

6. How would you ascertain if there are any local variations affecting the needle of your compass?

7. Required the contents in cubic yards of a shaft 8 ft. in diameter and 15 ft. deep.

SUBJECT 6.—Mine Drainage and Haulage, and Appliances for same.

1. What arrangements are necessary for renewing the wearing parts of mine-pumps and generally for keeping the shaft-work in order?

2. Give sketches showing—(a) A lifting-set or bucket pump; (b) forcing or plunger pump, and give sizes of either kind you would adopt to pump 500 gallons a minute from a depth of 600 ft.

3. Having to haul 600 tons a day of eight hours from a depth of 500 ft. up an incline plane dipping at the rate of 1 in 3, show by sketches the arrangements you would adopt, and state power of engines.

4. Having to wind 800 tons per shift of eight hours from a depth of 1,000 ft., give weight of cage-tubs, coal, and rope, and show by calculation size of engine you would use, with size of drum and pulleys.

SUBJECT 8.—Practical Elementary Electricity.

1. Having a plant producing 500 electrical horse-power at a pressure of 260 volts, what is its resistance, and what is the current in amperes?

2. What are the dangers to be guarded against in connection with the application of electricity to mining? State why such precautions are necessary.

3. Having to erect electrical machinery to raise 500 gallons a minute to a height of 600 ft., show by calculation the horse-power required to do the work; and, with the electrical pressure at 220 volts, give the amperes and electrical horse-power, allowing 85 per cent. efficiency.

4. What pressure must a machine have in order that 20 horse-power may just maintain a current of 100 amperes?

5. State what experience you have had in connection with electrical shot-firing, what dangers may arise in connection with it, and what you would do in the event of a missfire under this system.

SUBJECT 9.—Arithmetic, and a Knowledge of the Coal-mines Act, 1908, and Amendments; also First Aid to the Injured.

1. A coal-bearing area of 400 acres contains an average thickness of 13 ft. 6 in. of coal, with a specific gravity of 1.26: calculate the tonnage of coal in the area. Supposing 25 per cent. to be lost in mining, what tonnage will be extracted?

2. A coal-mine employing 220 hewers and 130 other employees was worked for 265 days in the year; the total output of coal for the year was 344,500 tons: what was the average daily output (a) for each hewer, (b) for each employee?

3. Explain as fully as you can how you would keep the mine accounts so as readily to ascertain the cost of production per ton of coal, and be able to check undue expenditure in any direction.

4. The head of water above the centre point of a dam is 350 ft.: what will the pressure-gauge indicate as the pressure in pounds per square inch? If the dam is 8 ft. by 9 ft., calculate the total pressure upon it. (The candidate may assume that a cubic foot of water weighs 62½ lb.)

5. What is the weight in pounds of a log 14 ft. long and 16 in. in diameter if the wood of which it is composed has a specific gravity of 0.81?

First Aid to the Injured.

1. State your practical experience in connection with first-aid work.

2. How would you render first aid in the case of a fractured thigh?

3. How would you deal with a person who has been rendered insensible by venturing into an atmosphere containing carbon-monoxide (CO)?

4. Give a brief description of the circulation of the blood, and of the organs connected therewith. Explain how a knowledge of blood-circulation is of use in rendering first aid where a blood-vessel has been severed.

5. Describe a form of ambulance stretcher suitable for mine use. How would you improvise a stretcher from materials commonly found in a coal-mine?

QUESTIONS ASKED AT THE 1912 EXAMINATION FOR SECOND-CLASS CERTIFICATES OF COMPETENCY.

SUBJECT 1.—Prospecting, Boring, Shaft-sinking, and Opening out a Colliery.

1. Describe the necessary fittings required for the starting of a new shaft, and explain the operation of sinking to the stonehead, and give the kind of timbering you would use in supporting the sides of the shaft until the walling is put in.

2. What do you consider a good method of lighting shots in a sinking shaft, and what precautions are necessary to prevent accidents in connection with shot-firing? Give particulars of any improved method of firing of which you have had experience.

3. What means are generally adopted to make certain of getting solid beds for walling-rings in sinking a shaft?