

ANNEXURE F.

EXAMINATIONS UNDER THE MINING ACT.

QUESTIONS ASKED AT THE 1913 EXAMINATIONS FOR CERTIFICATES OF COMPETENCY AS MINE-MANAGERS OF THE FIRST AND SECOND CLASS.

SUBJECT I.—*Mining.*

1. A lode has been discovered and proved to be 10 ft. wide, underlying 15° off the perpendicular to the south-east and striking north-east; a vertical rectangular shaft is to be sunk at a point 400 ft. south-east of outcrop and at a right angle thereto, to a depth of 500 ft.; the country expected to be met with is medium hard, water expected to be from 300 to 400 gallons per minute:
 - (a.) Draw a sketch-plan showing size of shaft in clear of timber. (i) Give size and class of timber you would use; (ii) show how you would fit it; (iii) the method of placing it in position; (iv) show the relative size of each compartment for pumping and hauling ore.
 - (b.) Give correctly the distance to crosscut from bottom of shaft to reach the lode, the height of back on course of reef from floor of level to outcrop, the collar of shaft being 50 ft. below level of outcrop.
 - (c.) Give the height of chambers you would open, the size of timber required, and the distance between each level. Having driven the levels, say how far apart you would sink winzes or put rises up to facilitate filling up old workings and provide ventilation.
 - (d.) In stoping out the lode, how far apart would you place the ore passes? Describe how you would timber them. State the distance apart you would fix ladder-roads, how you would timber them, and the size most suitable for travelling in.
 - (e.) How would you timber a level where the walls were fairly hard and sound? State how you would secure a level where the walls were soft and inclined to swell.
 - (f.) Give the breaking-strain in tons of a rimu cap 14 in. square, length between legs 4 ft., and uniformly loaded.
 - (g.) Ore in sight: how many tons of 2,240 lb. each are there in a block of the following dimensions: 350 ft. in length, 10 ft. wide at eastern end, and 7 ft. wide at western end; at the middle of block—*i.e.*, 175 ft. from either end—5 ft. wide by 150 ft. in height: allowing 14 cubic feet of quartz in the solid to equal a ton?
 - (h.) How would you beat out a back stope under an old level where the lode is 20 ft. wide, all taken out from wall to wall and filled up, the level being timbered with ordinary sets—caps 14 in. diameter, 4 ft. in clear; legs 12 in. by 12 in., 7 ft. long, and spread to $5\frac{1}{2}$ ft. at bottom; no sills? Draw a sketch showing cross-section, how the old timbers and level are caught up, and the place secured, the underlay of walls being 1 in 3.
2. Describe what precaution you would take in driving near an abandoned mine where an accumulation of water was known to exist.
3. Show how you would construct a dam in a drive, average width 5 ft. by 7 ft. in height, in ordinary rock, to keep water safely back to height of 300 ft. from bottom of dam. Give the total pressure in tons on the structure, (a) the mode of construction, (b) the material you would use, and your reasons for same.
4. Give the comparative strength of dynamite, gelignite, and compressed blasting-powder.
5. In face of drive you have a bench 3 ft. high by 6 ft. wide composed of hard rock without any apparent heads or seams; a hole is bored, $1\frac{1}{2}$ in. diameter, to a depth of $2\frac{1}{2}$ ft. at 22 in. back from face in centre of bench: give the depth of gelignite you would put in to displace the rock. What depth of compressed powder would you use to do the same work?
6. State how you would protect the wind-bore of a draw-lift pump when firing a group of holes in the bottom of a wet shaft. What explosives would you use, and how would you fire the charges?
7. Explain how it sometimes occurs that on firing a round of holes with an electric exploder some of the charges missfire.
8. Explain the difference between low-tension fuse and high-tension fuse in electric detonators.
9. Having no electric apparatus for firing explosives, state how you would fire a round of holes in the end of a drive or stope where you would have to travel, say, 200 ft. to a place of safety.

SUBJECT II.—*Mechanics.*

1. Explain the meaning of the terms—kilowatt; B.O.T. unit; British thermal unit; electrical horse-power; power factor; latent heat; elastic limit.
2. Describe two methods of controlling the speed of an electrically driven winding plant, stating their advantages and disadvantages. What additional risks of accident exist when electric winding is substituted for steam winding? How may such risks be reduced?
3. What are the conditions under which you would use each of the following pumps at a mine: (a) Pulsometer; (b) turbo or centrifugal; (c) three-throw; (d) draw-lift?
4. Describe and illustrate by sketch an overwinder or effective automatic appliance attached to winding-machinery to prevent overwinding.