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RTMENT OF EDUCATION

Industrial and Technical Education

RELATING TO

Correspondence Courses in Coal-mining

BULLETIN NUMBER TWO

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FOREWORD.

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FOR some years past the Department of Education of British Columbia has conducted night-schools for men engaged in the coal-mining industry in order to provide the requisite training for the examinations held by the Department of Mines.

The conditions of the shift system under which miners work have hitherto militated against the complete success of the venture. With a view to overcome this difficulty, as well as to bring the opportunity of advancement within reach of a greater number of men, it has been decided to conduct the classes through the medium of correspondence.

The proposed courses of study will, as before, consist of subjects having a direct bearing on the work which must be mastered by those who seek certificates as shotlighters, overmen, and mine managers.

A preparatory course leading up to the examinations referred to will also be provided for boys who have just left day-school to engage in work at the mines. It is thus hoped during the waiting or probationary period which closes at the age of twenty-three, not only to give these lads valuable training, but also to foster their ambition for promotion to responsible posts.

"Aim high and consider yourself capable of great things."

Correspondence Courses of Instruction in Coal-mining.

YOU MAY JOIN ANY OF THE FOLLOWING COURSES.

No. 1. Preparatory Mining Course for boys who have left school—	
Section A, Section B, Section C, Section D, Section E — per section	$ 5 00
Section F	10 00
No. 2. Preparatory Course in Arithmetic	10 00
No. 3. Course for Fireboss, Shiftboss, or Shotlighter's papers (Third Class)	15 00
No. 4. Course for Overman's papers (Second Class)	25 00
No. 5. Course for Mine Manager's papers (First Class)	35 00
No. 6. Course in Mine Survey Work	35 00

All fees payable in advance.

Fill in registration form on last page and forward to:—

Education Department, Technical Branch,
Parliament Buildings,
Victoria, B.C.

"We must work like peasants and think like philosophers, else we shall be as worthless as savages."—Rousseau.

INFORMATION REGARDING CORRESPONDENCE CLASSES IN COAL-MINING.

The boy who leaves school and goes to mining-work should at once join the Preparatory Mining Course No. 1. The subjects covered under the six sections will form a foundation upon which to build for future progress. They will provide ample preparation for the British Columbia mining examinations.

Course No. 2 will be found to be an excellent preparation for Courses Nos. 3, 4, 5, and 6.

The man who desires to study for his Fireboss, Shiftboss, or Shotlighter's papers (Third Class) should take No. 3 Course.

The man who desires to study for his Overman's papers (Second Class) should take No. 4 Course.

The man who desires to study for his Mine Manager's papers (First Class) should take No. 5 Course.

The man who desires to study for Mine Survey Work should take No. 6 Course.

Section A.

Arithmetic—Addition, substraction, multiplication, and division; vulgar and decimal fractions; short methods of obtaining approximations; practical applications; square root; proportion, simple and compound; proportion expressed in a form of simple equation.

Mensuration—Measurement of lines; scales; use of compasses, dividers, set-squares, T-square; areas—Rectangular, triangular, and circular areas; area of ellipse.

Drawing—Meaning of plane, elevation, section; type-models—prism, cube, etc., to be draughted and cut out of stout paper; plans, elevations, and sections to be drawn from them.

English—Penmanship; spelling; grammatical errors; letter-writing; personal and business composition; simple descriptions and narration relating to mines and mine operating; encouragement of home-reading.

Section B.

Mathematics—Revision of first year's work.

Algebra—Laws of commutation, distribution, and the index laws; simple factors used in mensuration.

Mensuration—Area of regular figures; the triangle, square, circle, and ellipse; area of irregular figures by Simpson's rule; squared paper; use of squared paper; graphs and their practical application.

Geometry—Usual definitions; measurement of angles; subdivision of angles and straight lines; scales.

Drawing—Plans, elevations, sections; the making of freehand sketches and diagrams.

Applied English—The subjects for this course will be selected with a view to forming a basis for the study of physics. Subjects to be treated in an interesting way with a view to whetting the appetite for more.

The Air—Atmospheric pressure; barometer and thermometer; oxygen, nitrogen, and carbonic acid.

Heat—Sources of heat; heat and temperature; effects of heat; expansion of solids; liquids and gases; thermometer; how an expanding gas may do work.

