

APPENDIX I.

MINE-MANAGERS' EXAMINATION-PAPERS.

QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR FIRST- AND SECOND-CLASS CERTIFICATES.

SUBJECT No. 1.—*On Shaft-sinking, Tunnelling, and Opening-out of a Colliery.*

1. Assuming you were placed in charge of the development of a new coalfield, what preliminary steps would, in your opinion, be necessary before determining the position of shafts or general surface works for dealing with the output of the field?

2. A shaft 12 feet in the clear is to be sunk through 200 feet of alluvial deposit heavily watered: describe the method you would adopt for doing so; and explain in detail the necessary equipment, giving sketches of, and strength of, tubbing required.

3. Describe the plant in detail, also material required, to sink a shaft to a depth of 1,800 feet. Explain how you would ventilate the shaft and carry on operations with a cradle permanently suspended, a feeder of water (1,200 gallons per minute) following the sinking to a depth of 1,600 feet.

4. If two shafts 50 yards apart and 1,300 feet deep are sunk to a 4 ft. 9 in. seam of coal having soft roof, show by sketches how you would connect them; and also give sketches showing how you would lay out the pit-bottom and main roads to deal with an output of 1,200 tons in eight hours. Give size of roadways and size of shaft-pillars.

5. Explain, and show by sketches, how you would secure the sides of a shaft being sunk through soft strata before permanent brickwork is put in.

SUBJECT No. 2.—*On working Coal and timbering underground.*

1. Explain the working of coal by the following systems:—

(a.) Pillar-and-stall and double-stall.

(b.) Working out and working home by longwall method.

Show sketches and state reasons why any one system is preferable to the other.

2. What method would you adopt for working a seam of coal 5 ft. 9 in. thick, with soft floor and fairly hard roof, dip being 1 in 3.75, and with 60 fathoms of cover?

3. Explain the term "thrust," and state what steps you would take to protect your active workings and main roads if threatened thereby. Show sketches.

4. Describe in detail and show by sketches the best method of setting heavy timber bars in the main haulage-road of a mine having a bad roof, the dip being 1 in 4.

5. Show by calculation the breaking-strain of a beam of timber 14 in. by 10 in. and 10 feet between the supports, load to be evenly distributed.

6. Show by sketches, plan, and side elevation how you would timber a working-board 6 yards wide; also method of securing the working-face whilst holing and cutting.

SUBJECT No. 3.—*On the Gases of Mines, Spontaneous Combustion, and Ventilation.*

1. Give the chemical symbol, composition, specific gravity, and characteristics of the gases usually met with in coal-mines, and describe their effects on human beings.

2. If you had a quantity of 50,000 feet of firedamp in a disused roadway, having only 2 per cent. of air, what additional quantity of air would be required to bring the mixture up to its highest explosive force?

3. What is spontaneous combustion? and, knowing a mine to be subject to same, what precaution would you take to minimise the dangers thereof, and how would you deal with an outbreak of fire underground, having special regard to the safety of workmen employed thereat?

4. Explain the advantage to be derived from splitting air, and describe the most effective method of doing so, and state the limit which governs effective splitting.

5. Sketch and give dimensions of an overcast to pass 50,000 cubic feet of air at a velocity of 16 feet per second.

6. How does the power required to overcome friction in mines vary with the perimeter, area, length, and velocity? If 40-horse power produces 35,000 cubic feet of air per minute, how many horse-power would be required to produce 140,000 cubic feet per minute?

7. What are the advantages to be derived from having large airways? Also, if 144,000 cubic feet passed through an airway 6 feet high, what is the width of same?