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

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

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

MINING ENGINEERING

Fifth Semester

MI5502 - Underground Mining Methods-Coal

(Regulations 2019)

Time:3 hrs | Max. Marks: 100

CO1	Gain exposure on Global and National level demand of coal production and reserves availability
CO2	Acquire the scientific design skill on coal district development of Bord and Pillar method
CO3	Get the safety manner of planning skill on coal district depillaring of Bord and Pillar method
CO4	Gain the knowledge continuous and cyclic manner of coal extraction with different capacity and cutting-edge technology machineries
CO5	Explore the novel methods of coal winning in order to tackle the problems associated with thick and thin seams extraction methods

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	Write short notes on GCV of coal.	2	CO1	L1
2	Classify types of coal mining methods based on caving and stowing techniques.	2	CO1	L2
3	Distinguish between the level gallery and dip gallery with its advantages and disadvantages.	2	CO2	L1
4	List out the equipment required for non-conventional mining techniques in bord and pillar development panel.	2	CO2	L2
5	Illustrate various types of partial extraction methods and its scope of field application.	2	CO3	L1
6	Determine the number of roof bolts required for a gallery width of 4.8m based on load bearing capacity of each bolts.	2	CO3	L4
7	What do you mean by crown pillars?	2	CO4	L2
8	State the significance of stable in longwall working.	2	CO4	L2
9	Mention the scope of application of underground coal gasification.	2	CO5	L1
10	Explain the term 'SSR' as per CMR.	2	CO5	L2

PART- B(5x 13=65Marks)

(Restrict to a maximum of 2 subdivisions)

Q. No	Questions	Marks	CO	BL
11 (a) (i)	Mention the locations of major coalfields of Gondwana and tertiary formation in India.	7	CO1	L2
(ii)	Explain the procedure involved in proximate and ultimate analysis for the coal samples. Discuss the procedure for collection of coal samples from loaded wagon and preparation of coal samples for laboratory analysis indicating precaution measures from contamination of collected coal samples	6	CO1	L2
	OR			
11 (b) (i)	Explain in detail of formation of coal in various stages.	5	CO1	L2
(ii)	Write short notes on (a) dip (b) strike (c) full dip (d) apparent dip	8	CO1	L2

12 (a)	Design a layout of a bord and pillar development district for a coal seam of 4.0 m thickness targeted to produce 300 tonne per day and the seam is deposited in the gradient of 1 in 6 seated at the depth of 80 m with incubation period of 8 months. The answer should include percentage of recovery from headings, drilling pattern, size of panel, number of pillars proposed, blasting sequence along with detonating factor and powder factor, machinery proposed with the population, manpower required, OMS expected, ventilation and haulage layouts.	**13**	CO2	L4
	OR			
12 (b)	Give a layout of bord and pillar district development in a 5.0 m thick seam having a gradient of 1 in 7. The answer should include the sequence of formation of pillars, horizon of development of the seam, machinery required along with their population, support system, haulage and ventilation layouts. Consider the incubation period to be 16 months and assume missing data, if any.	**13**	CO2	L4
13 (a)	Give a layout of a bord and pillar depillaring district in a 5.0 m thick seam having a gradient of 1 in 7. The answer should include the sequence of extraction of pillars (with suitable justification), the manner of extraction of each pillar, method adopted for extraction of the total intended height of extraction, horizon of working of the seam, machinery required along with their population, quantity of air required and size of pillars & panel. Assume the incubation period to be 12 months. Assume missing data, if any	**13**	CO3	L3
	OR			
13 (b)	Give a layout of depilllaring district in conjunctions with hydraulic sand stowing of a coal seam of 4.5 m thick was developed on bord and pillar method. The answer should include the sequence of extraction of the pillar, manner of extraction of each pillar, machinery proposed along with their population and the output expected. Also, discuss in detail of underground and face arrangements for stowing panels.	**13**	CO3	L3
14 (a)	Give a layout and the preparatory work adopted in the longwall panel for the relocation of longwall equipment. The answer should include pre-move preparation, face preparation, sequence of salvage operations, order of installation of equipment at new face and arrangement of installation station.	**13**	CO4	L3
	OR			
14 (b)	Describe in detail the technical indices for selection, operation and evaluation of longwall equipment with neat sketches. Also, discuss about abutment pressure in longwall panels. Draw a neat sketch to explain the vertical stress distribution around a longwall working face.	**13**	CO4	L3
15 (a)	With neat layouts, write short notes on i) Sub-level caving method ii) Hydraulic mining method	**7** **6**	CO5	L3
	OR			
15 (b)	With neat layouts, write short notes on i) Wongawilli mining method ii) Highwall mining method	**7** **6**	CO5	L3

PART- C (1x 15=15Marks)

(Q.No.16 is compulsory)

Q. No	Questions	Marks	CO	BL
16.	A coal mine which had been exploited three coal seams upto 150m of depth by opencast mining method and the detailed exploration data has proven that there is a mineable reserves at the depth of 150m. Suggest a suitable mining method and provide the appropriate layouts to develop the coal panels at the average depth of 250m with total thickness of 3m and dipping towards S-W direction in the average gradient of 1 in 7. Justify your suggestion with level of mechanization, horizon of progress, output expected per day, ventilation, haulage and support layouts, manpower required and the OMS expected.	**15**	CO4	L5