

ANNEXURE F.

QUESTIONS ASKED AT THE 1914 EXAMINATION FOR FIRST- AND SECOND-CLASS
CERTIFICATES OF COMPETENCY AS MINE-MANAGERS UNDER THE MINING ACT.

SUBJECT I.—*Mining.*

1. A shaft is to be sunk to a depth of 500 ft. to work to best advantage a series of quartz reefs from 1 ft. to 7 ft. wide striking north-east and underlying 10° off the vertical to south-east; quantity of water to be met with unknown.
 - (a.) Draw a plan showing (1) size of shaft, (2) style of timbering, (3) class of timber you would use, (4) the relative size of each compartment, and the situation of shaft to lodes.
 - (b.) State the distance between each level you would open chambers in shafts and the convenient height of each.
 - (c.) Show by sketch how you would put cage chairs or clips in at surface and each chamber in winding-compartments, to be easily manipulated when required.
 - (d.) State what are the advantages and also the disadvantages in the Rill system of stoping compared with the flat-back system.
2. Describe how you would drive through loose rubble or old filled-up stopes a level 7 ft. high and $5\frac{1}{2}$ ft. wide in the clear.
3. If a 4-ft.-square cribbed pass is 80 ft. in depth and empty of ore, how would you proceed to fill it to top so that the ore would not pack too tight and allow you to keep the ore from hanging up when it is being trucked out as stoping proceeds?
4. Give a correct estimate of the quantity of ore in tons (2,240 lb. each) in a block 200 ft. long, 150 ft. in depth, average width 7 ft.; also estimated value at £2 7s. per ton, allowing 14 cubic feet to ton of solid ore.
5. Describe in detail how you would organize a gang of miners and allot their respective work, and place the drilling-machines so that you could manage to drive a medium hard heading at the rate of about 50 ft. per week of six days.
6. Taking blasting-powder as a unit, give the relative strength of other explosives generally used in mines.
7. Describe how electric delay fuses are made, and what is the advantage in using them.
8. What precaution would you use in approaching old workings full of water? What provision would you make to prevent the mine being flooded by the water breaking away in greater volume than you anticipate?
9. Show by sketch how you would construct a dam in a drive $5\frac{1}{2}$ ft. wide by 7 ft. in height in ordinary rock to keep water safely back for 200 ft. in height, the dam to have a door and opening large enough to permit trucking through when dam is empty. (a) Describe the material you would use; (b) how you would construct the door so that, if necessary, it could be closed from the surface; (c) what provision you would make for drawing the water off in emptying the dam; (d) give the total pressure in tons when the dam is full.

SUBJECT II.—*Mechanics.*

1. Describe briefly the different classes of steel-wire rope used for hauling and winding. Show by calculation the size of rope you would employ for hoisting a load of 35 cwt. (cage, truck, and ore) in a vertical shaft from a depth of 1,200 ft. Specify which class of rope you would recommend for this work.
2. The height of a shaft-head frame is 60 ft.; rope used for winding, $1\frac{1}{4}$ in. diameter: give a side-view sketch of frame, showing position and diameter of head-pulley, diameter of drum, position of drum-shaft, and back-stay.
3. Describe a safety appliance for holding a truck in skip on an incline in case of accident to controlling-gear or breakage of rope.
4. State how you would test and examine a steam boiler—(a) Cornish, (b) tubular.
5. A mine-pumping plant is to consist of a suction-gas plant operating an electric generator, from which the electricity is to be conveyed a distance of 1,200 ft. to the pump-motor; quantity of water to be lifted is 6,000 gallons per hour against a head of 400 ft. State class of pump you would employ, and the respective horse-powers of the electric motor, electric generator, and gas-engine.
6. Give a working sketch of bailing-tank, to carry 250 gallons of water, in a vertical shaft, the overall size of compartment being 4 ft. 6 in. by 3 ft. 6 in.
7. What terms are employed for the unit of electro-motive force, current, and power, in electricity?
8. What are the regulations prescribed in the Mining Act in regard to the installation and use of electrical machinery underground?