

SUBJECT L.—A Knowledge of the different Rocks where Gold, Silver, Tin, Copper, Zinc, Lead and Antimony are found, and of the Formation of Lodes and Leads.

[Candidates need only answer three of the questions.]

1. Name the chief New Zealand localities in which copper, tin, and antimony are found; in each case mentioning the mineral form in which the metal occurs and the nature of the rock enclosing the deposit.

2. Describe the auriferous lodes of any district in New Zealand with which you are acquainted, paying attention to the following points:—

- (a.) Dimensions of lodes;
- (b.) Dip and strike;
- (c.) Enclosing rock (country);
- (d.) Minerals associated with the gold; and
- (e.) Distribution of the gold in the lodes (shoots, &c.), and the factors which would appear to have had an influence on the same.

3. Give some account of the way in which payable deposits of auriferous gravels have been formed. Exemplify your remarks by reference to localities in New Zealand or elsewhere.

4. What is meant by "fissure veins," "bedded veins," "contact veins." Refer in each case to occurrences with which you are acquainted.

QUESTIONS USED IN EXAMINATION OF BATTERY SUPERINTENDENTS FOR CERTIFICATES.

SUBJECT A.—The Different Modes of reducing and pulverising Ores.

1. State where you were employed in crushing-batteries where the gold was recovered by cyanide solution. Give the dates, and the names of the battery-superintendents you were under; also state in what capacity you were employed.

2. Show by sketch how you would construct a stamp-battery with rock-breakers, ore-bins, ore-feeders, amalgamating-tables, and concentrating-machines. Give the relative heights of each above the lower floor.

3. Show by calculation the power required to work a stamp-battery with 40 heads of stamps each weighing 1,200 lb. making 98 drops per minute with a drop of 7 in. Also the maximum number of drops that could be made per minute with the drop mentioned without the stamp striking the cam.

4. If you had to get a steam-engine to drive a stamp-battery as mentioned in the foregoing question, show by calculation the diameter of cylinder you would require if the speed of the piston was 450 ft. per minute, and the initial pressure of steam 100 lb. per square inch, cut off at half-stroke.

5. The whole of the machinery in connection with a crushing-battery required 200-horse power to work it, a Pelton water-wheel 6 ft. in diameter being used under a head of 200 ft.: show by calculation the quantity in cubic feet of water, and the diameter of the nozzle required, allowing the wheel to give 80 % of the power of the water.

6. Describe fully the use of tube mills—(a) their action; (b) the quantity of pulverised ore that has passed through a 20-mesh they are capable of treating to pass through a 40-mesh grating.

SUBJECT B.—Amalgamating-machines.

1. What is meant by "amalgamating-machines"? How is amalgamation of gold and silver effected?

2. Describe the action of a Watson-Denny pan. Give the speed it requires to be driven at, the quantity of tailings it is capable of treating in twenty-four hours, the horse-power required to work it, and the quantity of quicksilver in the pan.

3. State what difference there is between a Wheeler and Wilson pan and a Combination pan. Describe fully the action, and the quantity of tailings that each is capable of treating in twenty-four hours.

4. Describe the action of a Frue vanner. State the speed it requires to be worked at, and the quantity of pulverised ore it is capable of treating in twenty-four hours.

5. If you were constructing amalgamating-tables at each battery of five heads of stamps of 1,100 lb. each in weight, give the width and length of tables you would make; also state the gradient you would give them.

SUBJECT C.—The Use of Quicksilver, and Methods of using it in connection with the Extraction of Gold and Silver from Ores.

1. State the thickness of copper plates you would use to cover amalgamating-tables, and give the reason why the thickness is required; also state how you would coat copper plates with mercury. Describe fully.

2. State how you would remove antimony from mercury by using an electric current. Describe fully.

3. How do you know when mercury is impure, and not in a fit state to use for the amalgamation of gold or silver?