GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–V(NEW) EXAMINATION – SUMMER 2022

Subject Code:3152206   **Date:07/06/2022**
Subject Name:Underground Coal Mining
Time:02:30 PM TO 05:00 PM   **Total Marks: 70**

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS

Q.1 **(a)** Define: 03
   i. Rank of coal
   ii. Stook
   iii. Incubation period
   (b) Write a note on characteristics of Indian coal deposits.   04
   (c) Discuss the theories of coal formation.   07

Q.2 **(a)** Classify underground coal mining methods.   03
   (b) Write a note on: 04
   i.   Ultimate analysis
   ii.   Proximate analysis
   (c) Explain the factors influencing choice of mining method.   07
   OR
   (c) Explain the bord and pillar method with its applicability, layout, advantages and disadvantages.   07

Q.3 **(a)** Justify why working in panels is better than developing the whole area at once.   03
   (b) An underground panel in a coal mine is developed on B&P system. The pillar size is 33m center to center and the adjacent galleries are 3m wide. The percentage of extraction during development is?   04
   (c) Explain shearer machine with its constructional features and method of working.   07
   OR
Q.3 **(a)** State the factors influencing panel design.   03
   (b) In a 4.2m wide and 3.0m high gallery in a coal seam, twelve shot holes are blasted per round. The holes are charged with 2 explosive cartridges of 435g each. If the powder factor of the blast is 2.2 te/kg and specific gravity of coal is 1.4, the pull per round of blast in m is?   04
   (c) Define depillaring. Discuss pillar extraction techniques.   07

Q.4 **(a)** Explain hydraulic profile.   03
   (b) In a longwall panel, face is supported with shields of yield capacity of 460 tonne per shield. The distance from the canopy tip to coal face is 0.15m when the supports is fully advanced. The depth of web is 0.60m. The shield is set skin to skin at the face. Length of the canopy of the shield is 3.25 m and width 1.5m. The setting resistance at the maximum and minimum span of the coal face, in tonne/m^2, respectively are?   04
   (c) Explain the elements of a longwall face.   07
   OR

Q.4 (a) List the advantages of longwall mining over B&P mining method. **03**

(b) In a bord and pillar panel six shuttle cars, each of 10 tonne capacities, are deployed to transport coal produced by two continuous miners to a belt conveyor. Each shuttle car on an average carry 80% of its rated capacity and makes 7 round trips in an hour. The belt conveyor has a capacity such that the effective material cross section area is of 0.9 m^2 and runs at a speed 1.1m/s. The broken coal has a bulk density of 1.2 tonne/m^3. The ratio between the production and the capacity of the belt conveyor, in percent is? **04**

(c) Explain longwall mining method with suitable layout. Also discuss the scope of mechanization in longwall mining method. **07**

Q.5 (a) Define: **03**
     i.   Stowing
     ii.   Barrier
     iii.   Gallery

(b) Match the following for coal mining operation: **04**

Mining method	Mode of extraction	Loading/conveying equipment
A. Longwall	a. Cutting by continuous miner	i. AFC
B. Mechanised B&P	b. Drilling and blasting	ii. LHD
C. Semi-mechanised B&P	c. Cutting by shearer	iii. Apron loader and gathering arm
D. Blasting gallery	d. Longhole drilling and blasting	iv. SDL

(c) Classify stowing methods. Explain hydraulic stowing in detail. **07**

OR

Q.5 (a) List the precautions to be taken to maximize life of transportation pipes in hydraulic stowing. **03**

(b) Write a short note on roof bolts and its design parameters. **04**

(c) Explain types and applicability of supports used in underground coal mining. **07**

****