of the 11th Year of Meiji Ers (1878) Sept.1941

Review of Special Industries in Japan
(An Economic Study of Iyo Province) - - - - - - - - - - - - - May 1943

Outline of Economic and Industrial World of Ehime Prefecture - - Nov. 1947

We are sorry to tell you that we cannot submit to you the copies marked (*) because they were destroyed in the airraid.

Hideo Ito.

ITO Hideo
President
Matsuyama Economic
College.

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File: Higher Schools

THE MATSUYAMA ECONOMIC COLLEGE

SUBJECT: Reply to Mr.Bell

TO : Mr. Bell

FROM : ITO Hideo, President, Matsuyama Economic College.

13 January 1948

(1) The Students' Association is, together with its every department, an autonomous body, and all the students are its members. Each student is to choose any department to which he wants to belong with his own will.

The members of committees are appointed by election, the term being one year.

Professors are chosen through the recommendation of the member students to give advices and assistance concerning the management and activities of the departments.

Independent of the department and consequently without any financial help of the students' association, there are such societies as Y.M.C.A, Society for the Study of Social Science, Young Men's Buddhist Association, Newspaper Society. The organization and management of these are autonomous just like the departments.

The students of the dormitory also autonomously manage the affairs of the dormitory, the boarding and others.

(2) The budget for the Association is about ¥100,000, and every department of sports as well as of culture is vigorously working and are playing a very important part in the school life.

Budget, elections of the members of each committee, schedules for events, welfare facilities and provisions---these are decided after discussions and talks among the students.

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Budget, elections of the members of each committee, schedules for events, welfare facilities and provisions---these are decided after discussions and talks among the students.

Also in the dormitory, talks are often held concerning the dormitory life.

Hideo Ito.

ITO Hideo
President
Matsuyama Economic College

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A PLAN FOR NIIHAMA RIKOKA DAIGAKU

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INTRODUCTION

The Niihama Kogyo Senmon Gakko founded in 1939, is part of the engineering education system of Japan and is directly conducted by the Monbusho. The school comprises the Engineering Departments of Mechanical, Electrical, Metallurgical and Mining. The various faculties include over 50 officers of instruction. More than 1,000 students, representing other prefectures and territories were registered at the Niihama Kogyo Senmon Gakko, during the last year.

From the standpoint of the chemical industry in Niihama, it is evident to have the Chemical Engineering, Engineering Physics and Engineering Mathematics in our shool. We are planning to add these departments in near future when our school becomes Daigaku.

The aim of the Niihama Rikoka Daigaku is to lay a foundation of sound theory, sufficiently broad and deep to enable their graduated to enter understandingly on a further investigation of the several specialities of the engineering profession; and at the same time to impart such a knowledge of the usual professional practice as shall make the students useful upon graduation in any subordinate position to which they may be called. While the adapt-ation of

specialities of the engineering profession; and at the same time to impart such a knowledge of the usual professional practice as shall make the students useful upon graduation in any subordinate position to which they may be called. While the adapt-ation of theory to practice can be thoroughly learned only by experience, there are many matters in which the routine work of an engineering field party, office, or drafting room can be carried out, on a greater of less scale, in a training school. The technical branches are under the direct charge of those who have had professional experience as well as a full scientific training. The instruction will be to fit the students, as far as possible, for the requirements of active practice.

The Niihama Rikoka Daigaku is well situated for excursions to engineering industries. In Niihama there are many outstanding factories, such as Niihama Chemical Co, Misshin Chemical Co., Shikoku Machinery and Electrical Work, Sumitomo Besshi Mine, Sumitomo Electrical Power Co., Nippon Electrical Power and Distributing Co. and Shikoku Railway, each of which is located within the city. These companies are all in hearty sympathy and accord with our school and afford the students every opportunity for inspection of these plants. From the standpoint of engineering school, the Niihama Rikoka Daigaku

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has a strategic location the very center of industry of Shikoku. Imaharu, Mishima, Saijo, and Kawanoe, with the well-known spining and paper factories in Shikoku, are within easy excursion distances.

