

MINE-MANAGERS' AND BATTERY-SUPERINTENDENTS EXAMINATION PAPERS

QUESTIONS USED IN EXAMINATION OF MINING MANAGERS FOR CERTIFICATES.

SUBJECT A.—*The Laying-out and Construction of Shafts, Chambers, Main Drives or Levels, Adits, Uprises, and Stopes.*

1. State your experience in mining, and give the name of the mine or mines you were employed in during the last five years.
2. If it were known that a quartz lode was payable for working to a depth of 1,200 ft., and that the lode was underlying to the westward 67 degrees from the horizon, where would you sink a shaft to work the lode? Give your reasons fully.
3. In sinking a rectangular shaft, (a) what precautions would you take to keep it plumb? (b) state the necessary surface-work required if it had to be sunk to a depth of 300 ft.
4. Describe how you would open up levels from a shaft. Give the dimensions of a chamber you would construct if thirty men were employed on each level. State your reasons fully.
5. Give the dimensions of passes and their distance apart to work a lode 7 ft. wide, and state reasons for same.
6. Show by sketch how you would stope a lode, and also describe how you would protect the workmen from danger in travelling up and down passes.
7. In driving a level in hard ground requiring explosives, describe how you would commence to drill holes in a vertical face so as to obtain the best effect from the explosive force, assuming the level to be 5 ft. wide and 7 ft. high.

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. Show by sketch how you would fit timber for main adits, and also for a rectangular shaft, giving all dimensions.
2. Describe how you would timber a rectangular shaft through heavy swelling ground. Give dimensions of timber, state how you would fit it, and also the size of compartments.
3. If you were constructing a pumping and winding shaft where two lifts of pumps were used, the plunger being 16 in. in diameter and the draw-lift of same dimensions, state the minimum dimensions of pumping-compartments required at the change of lifts; also state how you would timber the shaft, and give your reasons for same.
4. Describe how you would proceed to open out a chamber from a shaft in heavy swelling ground, and how you would secure it with timber; also give the dimensions of chamber you would construct if forty men had to be employed on that level in the mine.
5. If you were sinking a shaft through quicksand, and had to secure it with timber, describe fully how you would do it.
6. Show by sketch and describe fully how you would timber stopes where the lode is 5 ft. in thickness and underlying at an angle of 60 degrees from the horizon.
7. How do you ascertain the strength of timber required for any particular piece of work? Given a round cap of kauri 14 in. in diameter with 8 ft. between its supports, show by calculation its breaking-strain and also its safe load.

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

1. Give the composition and specific gravity of H_2S and CO . Describe their characteristics, the means of detecting them, and their effects on the human system.
2. What is meant by "the diffusion of gases"?
3. Describe the various methods of producing reliable air-currents in mines.
4. A fan is circulating 100,000 cubic feet of air per minute at 1.5 in. W.G. Allowing 15 per cent. of the power given out by the engine for frictional resistances, and the efficiency of the fan to be 50 per cent. of the useful H.P. of the engine, what H.P. would have to be indicated by the engine when the fan is circulating 200,000 ft. per minute, the airways remaining unaltered.
5. Show how you would conduct the air through the underground workings of an alluvial mine shown on sketch-plan accompanying.* State what ventilating-power you would adopt, and show where you would apply it.

The alluvial deposit is lying horizontal, and yields CO_2 freely.

SUBJECT D.—*Tapping Water in Mines, and Mode of Constructing Dams in underground Workings to keep back the Water.*

1. In driving, a borehole from abandoned and closed workings at a higher level is met with and a feeder of water (approximately equal to one-fourth of the carrying-capacity of the bore) liberated. Depth of borehole, 400 ft. For 20 ft. above the heading the ground is of a soft nature with a covering of hard rock. How would you proceed to keep back the flow of water?
2. Describe the construction of (a) wood, (b) brick, and (c) concrete dams in underground workings, and compare their relative merits.
3. What general precautions would you adopt in approaching old workings full of water, and what provision would you make to prevent the stoppage of mining work in the event of the water from the old workings coming away in greater volume than anticipated?
4. A dam across a roadway 5 feet wide and 7 feet high is keeping back water having a vertical height of 110 ft. above bottom of dam. What is the total pressure on the dam?

* Plan not reproduced.