

SUBJECT No. 5.—*On Mine Drainage and Haulage and Appliances for same.*

1. Say what experience you have had in the working of pumps for mine-drainage, and describe what, in your opinion, is the safest and most approved pumping-engine.
2. Give sketches of working-part of bucket-lift, naming the several parts.
3. Explain action of siphon and the law which governs its working.
4. Describe any system of haulage with which you have had experience, and give your reasons for preferring any special system.
5. What is the least inclination at which self-acting inclines will run successfully? Give sketch of what you consider a suitable drum and brake for an incline grade 1 in 5, lowering 5 tons of coal each run.
6. Describe what you consider an effective plan for the prevention of runaway tubs on inclines.

SUBJECT No. 6.—*Arithmetic, and a Knowledge of the Coal-mines Act.*

1. For driving a heading 6 ft. wide by 5 ft. high and 150 yards long the men are paid 9s. per cubic yard: how much money will be required to pay for the work?
2. How many gallons will a water-tank hold which is 10 ft. 6 in. long by 3 ft. 6 in. diameter?
3. Having to lay a tram-line 500 yards, double line, rails 20 lb. per yard; grading costs £1 5s. per chain; rails, £8 2s. 6d. per ton; sleepers, 6d. each; fastenings, 2 tons at £15 per ton labour, laying, 6d. per yard: what amount is required to pay for material and labour?
4. What are the rules as to fencing; and where and by whom may safety lamps be opened? What are the rules relating to signals? Describe duties of charge-men in sinking shafts as defined by special rules; also say what is required by special rule as to sprags or holing-props, and what are the duties and responsibilities of a fireman under the Act and special rules.

QUESTIONS USED IN EXAMINATION OF CANDIDATES FOR CERTIFICATES OF COMPETENCY AS FIRST-CLASS MINING MANAGERS.

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

1. How would you proceed to prospect for coal in a new district, and what are the indications on which you would rely in deciding that coal existed on the ground?
2. In undertaking the development of a coalfield, what are the considerations by which you would be guided in selecting position for shafts or adits?
3. In sinking through alluvial deposits subjacent to surface, say how you would line the shaft, and with what materials, and show by sketches how you would prepare for placing a water ring in shaft on which to start brick lining.
4. Assume a shaft 250 yards deep and seam of coal 8 ft. thick: state size of pillars you would leave to protect the shaft; also chief considerations that would guide you to determine this.
5. What are the necessary precautions required to protect workmen from injury in sinking shafts? State how you would ventilate a shaft during sinking, and the method of shot-firing you would adopt.
6. Describe and illustrate by sketches (giving dimensions) the way you would lay out roads at the bottom of the drawing-shaft of a colliery, the quantity of coal to be drawn being 600 tons per shift of eight hours.
7. Explain by sketches how you would timber a tunnel having bad roof and heavy side pressure; also give sketches showing how you would pick up a heavy fall.

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

1. Explain, with sketches, the principles which should govern the timbering of working-places and roadways so as most effectually to resist the pressure of the ground.
2. Assume a mine worked on bord-and-pillar system, seam dipping 1 in 4: show by sketch-plan, the arrangements of workings and means used for the conveyance of coal from working-faces to haulage-roads, and state what contrivances and precautions should be adopted to insure safety of workmen.
3. State the considerations which would influence you in deciding on the system of working to be adopted in opening up a new colliery.
4. In working a mine on the long-wall system where the roof is soft and there are numerous breaks, show by sketches how you would timber the working-faces.
5. In removing or drawing timber what precautions are to be observed to avoid accident, and what tools do you consider necessary?
6. What explosives do you consider the best for use in fiery and non-fiery mines? Give the composition of the explosives, and state requirements of Coal-mines Act as to shot-firing and explosives generally.
7. Where gas is given off and the mine cannot be worked without blasting, what arrangements should you make to comply with the Coal-mines Act and to guard against accident?

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

1. Describe the properties of the different gases met with in coal-mines, how they are produced in the working of mines, and the effect they have on animal life.
2. Proto-carburetted hydrogen gas: What percentage of this gas is required to be mixed with air to enable you to detect its presence on the flame of a lamp, and what proportion of air to this