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SYNOPSIS OF NIIHAMA KOGYO SENMON GAKKO

Director: Sukeaki Sakai		
Prof' : (that do not belong to any particular Dept.) Prof. Sakai (Phys.) Prof. Morimoto (Eng.) " Tanaka (Phys) " Tsuchida (Phil.) " Sobajima (Eco.) " Tomokiyo (Math.) " Fujita (Law) " Masui (Phys.) " Sasaki (Math.) Assist.-Prof.s: Jinno Katakami Tanaka Murata	Departments	Faculty
	Mechanical	Prof. Sono (Dean) (Mechanics) " Ishiwata (") " Sasaki (") Assist. Pro's: Okada Yasuoka Toh
	Electric	Prof. Ando (Dean) (Elect.) " Katsoka (") Assist. Prof's: Okuda Iyeyasu Lecturer Matsuoka
	Mining	Prof. Okamura (Dean) (Mining) " Uchida (") " Sakaue (") " Ezawa (") " Igarashi (") Assist. Prof's: Yoshida

	Mining	Prof. Okamura (Dean) (Mining) " Uchida (") " Sakaue (") " Ezawa (") " Igarashi (") Assist. Prof's: Yoshida
	Metallurgic	Prof. Nakamura (Dean) (Metal.) " Onishi (") " Watanabe (") Assist. Prof.

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CURRICULUM IN MECHANICAL ENGINEERING AND REQUIREMENTS FOR GRADUATION

Cadidates for the degree of "Kogakushi" in Mechanical Engineering are required to complete the four year curriculum detailed below.

	Hours
a) Preparatory courses:	
Modern Language (English, German)	6
Cultural Electives, (Sociolog, Politics, History, Literature, Arts)	6
Mathematics 1, 2, 3, 4.	16
Physics 1, 2	10
Chemistry 5E	5
Drawing 1, 2, 3, 4	16
Shop 2	3
Economics, (General and Indutrial Economics)	6
TOTAL	68
b) Secondary and Technical Courses:	
Eng. Mech. Use of Instruments and Measuring	3
Eng. Mech. 2, Statics	2
Eng. Mech. 3, Strength and Elasticity	4
Eng. Mech. 4, Dynamics	3
Eng. Mech. 5, Hydraulics	4
Eng. Mech. 6, Thermodynamics	3
Mech. Eng. 2, Elements of Machine Design	4
Mech. Eng. 3, Heat Engines	4
Mech. Eng. 4, Hydraulic Machinery	3
Mech. Eng. 5, Machine Design	4
Mech. Eng. 6, Mechanics of Machinery	3
Mech. Eng. 7, Laboratory, First Course	3
Mech. Eng. 8, Laboratory, Second Course	3
Mech. Eng. 9, Power Plants	3
Mech. Eng. 10, Theory of Machine Movements	2
Mech. Eng. 11, Mechanical Techology	6
Civil Eng. 2, Theory of Structures	2

Mech. Eng. 6, Mechanics of Machinery	5
Mech. Eng. 7, Laboratory, First Course	5
Mech. Eng. 8, Laboratory, Second Course	3
Mech. Eng. 9, Power Plants	2
Mech. Eng. 10, Theory of Machine Movements	6
Mech. Eng. 11, Mechanical Techology	2
Civil Eng. 2, Theory of Structures	4
Elec. Eng. 2a, Electrical Engineering	3
Chem. Eng. 1, Engineering Materials	1
Chem. Eng. 10, Exam. of Gas and Fuel	2
Met. Eng. 5, Metallurgical Techology	
TOTAL	66

Summary:

Preparatory Courses	68
Secondary and Technical Courses	66
Electives	6
TOTAL	140

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CURRICULUM IN ELECTRICAL ENGINEERING AND REQUIREMENTS FOR GRADUATION

Candidates for the degree of "Kogakushi"in Electrical Engineering are required to complete the four year curriculum detailed below.

