SUBJECT VIII.—*The Haulage on Planes and in Shafts, also the Different Systems of Underground Haulage, with Horse-power required to do the Work.*

1. You have to wind 1,100 tons in ten hours from a depth of 80 fathoms: what horse-power is required to do the work, and what size cylinders would you fit up? Show fully how you arrive at your results.
2. An engine weighing 8 tons can draw a load of 60 tons on the level, the coefficient of friction being 160lb. per ton: what can it draw up an incline of 1 in 25?
3. State the reasons for and against loose wheels, also for those fast on the axle.
4. Give a sketch of your arrangements for rope and boxes where a branch curves off in endless-rope haulage.

THIRD DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT IX.—*The Theoretical and Effective Power of Steam-engines and Boilers; also, on the Strength of Hauling-ropes and -chains.*

1. Give a sketch, in section, of a Lancashire boiler fitted with Galloway tubes, and detail the advantages of the latter.
2. What size of cylinder is needed to give 60 I. H. P. with 57lb. mean pressure and 210ft. travel per minute?
3. Give a sketch of a safety-valve, and describe its action.
4. What is the bursting-pressure of a boiler 28ft. long, 6ft. diameter, and $\frac{5}{8}$in. plates, with tensile strength 55,000?
5. What is the breaking-strain of a steel-wire rope 2$\frac{1}{2}$in. in circumference?

SUBJECT X.—*The Incrustations in Steam-boilers and Cause of Same, and the Remedy therefor.*

1. How would you introduce a remedy for incrustations into a boiler?
2. What are the causes of corrosion in a boiler?
3. What remedy would you use for sulphate of lime in the feed-water of a boiler?

THIRD DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT XI.—*Tapping Water in Mines, and the Mode of constructing Dams in Underground Workings to keep Water back.*

1. Describe how you would put in a brick dam to withstand a heavy pressure, and give dimensions.
2. State the precautions you would adopt in approaching a large body of water overhead.

SUBJECT XII.—*Blasting, and Use of Explosives.*

1. State fully whether you think it would be desirable or not to use high explosives in place of powder in bringing down coal.
2. State what you know of water as tamping for dynamite.
3. What is the composition of gelignite?
4. To what points would you direct your attention to prevent accidents from blasting in a mine of which you had charge?

SUBJECT XIII.—*The Effect that Faults produce in Coal-seams, and how to ascertain the Direction of a Coal-seam when severed by a Fault.*

1. In prospecting a coalfield broken by granite, would it be material to find out whether the coal was deposited round the granite ridges, or if the latter had broken through the bedded rocks? How would you determine the point?
2. Give sketches of ordinary and reversed faults.
3. How would you ascertain the direction of a coal-seam when severed by a fault?
4. Describe fully what a "roll" in a coal-seam is, and state if it has any connection with faulting.
5. In your experience, have you ever found a fault produce a good effect on the quality of coal in a seam which it had severed? If so, describe it, and give your explanation.

FOURTH DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT XV.—*A Knowledge of Surface and Underground Surveying, and of making Plans, showing System of Working, Inclination of Seam, Faults, and System of Ventilation.*

1. The candidate must produce a plan showing the style of workings in a colliery, with the surface taken up for at least 20 acres in the vicinity of the shaft, and the underground workings in different-coloured ink. He must describe how he would connect them with the surface in the event of there being only one shaft. The levels and main heading must have assumed traverse, calculated in detail, and showing latitude and departure for each bearing.
2. A bore has been put down N. 40° E. and 20 chains distant from your mine-mouth, whence the stone mine dips at 10°, bearing N. 12° W., distant 8 chains; thence in the coal-seam, which is level, N. 7° E., 240 links; N. 2° W., 150 links; N. 15° E., 300 links: what distance have you to drive to strike the borehole, and on what bearing?
3. How would you ascertain if the sights in a dial were truly vertical and their supports correct? If they were not, would they cause the survey to be inaccurate?
4. Explain the reading of the vernier scale on a theodolite.