

ANNEXURE A.

QUESTIONS ASKED AT THE EXAMINATIONS HELD DURING DECEMBER, 1914, FOR MANAGERS' FIRST-CLASS CERTIFICATES OF COMPETENCY UNDER THE COAL-MINES ACT.

SUBJECT 1.—*Prospecting, Opening out a Colliery, Working Coal, and Timbering.*

1. Under what conditions would you consider it necessary to drive the winning-places of a new colliery to the boundary of the lease before opening out workings, and state the advantages, if any, which would be secured by such a course.
2. Being required to work two seams of coal, the upper one 10 ft. and the lower one 5 ft. thick, separated by 20 ft. of tender strata, what method of working would you adopt, and which of the workings would you keep in the lead?
3. Describe and give sketches of the following methods of working coal: (a) longwall, (b) pillar and stall and double stall, (c) the panel system, and the advantages, if any, to be derived from the adoption of this system.
4. What is meant by the term "creep or thrust" in mining? State cause, describe how the workings of a mine are affected thereby, what are the first indications, and how you would proceed to minimize same.
5. Give sketches showing position of (a) the downcast shaft, and (b) the upcast, giving size of shaft-pillars you allow for a depth of 1,000 ft., seam of coal being 8 ft. thick. Show by calculation how the result is arrived at, and state what conditions would influence you in deciding which of the two shafts should be the largest.
6. Sketch the various systems of timbering in vogue in coal-mines, and state precautions required with (a) soft floor, (b) hard floor and tender roof, and (c) strong roof, tender floor and sides.
7. Describe fully the plant and appliances you would require in sinking a shaft 15 ft. diameter to a depth of 1,500 ft.; the first 150 ft. from surface to stone-head being through running sand heavily watered, below this the measures yielding only a moderate quantity of water.
8. Show by sketches and describe the lay-out of (a) pit-bottom arranged to facilitate working 1,000 tons daily, and (b) the arrangement of the surface works, showing the position of the winding engine and boilers, screens, and railway-sidings. Three different grades or classes of coal to be made.

SUBJECT 2.—*Mine-gases, Spontaneous Combustion, and Ventilation.*

1. How would you determine the useful effect of a colliery ventilation-fan?
2. Explain the term "motive column." How may it be expressed, and how is it ascertained?
3. If you obtain 250,000 ft. of air per minute with a water-gauge of 3 in., find horse-power represented, and also find horse-power required to pass that quantity of air through a drift 10 ft. by 8 ft. if friction did not exist.
4. Describe the application of air-crossings in connection with the ventilation of coal-mines, giving sketches and figured dimensions of a well-constructed crossing through which 10,000 cubic feet of air per minute has to pass.
5. State what you consider is meant by the terms "ascensional" and "descensional" ventilation, and which in your opinion is to be preferred.
6. Having to deal with an underground fire which necessitates sealing up, how would you proceed with the work, and what precautions would you adopt for the safety of the workmen?
7. Describe the various gases met with in coal-mines, their properties, how produced, where most likely to be detected, and how they affect animal-life.
8. What would you understand is meant by "equivalent orifice" in connection with the ventilation of coal-mines?
9. Suppose you were placed in charge of a mine giving off a little fire-damp, the workings generally being dry and dusty, what precautions would you adopt to safeguard life?

SUBJECT 3.—*General Mining, Steam Boilers and Engines.*

1. Describe fully under what conditions you would anticipate a sudden inrush of fire-damp, and what steps you would take to prevent disaster arising from such.
2. What are the necessary precautions required to obtain the maximum safety in relation to the working of all classes of machinery in connection with coal-mines?
3. If required to raise 1,500 tons of coal in 8 hours from a shaft 1,000 ft. deep, state power required and type of steam-engine you would erect. (Assume sizes and weight of tubs, weight of coal carried by each, and the useful effect obtained from the engine).
4. 100 tons of coal per hour is required to be delivered by endless rope 2,000 yards long, working on a grade of 1 in 8; speed of rope to be $2\frac{1}{2}$ miles per hour; tubs to weigh 5 cwt., and capacity 11 cwt. each: what horse-power will be required?
5. State the special precautions you would observe in driving towards old workings where it is anticipated water under pressure may be met with, and where noxious gases have also to be guarded against.