a) Preparatory Courses:	Hours
Modern Language (English, German)	6
Cultural Electives (Sociology, Politics, History, Literature, Arts)	6
Mathematics 1, 2, 3, 4.	16
Physics 1, 2	10
Chemistry 5E	5
Drawing 1, 2, 3.	10
Shop 2	2
Economics (General and Industrial Economics)	6
TOTAL	61

b) Secondary and Technical Courses:	
Physics 3, Electrical Measurements	4
Surveying 2, Use of Instruments	2
Eng. Mech. 1, Statics	4
Eng. Mech. 2, Strength and Elasticity	3
Eng. Mech. 3, Dynamics	2
Eng. Mech. 4, Hydromechanics	3
Civil Eng. 2, Theory of Structure	3
Mech. Eng. 2a, Elements of Machine Design	3
Mech. Eng. 3, Heat Engines	4
Chem. Eng. 1, Engineering Materials	3
Elec. Eng. 1, Prin. of Electricity and Magnetism	4
Elec. Eng. 2, D. C. App. and Circuits	4
Elec. Eng. 3, A. C. Circuits	4
Elec. Eng. 4, A. C. Apparatus	4
Elec. Eng. 5, Design of Electrical Machinery	4
Elec. Eng. 6, Elec. Materials	2

Chem. Eng. 1, Engineering Materials	3
Elec. Eng. 1, Prin. of Electricity and Magnetism	4
Elec. Eng. 2, D. C. App. and Circuits	4
Elec. Eng. 3, A. C. Circuits	4
Elec. Eng. 4, A. C. Apparatus	4
Elec. Eng. 5, Design of Electrical Machinery	4
Elec. Eng. 6, Elec. Materials	2
Elec. Eng. 7, Illumination and Photometry	2
Elec. Eng. 8, Thermionic Vacuum Tubes	2
Elec. Eng. 9, Radio	2
Elec. Eng. 10, Telephone	2
Elec. Eng. 11, Power Plants, Transmission and Distribution	5
Elec. Eng. 12, High Voltage	1
Elec. Eng. 13, Principle of Electric Traction	2
Elec. Eng. 14, Electro-mechanics	4
Elec. Eng. 15, Electrical Law	1
TOTAL	74

Summary:

Preparatory Courses:	61
Secondary and Technical Courses	74
Electives	5
TOTAL	140

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CURRICULUM IN MINING ENGINEERING AND REQUIREMENTS FOR GRADUATION

Candidates for the degree of "Kogakushi"in Mining Engineering are required to complete the four year curriculum detailed below.

	Hours
a) Preparatory Courses:	
Modern Language (English, German)	6
Cultural Electives (Sociology, Politics, History, Literature, Arts)	6
Mathematics 1, 2, 3, 4	16
Physics 1, 2	10
Chemistry 5E(General and Inorganic Chemistry)	5
Drawing 1, 2, 3	8
Economics (General Economics and Industrial Ecomics)	6
Shop 1	2
TOTAL	59
b) Secondary and Technical Courses:	
General Surveying	2
Mine Surveying	3
Eng. Mech. 1, (Statics)	4
Eng. Mech. 2, (Strength and Elasticity)	3
Eng. Mech. 3, (Dynamics)	2
Elec. Eng. 2a, (Theory and Machinery)	4
Mech. Eng. 2a, (General Mech. Eng.)	3
Mineralogy	2
Geology	2
Analytical Chemistry	1
Min. Eng. 1, (Metal Mining)	3
Min. Eng. 2, (Mineral Deposits)	2
Min. Eng. 3, (Coal Mining)	3
Min. Eng. 4, (Prospecting)	2
Min. Eng. 5, (Ore Dressing)	3
Min. Eng. 6, (Briquetting)	1

Geology	2
Analytical Chemistry	1
Min. Eng. 1, (Metal Mining)	3
Min. Eng. 2, (Mineral Deposits)	2
Min. Eng. 3, (Coal Mining)	3
Min. Eng. 4, (Prospecting)	2
Min. Eng. 5, (Ore Dressing)	3
Min. Eng. 6, (Briquetting)	1
Min. Eng. 7, (Mining Machinery)	3
Chem. Eng. 2, (Physical Chemistry)	2
Chem. Eng. 3, (Industrial Inorganic Chemistry)	2
Chem. Eng. 5, (Industrial Organic Chemistry)	2
Metallic Materials	2
Mine Law	1
Explosive	2
Mine Hygiene	1
Civil Eng. 3a, (Civil Engineering)	2
Metal. Eng. 2a, (Metallurgy)	3
Special Lectures on Mine Eng.	5
Architecture	2
Graduation Research	5
TOTAL	72