Electricity—Its nature, laws, etc.

Section C.

Mathematics—Algebraic quantities; addition and substraction; multiplication and division; factoring; simple equations; graphs.

Mensuration—Definitions, polygons, triangles, quadrilaterals, circles, solids, prisms, and cylinders; pyramids and cones; spheres, wedge, and cylindrical ring.

Geometry—Scales, plain and diagonal; construction of triangles; similar triangles; measurement of sine, cosine, and tangent of an angle; making of working drawings.

Elementary Mechanics—Matter and its properties; the three laws of motion; magnitude of a force, direction of a force, graphical representation of forces, composition and resolution of forces, centre of gravity, velocity, gravitation, mass, etc.

Elementary Chemistry—Definitions; atom, molecule, elements, symbols, and atomic weights; chemical compounds and mechanical mixtures; description and composition of fuels.

Section D.

Mining Arithmetic—Equations, transposition, formulas, percentage, ratio and proportion, square and cube root.

Mine Gases—Occurrence, properties, behaviour, and detection of mine gases; oxygen, hydrogen, nitrogen, carbon, and sulphur; methane, ethane, propane, butane, carbon monoxide, carbon dioxide, hydrogen sulphide, sulphur dioxide, nitrogen peroxide, and ethylene; physiological effects of different gases on man; principle of safety-lamp; gob-fires.

Mechanics—Problems on work and power; triangle and parallelogram of forces; sliding and rolling friction; the lever, wheel, and axle; pulleys, belts, gear-wheels, screws, jacks, and inclined plane; tensile and crushing strength of materials; steam, types of engines, boilers, and pumps.

Explosives and Blasting—Different kinds of explosives used in coal-mining and rock-work; shot-firing, squibs, safety-fuse, electric battery, detonators, tamping; coal-dust; composition of explosives and resultant gases.

Section E.

COAL-MINES ACT—RULES AND REGULATIONS.

Trigonometry—Angles; definitions of functions; solution of right triangles; solution of oblique triangles and logarithms.

Lighting—Safety-lamps, various types and details; testing for gas, gas-caps, gas-detector; portable electric and acetylene lamps.

Ventilation—Theory and practice of mine ventilation; laws of ventilation; anemometer, air measurements, splitting air-currents, choice of airways; methods of producing ventilation; problems on ventilation.

Methods of working Coal—General methods; flat and pitching seams; surface stripping; room-and-pillar, long-wall, and panel system; size of pillars; lay-out of slope and shaft bottoms; direction of main roads.

Geology—Coalfields of Canada, geological age of rocks, carboniferous and cretaceous measures; coalfields of British Columbia.

Prospecting—Open-cuts, tunnels, shafts; diamond and other methods of drilling.

Shaft-sinking—Head-frame, sinking tools and appliances, shaft timbering, sheaves, cages, guides, detaching hooks, and signalling.

Underground Haulage—Animals, tail-rope, endless rope, and gravity-plane; electric, compressed air, gasolene, and steam locomotives.

Hoisting Machinery—Horse-power, steam, air, gasolene, and electric hoists; indicator diagrams and ropes.

Compass Surveying—Station, measuring distances on pitch and horizontal, bearings of a line, asimuth, meridian, verniers, making and plotting a compass survey.

Section F.

COAL-MINES ACT—RULES AND REGULATIONS.

Pumps—Simple hydraulics; static head; flow of water through pipes; siphon; calculations of horse-power; types of pumps, sinking-pump, electrical-driven pump, and their instalment; sumps and dams; hoisting-tanks.

Timbering—Properties of mine timber, strength of timber, timber measurements, timbering swelling ground; drawing timber; different methods of framing and timbering; iron and steel timbering; reinforced concrete; brick arches.

Ventilation—Fans of different types; calculations on ventilation; motive column, splits, overcasts, regulators, and water-gauge; stoppings and brattice.

Coal Cutting and Drilling Machines—Types of coal cutting and drilling machines; power used in coal-cutting.

Electricity—Direct and alternating currents, bells, batteries, magnetos, generators, motors, transformers and signals, static charges, conductors, electrical quantity, electrical work, telephones.

