

SUBJECT XII.—*A Knowledge of Arithmetic, and the Method of Keeping Accounts.*

1. How many cubic feet would be excavated in sinking a shaft 12ft. diameter for a depth of 160ft.?
2. A brick wall is 900 square feet, and one half-brick in thickness: how many bricks does it contain?
3. Five men at 13s., two at 12s., and nineteen at 10s. 6d. per day: what will the amount of the week's pay be?
4. What is the square root of 1,156?

SUBJECT XIII.—*A Knowledge of the Provisions of "The Coal-mines Act, 1891."*

QUESTIONS USED IN EXAMINATION FOR CERTIFICATES AS ENGINE-DRIVERS WORKING WINDING-MACHINERY.

FIRST DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT 1.

*On the Different Classes of Steam-engines used in Winding; and also all the Internal and Moving Parts.*

- No. 1. Mention all the different types of steam-engines used for winding.
- No. 2. Describe a piston; mention all its parts and their respective uses.
- No. 3. How would you ascertain if your piston was steam-tight?
- No. 4. Describe a feed-pump; mention all its parts, and for what purpose each part is required.
- No. 5. If feed-pump failed to work, what part would you examine for defects?
- No. 6. What speed per minute do you consider it safe to wind men up a shaft, and what speed material?
- No. 7. In what respect does a winding-engine differ from an ordinary steam-engine?
- No. 8. Describe a slide-valve—where placed, how driven, and for what purpose it is required.
- No. 9. Describe in detail all you consider an engine-driver should do before starting a winding-engine.

SUBJECT 2.

*On the Different Appliances and Indicators used to show the Position of Cage in Shaft, or Truck on Plane, in which Persons are conveyed; also Meaning of the different Signals used in Mines.*

- No. 1. How is the position of cage in shaft, or truck on plane, made known to engine-driver?
- No. 2. Describe an indicator which complies with the above conditions.
- No. 3. Describe the methods of signalling from different parts of the shaft to the engine-driver.
- No. 4. Describe the different methods of signalling from any part of a plane to the engine-driver.
- No. 5. What are the regulations under the Coal-mines Act when the cage is required to lift, stop, and lower—and if any difference when drawing men or material?
- No. 6. Describe any other methods of signalling you are acquainted with.

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT 3.

*On the Different Kinds of Boilers used for Winding-engines and their Connections; the Effect of Impurities in Water used in such Boilers; and the different Remedies adopted to keep them Clean.*

- No. 1. Describe a Lancashire boiler.
- No. 2. Mention all the necessary fittings and mountings required for a Lancashire boiler.
- No. 3. Give a description of a low-water alarm.
- No. 4. What are fusible plugs, where fitted, and for what purpose?
- No. 5. If water became dangerously low in a boiler at work, what precautions would you adopt to prevent an accident?
- No. 6. What would be the result if your feed-check got set fast with valve open? also, if valve was shut?
- No. 7. What parts of a Cornish or Lancashire boiler require special attention if the water used is impure?
- No. 8. What ingredients would be required to remove the impurities in a boiler using limestone water?

SUBJECT 4.

*On the Different Appliances used for Winding with Hydraulic Machinery, and the Methods adopted for letting on and shutting off the Water.*

- No. 1. In what respect does a reversing wheel differ from an ordinary wheel?
- No. 2. Is a brake necessary on a reversing wheel; if so, where should it be placed?
- No. 3. Can a Pelton wheel be used for winding; if so, what gear, if any, is necessary for its adoption?
- No. 4. Can a turbine wheel be used for winding; if so, what is required for its adoption?
- No. 5. What is a sluice-valve, where fitted, and for what purpose?