Summary:

Preparatory Courses	59
Secondary and Technical Courses	72
Electives	9
TOTAL	140

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CURRICULUM IN METALLURGICAL ENGINEERING AND REQUIREMENTS FOR GRADUATION

Candidates for the degree of "Kogakushi" in Metallorgical Engineering are required to complete the four year curriculum detailed below.

a) Preparatory Courses	Hours
Modern Language (English, German)	6
Culutural Electives (Sociology, Politics, History, Literature, Arts)	6
Mathematics 1, 2, 3, 4,	16
Physics 1, 2, 3,	12
Chemistry 1E, (Engineering Materials)	2
Chemistry 5E, (General and Inorganic Chemistry)	5
Drawing 1, 2, 3,	6
Metal Processing (The Working, Treating & Welding of Steel)	2
Economics (General and Industrial Economics)	6
TOTAL	63

b) Secondary and Technical Courses	
Chemical Analysis 1, 2, 3.	9
Ore Dressing 2, 3.	4
Assaying 3	2
Mineralogy 2, 3.	4
Ore Deposits 3	2
Metals and Alloys 2, 3.	8
Iron Metallurgy 2, 3.	6
Non-ferrous Metals 2, 3.	8
Elec. Eng. 2E (Electric Apparatus and Circuits)	4
Mech. Eng. 1, (Statics)	3
Mech. Eng. 2, (Strength and Elasticity)	4
Mech. Eng. 2s (General Mech. Eng.)	3
Mech. Eng. 3 (Dynamics)	4
Metallography	3
Technology	4

Elec. Eng. 2E (Electric Apparatus and Circuits)	4
Mech. Eng. 1, (Statics)	3
Mech. Eng. 2, (Strength and Elasticity)	4
Mech. Eng. 2a (General Mech. Eng.)	3
Mech. Eng. 3 (Dynamics)	4
Metallography	3
Technology	4
TOTAL	68

Summary:

Preparatory Courses	63
Secondary and Technical Courses	68
Electives	9
TOTAL	140

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CURRICULUM IN CHEMICAL ENGINEERING AND REQUIREMENTS FOR GRADUATION

Candidates for the degree of "Kogakushi" in Chemical Engineering are required to complete the curriculum detailed below.

a) Preparatory Courses:	Hours
Modern Language (English, German)	8
Culutral Electives (Sociology, Politics, History, Literature, Arts)	8
Mathematics 1, 2, 3, 4	16
Physics 1, 2, 3	12
Chem. Eng. 1, (Engineering Materials)	2
Chem. 5E, (General and Inorganic Chemistry)	5
Drawing 1, 2, 3	8
Metal Processing, (The Working, Treating and Welding of Steel)	3
Economics, (General Economics and Principles of Accounting)	6
Factory Management	2
TOTAL	70

b) Secondary and Technical Courses	
Chem. 40, Physical Chemistry	3
Chem. 41, Physical Chemistry	3
Chem. 53, Quantitative Analysis	5
Chem. 57, Organic Chemistry	4
Chem. 58, Organic Chemistry	4
Eng. Mech. 1, Statics	3
Eng. Mech. 2, Strength and Elasticity	4
Mech. Eng. 2a, Elements of Machine Design	3
Mech. Eng. 3c, Heat Engines	4
Elec. Eng. 2a, Electric Apparatus and Circuits	4
Chem. Eng. 2, Fuels and Furnaces	3
Chem. Eng. 3, Structure and Properties of Metals	3
Chem. Eng. 4, Technology of the Inorganic Industries	2
Chem. Eng. 5, Technology of the Organic Industires	4

