

3. Explain fully how you would put up your brattice-cloth.
4. How would you ventilate a shaft in which a little black-damp was met with in sinking?
5. In splitting the air, how would you provide that one district did not get too much?

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SECOND DAY.—TIME: 9 A.M. TO 12 NOON.

SUBJECT V.—*On the Areas of Airways, the Velocity and Divisions of Currents, and the Deductions to be made for Friction.*

1. Is anything else than an increased current gained by splitting the air?
2. Would you unite all your return air-currents as soon after passing the men as possible in an extensive mine free from gas?
3. You have an air-course 20ft. by 10ft. which must be allowed to close: what size must two smaller air-ways of equal size be to give the same volume of air?
4. State the different reasons that would guide you in regulating the velocity of the currents in a fiery mine.
5. What does one inch of water-gauge mean?

SUBJECT VI.—*On the Nature and Composition of Explosive and Dangerous Gases occurring in Coal-mines, and on Spontaneous Combustion.*

1. Describe the various properties of carbonic acid gas.
2. What proportions of fire-damp and air cease to be explosive?
3. What is the composition of after-damp?
4. Describe the Marsaut safety-lamp.
5. Are all coals liable to spontaneous combustion? Explain as fully as you can.

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SECOND DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT VII.—*On the Drainage of Mines, and Pumping Appliances.*

1. What is the greatest depth for a single lift, and what causes limit this?
2. Is there more wear and tear with a forcing or lifting pump? Explain why.
3. Sketch the arrangements at the junction of a plunger and lifting-set.
4. What arrangements would you make for pumping very sandy water?

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

1. What is the limit to the length of one section of an endless rope? Give an example.
2. Give sketch of self-acting incline, where the roof is so bad that you cannot have a double line of rails except in the middle, and describe arrangements for tubs passing.
3. Describe and give sketch of the method by which you would keep an endless rope from becoming slack.
4. How would you attach the tubs to an endless chain, where the thinness of the seam compelled it to be done underneath the box? Give sketch.

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THIRD DAY.—TIME: 9 A.M. TO 12 NOON.

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

1. Give sketch in plan, with sizes marked, of the dam you would put in for a heavy head of water.
2. What arrangements would you make for preventing too great an outflow of water from the bore-hole in tapping a body of water under great pressure?
3. What is the greatest width you would permit a place approaching a heavy body of water to be?

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SUBJECT X.—*Blasting and the Use of Explosives.*

1. What is the chief objection to the use of powder in mines?
2. Why should another hole not be drilled near any one in which any charge of a nitro-glycerine explosive has missed fire?
3. What are the uses of the water cartridge?

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THIRD DAY.—TIME: 2 P.M. TO 5 P.M.

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

1. What is meant by a step fault, and what does it indicate?
2. What reasons are there for coal being of inferior quality near faults?
3. In what circumstances would you look for a reversed fault?
4. Show by sketch how you would measure the amount of displacement caused by a fault in an inclined seam?