10MN55

Fifth Semester B.E. Degree Examination, June/July 2019
Underground Coal Mining

Time: 3 hrs. Max. Marks:100

Note:1. *Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. *Use of CMR 1957 is allowed.*

PART – A

1 a. Define the following : i) Incubation period ii) In – seam mining iii) Horizon mining iv) Goaf v) Spontaneous heating of coal vi) Degree of gassiness vii) Face viii) Adit ix) Recovery ratio x) Commercial coal reserves. **(10 Marks)**

   b. A mine has been planned to produce 1 mega tone of coal per annum for 40 years from a 2.2m thick coal seam dipping at 10^0. Recovery is expected to be 90%. Determine the dimension of the mine along the dip and along the strike. Explain the relationship formula used. Comment on the result obtained. **(10 Marks)**

2 a. Discuss how depth of seam influences the choice of mining method. **(04 Marks)**

   b. What are the different degrees of gassiness of Indian coal mine? How gas content of a coal seam influences the choice of mining method? **(06 Marks)**

   c. A coal seam 12cm thick is located at a depth of 600m. Which method of working should be adopted to extract coal from these seams? What problems are likely to be handled for ensuring safety of the mine workers and mine environment? **(10 Marks)**

3 a. A coal seam at a depth of 220m is being worked by Bord and Pillar method. Development of a panel has taken 2 months. Height of the working is 3m and width of gallery is 4m. Coal pillars have dimension of $34m \times 34m$ (Centre to centre). The panel has 24 pillars excluding the barrier pillars. Coal locked in the entire panel, including the barrier pillars is 200,000t. The coal has a specific gravity of 1.4. Coal from the panel has to be extracted within the incubation period of 10 month. If on average 25 working days are available per month and 160 persons work in one shift (the mine runs in three shifts a day). Calculate
   i) Extraction ratio during development.
   ii) Total coal locked in the pillars under extraction.
   iii) Final extraction ratio of the panel after depillaring (assume all coal have been obtained from the pillars under extraction).
   iv) Rate of production during depillaring in tones / day.
   v) Output per Man – Shift (OMS). **(15 Marks)**

   b. Mention the standard pillar sizes to be considered with respect to seam depth and gallery width as per CMR 1957 Reg No. 99, in Bord and Pillar method of mining. **(05 Marks)**

4 a. Under what conditions a room and pillar mining is generally used? What are the merits of the room and pillar system of workings? **(15 Marks)**

   b. In a bord and pillar working the size of each rectangular pillar inside the panel is $40m \times 35m$. The width of the gallery is 4.2m. Calculate the percentage extraction during development. **(05 Marks)**

PART – B

5 a. Calculate the percentage of extraction of coal during extraction from a long wall retreating panel having 150m face length (edge to edge), 1500m panel length (actual extraction length from edge to edge), 4.8m wide main gate , 4.2m tail gate, barrier pillar of 36m (edge to edge) on all sides, thickness of the seam 4.5m, 3.6m height of extraction, width of the face initially 8.0m and existing at a depth of 200m from the surface. Assume missing data if any.
(08 Marks)

    b. With neat sketches, describe the characteristics of different types of immediate roof which are encountered in long wall panels during extraction. **(12 Marks)**

6 a. Explain briefly exploitation of thin coal seam with the combination of plough and powered supports. **(10 Marks)**

    b. Explain with neat sketches, the half face system of cutting coal by a shearer in a mechanical long wall face. **(10 Marks)**

7 a. Explain briefly exploitation of thick coal seam by Long wall Top Coal Caving (LTCC) method. Illustrate the same with neat sketch. **(12 Marks)**

    b. Give classification of slicing methods of thick seam mining along with its applicability , advantages and disadvantages. **(08 Marks)**

8 Propose and explain a method of extracting a 14m thick seam dipping at an angle of 85^0 to the vertical. The seam has reasonably strong sand stone roof and floor. The seam has been already developed on bord and pillar method along the floor of the seam. The developed pillars are 45m centre to centre and galleries have a cross section of 4.8 of 2.75m. The answer should include the method of extraction, haulage and ventilation layouts, machinery required with their population , support system proposed and manpower required. Justify your choice of mining method and other aspects. Stowing material is not available and the surface is a barren land and does not require protection. **(20 Marks)**

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