Mech. Eng. 2a, Elements of Machine Design	3
Mech. Eng. 3c, Heat Engines	4
Elec. Eng. 2a, Electric Apparatus and Circuits	4
Chem. Eng. 2, Fuels and Furnaces	3
Chem. Eng. 3, Structure and Properties of Metals	3
Chem. Eng. 4, Technology of the Inorganic Industries	2
Chem. Eng. 5, Technology of the Organic Industires	4
Chem. Eng. 9, Unit Operations	6
Chem. Eng. 12, Special Problems	5
Chem. Eng. 15, Unit Operations Laboratory	2
TOTAL	62

Summary:

Preparatory Courses	70
Secondary and Technical Courses	62
Electives	8
TOTAL	140

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CURRICULUM IN PHYSICS

Candidates for the degree of "Rigakushi" in (Physics) are required to complete the following curriculum.

	Hours
a) Preparatory Courses;	
Education	3
Modern Language (English & German)	10
Cultural Subjects (History, Economics, Politics, Sociology)	12
Mathematics 1, Algebra and Analytic Geometry	4
" 2, Plane and Solid Analytic Geometry	4
" 3, Calculus I	4
" 6, " II	4
" 7, Differential Equations	2
Physics	10
Chem. 5E	5
Metal Proc. 1 & Chem. Eng. 1 -	5
Drawing 1, 2, 3,	5
TOTAL	68
b) Secondary Courses;	
Eng. Mech. 1, Statics	3
Eng. Mech. 2, Strength and Elasticity	4
Eng. Mech. 3, Dynamics	3
Eng. Mech. 4, Hydromechanics	3
Heat Engines	4
Principles of Electricity and Magnetism	4
Direct Current Apparatus and Circuits	4
Alternating Current Circuits	4
Modern Physics	2
Electrical Measurements	4
Vacuum Tubes	2
Light	4
Atomic Structure	3

Principles of Electricity and Magnetism	4
Direct Current Apparatus and Circuits	4
Alternating Current Circuits	2
Modern Physics	4
Electrical Measurements	2
Vacum Tubes	4
Light	3
Atomic Structure	43
TOTAL	

c) Advanced Coures;

Group Options in Physics and Mathematics	14
General Electives	15
TOTAL	140

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CURRICULA IN MATHEMETICS

Candidates for the degree of "Rigakushi" in (Mathematics) are required to complete the following curriculum.

		Hours
a) Preparatory Courses;		
Education		3
Modern Language (English & German)		10
Cultural Subjects (History, Economics, Politics, sociology)		12
Mathematics	1. Algebra and Analytic Geometry	4
"	2. Plane and Solid Analytic Geometry	4
"	3. Calculus I	4
"	6. " II	4
"	7. Differential Equations	2
Physics, General		10
Chem. 5E		5
Metal Proc. 1 & Chem. Eng. 1		5
Drawing 1, 2, 3.		5
TOTAL		68
b) Secondary Courses		
Celestial Mechanics		3
Complex Variable		3
Eng. Mechanics 1, 2, 3, 4.		13
Elec. Eng.2		4
Civil Eng. 2		3
Mech. Eng. 3		4
TOTAL		30
c) Advanced Courses		
Technical Group		14
Mathematics Group		14
Electives		2

TOTAL	30

c) Advanced Courses

Technical Group	14
Mathematics Group	14
Electives	8
Group Optains in Eng. Mechanics, Astronomy, Physics, Mathematics or Technical Eng.	6
TOTAL	140

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THE DEPARTMENT OF MECHANICAL ENGINEERING

The department of Mechanical Engineering of Niihama Kogyo Senmon Gakko endeavors to give the student a through training in the foundmental principles of the basic mechanical engineering subjects. Most of the time of the first two years and a part of the third year, is spent in a study of the fundation courses such as mathematics, economics, foreign languages, physics, chemistry, drawing and mechanics when the school becomes "Daigaku." In the third and fourth years, required courses in heat engines, machine designs, mechanical laboratory, thermodynamics, hydrulics and power plants supplement the fundation courses. The Department recongnizes the fact that no student can properly expect to specialize in any branch of engineering in four years of college work. However, a number of adavced courses are offered those who desired or plan to spend more than four years. Graduate Mechanical engineers very rapidly rise to position of responsibility in the industries, and a broad general course as well as a technical course is of great value to them in their advancement. For this reason students are urged to elect in other engineering departments and also in the literature, science and art courses which are being prepared as the selective subjects.

is of great value to them in their advancement. For this reason students are urged to elect in other engineering departments and also in the literature, science and art courses which are being prepared as the selective subjects.

