

**B. E. Part-II, 4<sup>th</sup> Semester Final Examination, 2013**  
**Underground Coal Mining (MN-402)**

Time: 3 hours

Full Marks: 70

**Use separate answer script for each half**  
Answer SIX questions, 1&6 compulsory and any two from each half.  
Marks are given at right side of questions.

**First half**

1. Comment on the followings:-

- a) Mean load density
- b) Stable immediate roof
- c) Front abutment pressure
- d) Bridge stage loader (BSL).

(3+4+3+3)

2. a) Describe the guidance of CMRI on the support density required for a given deposit to be worked by longwall.  
b) "Adequate height of the longwall face is to be maintained during preparation of salvaging chamber" justify the statement.

(7+4)

3. a) Illustrate the arrangements to be made in mixing chamber for hydraulic stowing in underground coal mines.

b) An Incline gradient 1 in 4.8 touches a coal seam at 960m. The working faces are 48 pillars away from Incline along the main dip of the seam. The size of the pillar is 45m×45m (centre to centre) and dip of the seam is 1 in 15. Mine management decided the extraction of pillars with stowing for protection of surface structure. Suggest proper layout of stowing ranges.

(4+7)

4. A coal seam of 3.5m thickness is to be worked by longwall caving system. Average length of core of the immediate strata = 11cm, compressive strength of strongest bed = 681kg/cm<sup>2</sup>, thickness of strongest bed = 5.8m, value of 'n factor' = 1.0, value of K factor = 0.025, value of K' factor = 3, maximum convergence = 60mm/m. Calculate required support resistance to extract the full seam in a single slice.

(11)

5. a) Draw a neat sketch of a double ended ranging drum shearer (DERDS) and describe.

b) Comment on daily maintenance schedule at longwall face.

(6+5)

Second First Half

6 What will happen if –

1 ½ x 10=15

- i) lead and lift distance is very high
- ii) coal seams do have prominent natural cleavages
- iii) dip faces do not run well
- iv) main dip becomes difficult to deploy worker and machines
- v) spalling takes place in abundance
- vi) delay in main fall in depillaring district
- vii) goaf line velocity is not very good
- viii) breathing in takes place in goaf
- ix) roof is weak but needs depillaring
- x) prominent slips/cracks observed in immediate roof

7 ~~7~~ i) What are different steps to be observed prior to opening a mine? How will you decide the size of pillars in a mine? 3+2+5

ii) What are steps of mining activities involved in Bord and Pillar working with solid blasting?

8 ~~8~~ i) What are the different types of underground coal losses <sup>taking</sup> ~~takes~~ place during mining? 3+2+2+3

ii) On what factors do the period of liquidation and reaching targeted output depends?

iii) What are the importance of running bottom most face in a district? What are the advantages of panel system working?

9 ~~9~~ i) A developed underground coal mine is to be depillared having the following statistics – 7+3

Pillar size (corner to corner)	- 30m
Original developed gallery width	- 4.0m
Manual loaders	- 5 crews

You are to show the manner of extraction (with suitable dimensions) following diagonal line with splits and slicing including all rib pillars, highlighting the locations to engage the loaders so that uniform production is achieved throughout the depillaring operation. Refer all relevant statutes.

ii) State the conditions that a Colliery Manager has to fulfill during its depillaring operation?

10 ~~10~~ 7. What are the precautions to be observed for following cases? 4+3+3

- i) Bumps
- ii) Air blast
- iii) Primary stages of fire