Surveying—The transit; use of the transit in pitching and horizontal seams; verniers, determination of a true meridian; putting on sight-lines, mine curves, railway

location; plotting by protractor, latitudes, and departure; map making and lettering; triangulation, stadia-work, connecting surface and underground workings; how to keep notes; calculating areas.

Levelling—Use and adjustments of level; spirit levelling, trigonometric levelling, profiles, calculating cuts, fills, etc.; contour-lines; how to keep notes.

"He that stays in the valley will never get over the hill."

COURSE FOR FIREBOSS, SHIFTBOSS, OR SHOTLIGHTER'S PAPERS (THIRD CLASS).

COAL-MINES ACT—RULES AND REGULATIONS.

Arithmetic—Addition, subtraction, multiplication, and division

The Air—Oxygen, nitrogen, and carbon dioxide.

Mine Gases—Occurrence, properties, behaviour, and detection; elements, symbols, atomic and molecular weights; definitions; chemical compound and mechanical mixture; methane, carbon monoxide, and carbon dioxide; coal-dust and its danger in mines; effect of different gases on man.

Lighting—Principle of safety-lamp, lamps of various types, and details; testing for gas; gas-caps; gas-detector; portable electric and acetylene lamps.

Practical Work—Geology of the coalfields of British Columbia; methods of working coal, timbering, tracks, brattice, stoppings, pumping, haulage, gob-fires, etc.

Explosives—Different kinds of explosives used in coal-mining and rock-work; shot-firing, squibs, safety-fuse, electric battery, detonators, and tamping.

Ventilation—Principles of ventilation; overcasts, regulators, air measurements; anemometer.

"Constant application overcomes the greatest difficulties."

COURSE FOR OVERMAN'S PAPERS (SECOND CLASS).

Unless the applicant is the holder of a Fireboss's Certificate he is not eligible for this course.

Arithmetic—Addition, subtraction, multiplication, division, vulgar and decimal fractions, square root, elements of geometry and trigonometry.

The Air—Oxygen, nitrogen, carbon dioxide.

Mine Gases—Occurrence, properties, behaviour, and detection; elements, symbols, atomic and molecular weights; definitions; chemical compound and mechanical mixture; methane, ethane, propane, butane, ethylene, or olefiant gas, carbon monoxide and carbon dioxide; gas-detector; effects of different gases on man; absorption of oxygen by coal.

Lighting—Principle of safety-lamps; lamps of various types and details; testing for gas; gas-caps; portable electric and acetylene lamps.

Geology—Geology of the coalfields of Canada, particularly of British Columbia; earth's crust; classification of rocks; strike, dip, faults, and folding.

Prospecting—Open-cuts, tunnels, drilling, and shafts.

Methods of working Coal—Long-wall, room and pillar, and modifications; panel system; flat and pitching seams.

Practical Work—Timbering, iron, steel, reinforced concrete, track, curves, grades, etc.

Explosives and Blasting—Different kinds of explosives used in coal-mining and rock-work; shot-firing, squibs, safety-fuse, electric battery, detonators, and tamping coal-dust.

Pumping—Kinds of pumps; simple hydraulics; static head; flow of water through pipes; calculation of horse-power; sumps and dams; hoisting-tanks.

Ventilation—General principle of mine ventilation; calculations in ventilation, power, areas, perimeters, and splits; overcasts, regulators, fans; brattice and stoppings.

Electricity—Its nature, laws, etc.; use of batteries, magnetos, generators, motors, and transformers.

Machinery—Hoisting and haulage engines; inclined plane; indicators, brakes, drums, ropes, and safety appliances; coal cutting and drilling machines.

Mine Surveying—Use of transit and compass in underground work; bearings, distances, sine, cosine, and tangent; plotting of compass survey.

"Be active for idleness is the rust of the mind."

COURSE FOR MINE MANAGER'S PAPERS (FIRST CLASS).

COAL-MINES ACT—RULES AND REGULATIONS.

Unless the applicant is the holder of an Overman's Certificate he is not eligible for this course.

Arithmetic—Addition, subtraction, multiplication, division, greatest common measure, least common multiple, vulgar and decimal fractions, percentage, square and cube root.

Algebra—Definitions; positive and negative quantities; addition, subtraction, multiplication, division, simple equations, transposition, and substitution as used in mining formulas.

Mensuration—Definitions; polygons, triangles, quadrilaterals, circles, solids, prisms, and cylinders; pyramid and cones; sphere, wedge, and cylindrical ring.

