

## (g.) EXAMINATIONS UNDER "THE MINING ACT, 1905."

## QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR FIRST-CLASS AND SECOND-CLASS CERTIFICATES.

SUBJECT A.—*The Laying-out and Construction of Shafts, Chambers, Main Drives, Adits, Rises, Stopes, &c.*

1. The plan (not here shown) illustrates a lode outcropping for a length of 700 ft. You are asked to lay off and execute all the preliminary works required to open up the lode to a depth of 260 ft. below A, D, and F. The lode underlies  $10^\circ$  to the west. Place shafts, winzes, and uprisers on plan and section. State in detail (a) where you would commence work; (b) where you would end; (c) how you would complete all connections; and, assuming the lode to average in width 3 ft. at A, 6 ft. at B, 7 ft. at C, 5 ft. at D, 10 ft. at E, 12 ft. at F, 10 ft. at G, and 8 ft. at H, give the total tons, taking 13 cubic feet to the ton. A creek (half a mile distant) containing 15 heads of water could be taken on to the site (over easy country), giving a head of 200 ft.: could you utilise it, and how?

2. The winding-pulley on poppet-heads is 70 ft. above the collar of shaft, the winding-drum is on the level of the collar of shaft and 65 ft. distant; the vertical load is  $2\frac{1}{2}$  tons: show by calculation and sketch the resultant strain on the poppet-heads; and, supposing the excavation for the poppet-heads had been in solid rock having an angle of elevation of  $70^\circ$ , show by sketch how you could easily counteract the strain on the poppet-heads.

3. Having selected the site for a winding-shaft, give full details of the preliminary works required.

4. If you took the creek mentioned in Question 1 on to the site, and you had a pelton wheel as your motor, what effective horse-power would you have at your disposal?

SUBJECT B.—*On the Timbering of Shafts, Adits, Main Drives or Levels, Passes, Stopes, and generally on the Systems of Timbering Mines, and also in filling up Old Workings.*

1. From a shaft timbered with planking you are to open out for a chamber; the material is loose, and inclined to run: describe fully how you would do the work. Give height, width, and length of chamber, distance of sets apart (centre to centre), sizes and description of timbers; also, how would you join the chamber sets with the sets in the drive?

2. The quartz has to be conveyed to the shaft for a distance of 1,000 ft. and over: to insure speedy transit would you provide a double line throughout, or what would you do? If you provide a double line, give width between the legs, describe the system you would adopt fully, and give your reasons.

3. The walls along the lode are heavy and of a swelling nature; the ordinary sets collapse: show how you would fit the sets to withstand the pressure, and give a longitudinal section of the level timbered complete, also sizes and description of the timbers you would use.

4. Sketch a three-compartment uprise timbered with logs: where would you place the ladder-way, and why? Give description and figure sizes of timbers on sketch.

5. Show by sketch how you would timber a lode 40 ft. in width. The angle is  $15^\circ$  from the perpendicular. Figure lengths and sizes on sketch, and describe fully.

6. To what height would you stope on the above lode before filling in, and where would you procure your filling if you were 1,000 ft. below the surface?

7. A cap-piece of kauri is 18 in. in diameter and 4 ft. in the clear between the legs: required the breaking-strain.

8. What would be the safe load on a stringer of black-birch 14 in. by 18 in.? The length between the supports is 18 ft., and one end is 6 ft. lower than the other.

SUBJECT C.—*Ventilation of Mines and Composition of Gases.*

1. What is meant by the diffusion of gases? Explain how the ventilation of mines is assisted thereby; also state by which of the two gases  $H_2S$  or  $CO_2$  is the diffusion most rapid?

2. What are the three laws of friction of the air in mines, as regards (a) rubbing-surface, (b) sectional area; (c) velocity?

3. Describe natural ventilation, its causes, disadvantages, and limits of application; also state under what conditions may the direction of the air-current be reversed in this system of ventilation.

4. Explain the theory of centrifugal ventilating-machines; state why they are superior to other forms of mechanical ventilators generally. Illustrate by sketch a ventilating-fan you would recommend for a small mine.

5. In addition to the pollution of the air in mines by gases introduced naturally from the surrounding rocks, various other causes combine to render the atmosphere of some mines unfit for life: state what these causes may be.