

ANNEXURE D.

QUESTIONS ASKED AT THE EXAMINATION HELD DURING DECEMBER, 1915, FOR MANAGERS' FIRST AND SECOND CLASS CERTIFICATES OF COMPETENCY UNDER THE MINING ACT.

SUBJECT I.—*Mining.*

1. Describe and show by sketch how you would place the penthouse in a three-compartment rectangular-framed shaft, if you had to sink with a winch from the 1,000 ft. level, two of the compartments being in use full time sending up ore to surface.
2. Give the size of timber you would use, and show by sketch how it is fitted and the sets hung in position.
3. Describe the difference between a vertical shaft, an underlay shaft, and a winze.
4. State fully how you would drive through loose running country, and how you would secure heavy swelling ground.
5. Name the different methods of stoping and beating out small lodes and large lodes respectively.
6. Describe the filling-up method you would adopt on lodes, say, 2 ft. wide and 40 ft. wide; also, how you would fill in at three different levels simultaneously the levels being directly over one another.
7. What size of trucks and style of truck-wheels would you use, weight per yard of rails, and gauge of track would you put down where a large quantity of ore had to be handled?
8. Give the relative strength of gelignite, dynamite, and gelatine-dynamite, taking blasting-powder as a unit. State the class of country for which each is best adapted.
9. What explosive would you use under water?
10. Give the reason electricity from lighting or power cables "shall not be allowed for firing shots," under the Mining Act.
11. State the number of holes you would bore with rock-drill in a hard vertical face of drive 7 ft. in height by 5 ft. wide.
12. Describe the kind of hole you would put down or bore to prove the value of a placer deposit.
13. There are three methods of boring deep holes—namely, the spring pole, warping-barrel, and diamond drill: describe each, and how they are worked, and the country for which they are best suited.

SUBJECT II.—*Mechanics.*

1. Describe fully a pumping plant, including power capable of raising 500 gallons per minute from a depth of 400 ft., and state conditions under which the plant described would be most suitable.
2. State all precautions which should be taken when an underground working is approaching a place known to contain a dangerous accumulation of water.
3. Describe and sketch a dam in an underground level, suitable for damming back water to a height of 5 ft.
4. Sketch section of pithead frame, above landing brace, showing all appliances for prevention of accident in the case of an overwind.
5. Give maximum speed at which it is safe to raise or lower cage containing men in shaft.
6. Show by calculation the size of rope and also the size of coupling-chain required for winding in shaft 1,000 ft. deep with loaded cage weighing 30 cwt.
7. Describe plant for controlling (self-acting or balance) incline tram having gradient 1 in 3, length 40 chains, and load 1 ton.
8. Trace the passage of the steam from the boiler through a compound condensing engine.
9. Describe briefly the principal parts of an electric motor. Give in electrical terms the equivalent for 1 horse-power.

SUBJECT III.—*Ventilation: Ventilation of Mines and Knowledge of Mine Gases; Rescue Apparatus used in Mines; Methods of Dealing with Underground Fires.*

1. What are the leading characteristics of the three principal gases contained in air? State generally in what respects the return mine air differs from the intake air.
2. What does a variation in the readings of the wet and dry bulbs of a hygrometer represent? How is the amount of moisture in the atmosphere calculated from this data, and what is understood by "dew-point"?
3. State what is the general efficiency of mine-fans? If the horse-power of an engine is 52.84 and the water-gauge is 4.7 inches, what quantity of air would you expect to get?
4. With a water-gauge of 0.4 inch and the fan making 65 revolutions per minute, there is produced 35,000 cubic feet of air per minute: what quantity would be produced with a water-gauge of 0.6 inch?
5. A given mass of air occupies 1 cubic foot at 60° Fahr.: what volume will it occupy at 90° Fahr., and what is the weight of the above mass of air if the barometer stands at 30 in.?