

3. It is proposed to open a mine by means of a dip incline on a seam of coal 5 ft. thick, roof requiring to be timbered, inclination 1 in 5, length 500 yards. How would you carry on the works, providing for—

- (a.) Seventy-five gallons of water per minute, and material excavated;
- (b.) Ventilating tunnel.

And show by sketch how timber set to secure roof. Tunnel to be 10 ft. wide and 6 ft. high inside timbers.

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT II.—*On Working Coal, and Timbering Underground.*

1. Show by sketch how you would construct an overcast for ventilation purposes, giving figured dimensions of an overcast suitable for a current of 8,000 cubic feet per minute.
2. What is the order of operation in getting coal when the seam requires blasting? Describe fully, and mention precautions necessary in carrying on the operations.
3. State condition under which coal-dust in mines becomes dangerous as a source of explosion.
4. How would you secure a "longwall-face" where roof tender and floor soft; seam 5 ft. thick, inclination 1 in 8.

SECOND DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT III.—*On Gases of Mines, Spontaneous Combustion, and Ventilation.*

1. Name the several gases met with in coal-mines, and the steps you would take to render them harmless to life.
2. Give your opinion as to relative merits of fan and furnace ventilation, and indicate the conditions under which the fan is preferable.
3. What steps would you take in dealing with a gob-fire, and generally what precautions should be taken to prevent such?

SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT IV.—*On dealing with Old Workings and other Sources of Danger.*

1. In starting a pair of headings to connect old workings known to contain water, what precaution would you adopt, and what special appliances would you make use of?
2. What are the dangers to be feared from blown-out shots in coal-mines, and how are such to be prevented?
3. Describe what in your opinion is a suitable safety-lamp.
4. Describe how you would test a working-place for firedamp; and what means would you take to clear it if firedamp present?

THIRD DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT V.—*On Mine Drainage and Haulage, and Appliances for Same.*

1. Describe what you consider a good class of pump for raising water from dip workings, and what motive you would apply to work such pumps.
2. Describe a lifting set of pumps, and say how much water can be raised per minute by such a pump 12 in. diameter, 6 ft. stroke, making 12 strokes per minute, and allowing a loss of 10 per cent.
3. Under what condition would you apply a siphon in a mine?
4. Describe tail-rope and endless-rope haulage systems. Give conditions under which you would adopt one or other of these systems.

THIRD DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT VI.—*Arithmetic, and a Knowledge of "The Coal-mines Act, 1891."*

1. What quantity of material will be excavated for a site for new shaft which measures 50 ft. in circumference? Give answer in cubic yards per fathom.
2. Assume output of mine to be 1,000 tons weekly,—

500 tons screened coal,	cost	3s.	6½d.	per ton ;
100 " "	nuts,	"	2s. 1½d.	"
250 " "	unscreened	"	1s. 9½d.	"
150 " "	waste :			
- show average cost per ton percentage of respective kinds, and the percentage of loss.
3. Describe the various duties devolving on the underground manager and his subordinate officers under Coal-mines Act.
4. What are the provisions as to refuge-holes? Describe these, and where placed.
5. What books are required to be kept at a mine, and who is responsible, under the Act, for reports and notices?
6. What are the general rules with respect to explosives in coal-mines?

[All answers relative to Act to be given in writing.]