Geometry—Definitions; measurements of lines and angles; protractor; angles of figures; equality of parts of triangles; complement and supplement of an angle; properties of circle, chord, and tangent.

Trigonometry—Definitions; angle, sine, cosine, tangent, cotangent, secant, cosecant; geometric construction for angles; solution of right and oblique triangles; logarithms.

Mine Gases—Occurrence, properties, behaviour, and detection; elements, symbols, atomic and molecular weights; air, oxygen, hydrogen, nitrogen, carbon, and sulphur; chemical compound and mechanical mixture; methane, ethane, propane, butane, etc.; ethylene or olefiant gas series; acetylene series; carbon monoxide, carbon dioxide, hydrogen sulphide, sulphur dioxide, nitrogen peroxide; physiological effects of different gases on man; simple chemical arithmetic; principle of safety-lamp; gob-fires; fuels.

Lighting—Lamps of different types and details; testing for gas; gas-caps; gas-detector; portable electric and acetylene lamps.

Prospecting—Open-cuts, tunnels, drilling, and shafts.

Practical Work—Timbering, iron and steel; reinforced concrete; tracks, curves, grades, and switches; brickwork; brattice and stoppings.

Explosives and Blasting—Different kinds of explosives used in coal-mining and rock-work; shot-firing, squibs, safety-fuse, electric battery, detonator, and tamping; composition of explosives and resultant gases.

Pumping—Simple hydraulics; static head; flow of water through pipes; siphon; calculations of horse-power; types of pumps, sinking-pumps, electrical-driven pumps and their instalment; sumps and dams; hoisting-tanks.

Timbering—Properties of mine timber, strength of timber, timber measurements, timbering swelling ground; drawing timber; different methods of framing and timbering.

Ventilation—Theory and practice of mine ventilation; laws of mine ventilation; anemometer, air measurements, splitting air-currents, choice of airways, methods of producing ventilation, motive column, overcasts, regulators, water-gauge, and different types of fans; problems on ventilation.

Geology—Geology of the coalfields of Canada, particularly of British Columbia; earth's crust; classification of rocks; table of formations; strike, dip, faults, and folding.

Methods of working Coal—General methods; flat and pitching seams; surface stripping, room and pillar, long-wall, and modifications; panel system; size of pillars; lay-out of slope and shaft bottoms; direction of main roads.

Shaft-sinking—Head-frame, sinking tools and appliances, shaft timbering, sheaves, cages, guides, detaching hooks, and signalling.

Underground Haulage—Animals, tail-rope, endless rope, and gravity-plane.

Hoisting Machinery—Horse-power, steam, air, gasolene, and electric hoists; indicator diagrams and ropes.

Electricity—Electrical units; bells, batteries, magnetos, generators, motors, transformers, signals, static charges, conductors, electrical quantity, electrical work; direct and alternating current; telephones.

Surveying—Compass surveying; stations, measuring distances on pitch and horizontal, bearing of a line, azimuth, meridian, verniers, making and plotting a compass survey.

Transit—The transit and its use; pitching and horizontal seams; verniers, determination of a true meridian, putting on sight-lines, mine curves, principles of railway location, plotting by protractor, latitudes and departures; map making and lettering; triangulation, stadia-work, and connecting surface to underground workings; calculating areas; how to keep notes.

Levelling—Use and adjustments of level; spirit levelling, trigonometric levelling, profile, calculating cuts, fills, etc.; contour-lines; how to keep notes.

MINE SURVEYORS' COURSE.

Arithmetic—Addition, subtraction, multiplication, and division; highest common factor, least common multiple, vulgar and decimal fractions, square and cube root, percentage.

Algebra—Definitions; positive and negative quantities; addition, subtraction, multiplication, and division; factors, simple equations, problems.

Mensuration—Definitions; polygons, triangles, quadrilaterals, circles, solids, prisms, and cylinders; pyramids and cones; sphere, wedge, and cylindrical ring.

Geometry—Definitions; measurements of angles and lines; protractor; equality of triangles; properties of straight and parallel lines; angles of figures; equality of parts of triangles; properties of right-angled triangles; complement and supplement of angle; properties of parallelogram, circle, and chords; similar triangles.

