

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 5 – EXAMINATION – SUMMER 2026

Subject Code: 3152206

Date: 06/06/2026

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.**

- Q.1**
- (a) Explain the in-situ theory of coal formation and how it differs from the drift theory. **03**
 - (b) Describe the general characteristics of Indian coal deposits in terms of ash content and moisture. **04**
 - (c) Detail the technical factors (Depth, Inclination, and Geological disturbances) that influence the selection of an underground mining method. **07**
- Q.2**
- (a) Define 'Percentage of Extraction' and explain its significance during the development phase of a Bord and Pillar mine. **03**
 - (b) Sketch and describe a mechanized development layout for a coal panel including the location of the main haulage road. **04**
 - (c) Discuss the common problems and safety issues encountered during the depillaring (pillar extraction) process. **07**
- OR**
- Q.2**
- (c) Explain the 'Cycle of Operation' for a development heading using a Side Discharge Loader (SDL) or Load Haul Dump (LHD). **07**
- Q.3**
- (a) What are the specific conditions that make a coal seam 'highly inclined,' and how does this affect mining? **03**
 - (b) Explain the concept of 'Barrier Pillars' and why they are left between adjacent panels or properties. **04**
 - (c) Discuss the problems of mining 'Contiguous and Thick Seams.' Suggest suitable methods for their extraction. **07**
- OR**
- Q.3**
- (a) Briefly explain the application of a SERDS (Single Ended Ranging Drum Shearer) in thin coal seams. **03**
 - (b) Compare the ventilation arrangements required for a Longwall Advancing face versus a Longwall Retreating face. **04**
 - (c) Describe the working of a Longwall face in the 'Strike' direction. Include a sketch of the face layout. **07**
- Q.4**
- (a) Explain the function of 'Cable Bolting' in supporting heavy roof strata or junctions. **03**
 - (b) Differentiate between 'Cyclic' and 'Non-cyclic' operations in terms of labor productivity and equipment utilization. **04**
 - (c) Discuss the principle of Hydraulic Stowing. Detail the requirements for the 'Pipe Layout' and water-sand ratio. **07**

OR

- Q.4**
- (a)** Define 'Shrinkage of Stowing Material' and its impact on surface subsidence. **03**
 - (b)** Describe the construction and use of 'Steel Arch Supports' in main haulage roadways. **04**
 - (c)** Explain the 'Mechanical Stowing' process and list the specific machinery used on the surface and underground. **07**

- Q.5**
- (a)** What is a 'Packwall,' and how is it used in Longwall Advancing systems? **03**
 - (b)** Outline the 'Systematic Supporting Rules' (SSR) for a depillaring area as per Indian coal mine regulations. **04**
 - (c)** Compare the mechanism and load-bearing capacity of 'Friction Props' versus 'Hydraulic Chocks.' **07**

OR

- Q.5**
- (a)** List the parameters used to determine the 'Optimum Length' of a longwall face. **03**
 - (b)** Explain the process of 'Collection and Preparation' of stowing material (sand/crushed rock) on the surface. **04**
 - (c)** Describe the 'Resin Bolting' and 'Slot and Wedge' types of roof bolts. Explain their anchoring mechanisms. **07**