FACILITIES FOR INSTRUCTION

It is recognized by this department that the pricipal benefits to be derived from a college training are dependent more upon the character of the instruction than upon physical equipment. The importance of certain apparatus for purpose of illustration, demonstration and testing is however apparent in some lines of work, and the Department aims to include a sufficent amount of laboratory instruction to supplement properly the work of the classroom. The Mechanical Engineering Laboratory is located as shown in the map and has a floor space of approximately 2380 Sqm. It is devoted to experimental work inconnection with the testing of engines, boilers, pumps, fans, air compressors, hydraulic machinery and automobile engines. The laboratory, as a whole, comprises all the equipment utilized for illustration of the theory involved in mechanical engineering and for experimental work of both standard and research nature. Although, present laboratory equipment is not sufficient for the college standing as shown in Table I and it is essential to prepare more laboratory facilities

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which are detailed in Table II as the well-equiped college laboratory.

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Table I

THE PRESENT EQUIPMENTS OF MECHANICAL ENGINEERING
LABORATORY OF THE NIIHAMA TECHNICAL COLLEGE

Name	Capacity or Size	No. of equipment
I. Shop practise:-		
Ordinary metal lathe	6'-long	11 sets
" "	5'-long	5
All geared lathe	8'-long	1
Beleaving lathe	6'-long	1
Horizontal Universal milling machine	No.2	1
Gear hobbing machine	D.P.4,24"d	1
Universal cutter & tool grinder	24"	1
Shaping machine	16"	1
Upright drill press	16"	1
Sensitive drill press	12"	1
Tool grinder	12"	1
Water tool grinder	18"	1
Box vice	5"	50 sets
Surface plate	5'×6'	2

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Tool grinder	12"	1
Water tool grinder	18"	1
Box vice	5"	50 sets
Surface plate	3'×6'	2
"	2'×2'	2
"	1'×1'	2
Bench working Small tools		10 sets
Wood working lathe	4'-0"	2
"	6'-0"	1
Band Sawing Machine	20"	1
Wood planing machine	16"	1
Disk & Spindle Sander		1
Wood working Small tools		8 sets
Small cupola	3/4 ton	1
Crucible furnace		1
Core over		1
Moulding sand mixer		1
Foundry men Small tools		10 sets
Smithing hearth		4
Air hammer	18 ton	1
Smithing tools		8 sets

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Name	Capacity or Size	No. of equipment
Electric furnace		1 set
Salt bath		1
Electric arc welding machine	16 KW	1
Electric resistance welding machine	30 KW	1
Oxy-acetylene welding apparatus		1
2. Measurement :-		
Tool maker's microscope		1
Measuring microscope		2
Minimeter		2
Tool microscope		2
Micron Indicator		1
Screw measuring apparatus		1
Dial Indicator		4
Micrometer		4
Verniercaliper		8
Optical flat		2
Block gauge & fittings		2

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Micrometer		4
Vernierealiper		8
Optical flat		2
Block gauge & fittings	A&C	2
Spirit level		4
3. Heat Engine:-		
Diesel Engine & Dynamo	40 HP	1
Small diesel Engine	16 HP	1
Hot bulb Engine	8 HP	1
Small diesel Engine	4 HP	1
Kerosene Engine	2 HP-3 HP	4
Charcool gas producer		1
Floude Hydraulic Dynamometer	40 HP	1
Electric Dynamometer	10 HP	1
Air compresser		4
3' Hydraulics:-		
Turbine pump	15 HP	1
Water channel		1
4. Material testing:-		
Amsler universal testing machine	50 tons	1
Fatigue testing machine		1

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Name	Capacity or Size	No. of equipment
Sharpy Impact testing machine		1
Brinnel hardness testing machine		1
Rockwell hardness testing machine		1
Shore hardness testing machine		1
5. Miscellaneous equipment		
Extensometer		1
Optical pressure Indicator		1
Planimeter		3
Tachometer		2
Pressure gauge	5Kg-300Kg	6
Hygrometer		1
Barometer		2
Anemometer		1