Trigonometry—Angles; definitions of trigonometric functions, sine, cosine, tangent, cotangent, secant, cosecant, and their relations; functions of an acute angle of a right triangle; functions of complementary angles; functions of supplement of an angle; functions of 45°, 30°, 60°; solution of right triangle; solution of oblique triangle by the aid of right triangles; the oblique triangle; area of a triangle; logarithms.

Mine Gases—Elements, atomic and molecular weights, oxygen, hydrogen, nitrogen, carbon, and sulphur; methane, carbon monoxide, carbon dioxide, and their properties.

Surveying—The compass, magnetic needle, magnetic meridian, defects of compass, taking bearings, back-sights, correction of magnetic bearings; the compass in railroad surveys; how to keep notes.

Transit—Use and adjustment of transit, telescope, cross-hairs, line of collimation, graduated circle, vernier; how to prolong a straight line; double centres, horizontal angles, and their measurement; deflected line, triangulation, vertical angle, angle of intersection, simple, compound, and reverse curves; deflection angle, degree of curvature, chords, tangents; determination of a true meridian; putting on sight-lines, mine curves; surveys in pitching and flat seams; connecting surface and underground surveys; stations, stadia-work, traverse tables; how to keep notes.

Levelling—Use and adjustments of a level; spirit levelling, trigonometric levelling; rod, datum-line, bench-mark, profiles, and grade-lines; calculating cuts and fills.

Topographical Surveying—Contour-lines, hand-level, and clinometer; how to keep notes.

TEXT-BOOKS.

1. Milne's Arithmetic. Second Year.
2. Milne's Arithmetic. Third Year.
   Free Text-book Department, Victoria. Price, Second Year 42c., Third Year 48c., postage paid.
3. Canadian Drawing Book, 4A, Third Edition. Free Text-book Department, Victoria. Price, 10c., postage paid.
4. English for Technical Students, by Frederick F. Potter. Publisher: Pitmans, London, Eng. Price, 75c.
5. Practical Coal-mining, by Kerr. Publishers: Griffin & Co., Exeter Street, London, Eng. Price, $3.50.
6. Mining Formulæ and their Application. Publishers: "C.M.A." Office, Leigh, Eng.
7. The Theory and Practice of Mining Ventilation, by Tate. Publishers: Crosby, Lockwood & Sons, London, Eng.
8. Coal Miners' Pocket Book, Eleventh Edition.
9. Mine Surveying, by Bennett H. Brough. Publishers: Griffin & Co., Exeter Street, London, Eng.

(Publishers: Geological Survey, Ottawa. Free on Application.)

10. Geology of Nanaimo Map Area (Memoir 51).
11. Coalfields of Manitoba, Saskatchewan, Alberta, and Eastern British Columbia (Memoir 53).

(Publishers: International Text Book Co., Scranton, Penn.)

Vol. 86. Rock-boring, Rock-drilling, Explosives and Blasting; Coal-cutting Machinery.

Vol. 87. Geology of Coal, Drifts, Slopes, Shafts, and Methods of Working.

Vol. 88. Surface Arrangements, Coal-washing.

Vol. 37B. Mine Gases, Mine Ventilation, and Fuels.

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DEPARTMENT OF EDUCATION.

BRITISH COLUMBIA.

Industrial and Technical Education.

APPLICATION FORM.

CORRESPONDENCE CLASSES IN COAL-MINING, IN PREPARATION FOR BRITISH COLUMBIA EXAMINATIONS UNDER "THE MINES ACT."

No. 1. Preparatory Mining Course for boys who have left school—

Section A	per section	$ 5 00
Section B		
Section C		
Section D		
Section E		
Section F		10 00

No. 2. Preparatory Course in Arithmetic 10 00

No. 3. Course for Fireboss, Shiftboss, or Shotlighter's papers (Third Class) 15 00

No. 4. Course for Overman's papers (Second Class) 25 00

No. 5. Course for Mine Manager's papers (First Class) 35 00

No. 6. Course in Mine Survey Work 35 00

All fees payable in advance.

SIR:

I desire to take the course in mining mentioned above as No....., and enclose the required tuition fees to pay for same.

Name in full .....

Address .....

Age last birthday .....

Nationality .....

Forward this form to Education Department, Technical Branch, Parliament Buildings, Victoria, B.C.

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