80, while for the rope it is 0.1. The rope has a mass of 2.25 kg/m. The maximum haulage speed is 6.0 km/h, and the system accelerates at a rate of 0.1 m/s². Assuming any additional data as necessary, calculate (a) the annual quantity of mineral that can be transported when operating up the gradient (b) the annual quantity of mineral that can be transported when operating down the gradient, assuming all other parameters remain the same.	**15**	CO2	L5