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Table II

THE ADDITIONAL EQUIPMENTS TO RAISE OUR SCHOOL TO THE DAIGAKU

Name	Capacity or Size	No. of equipment	Estimated price
1. Metalogy			
Microscope for Metalogy		1 set	100,000
Small Electric furnace		1	10,000
Metal polishing apparatus		1	10,000
2. Material testing			
Fatique tester		1	50,000
Small capacity universal testing machine	10 ton	1	900,000
Tension tester	1	1	50,000
Hardness tester		1	20,000
Wear testing machine		1	50,000
Measuring instruments		1	200,000
Photo Elastic apparatus		1	50,000
3. Mechanics & Dynamics			
Stroboscope Apparatus		1	50,000

Measuring instruments	1	200,000
Photo Elastic apparatus	1	50,000
3. Mechanics & Dynamics		
Storoboscape Apparatus	1	50,000
Oscillograph apparatus	1	150,000
Vibration measuring apparatus	1	80,000
Bearing tester	1	30,000
4. Heat Engine		
Single cylinder testing Engine	1	50,000
Automobile	1	40,000
Automobile engine	1	10,000
Dynamometer	1	150,000
High Speed pressure Indicator	1	50,000
Small Boiler	1	100,000
Small Steam turbine	1	100,000
Small Steam engine	1	150,000
Fuel calorimeter	1	10,000
Oil testing Apparatus	1	5,000
Small Pelton wheel	1	50,000
Small Francis Water turbine	1	70,000
Electric motor		200,000

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Name	Capacity or Size	No. of equipment	Estimated price
5. Hydraulics			
High pressure water turbine pump		1	30,000
Reciprocating water pump		1	20,000
Small Centrifugal pump		1	10,000
Hydraulic clutch		1	100,000
Flow meter			20,000
6. Measurement			
Universal tool Maker's Microscope		1	200,000
Screw testing machine		1	50,000
Gear testing machine		1	50,000
Protilometer		1	50,000
Interference Comparator		1	100,000
Optimeter		1	200,000
Angle block gauge		1	20,000
Dividing machine		1	200,000
Chemical balance		1	30,000
Measuring Machine		1	250,000

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Angle block gauge		1	20,000
Dividing machine		1	200,000
Chemical balance		1	30,000
Measuring Machine		1	250,000
7. Shop practices			
Planing machine	7'-0"	1	250,000
Turret lathe		1	200,000
Vertical milling machine	No. 2	1	150,000
Bench milling machine		1	50,000
Vertical boring & turning machine		1	100,000
Precision lathe		1	20,000
High Speed lathe		1	100,000
Horizontal boring machine		1	100,000
High Speed drilling machine		1	200,000
Gear cutting machine		4	1000,000
Grinding machine		1	150,000
Broaching machine		1	200,000
Shearing & punching machine		1	50,000
Metal melting apparetus		1	100,000
8. Chemical machinery			
Refrigerating machine		1	200,000

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Name	Capacity or Size	No. of equipment	Estimated price
Blower		1	50,000
Palverizing machine		1	20,000
Temperature Contralling apparatus		1	100,000
Vacuum pump apparatus		1	150,000
Air Compressor		1	150,000
9. Miscellaneous equipment			
Tachometer		5	20,000
Flow meter			50,000
Temperature Measuring apparatus			100,000
Pressure measuring apparatus			100,000
Time measure			20,000
Electric measuring apparatus			100,000
High speed cine camera		1	300,000
Projecter		1	10,000
10. Raw material			1000,000

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Projector	1	10,000
10. Raw material		1000,000

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ELECTRICAL ENGINEERING

Electrical engineers practice in a field of great breath, any true subdivision of it is very difficult. In our complex industries there must be specialization, and some electrical engineers become experts in design of electrical machines, some in the operation of electrical communication, some in the development of electrical power plant and distribution, and some in the production and utilization of electric light with correct principles of physics, physiology, art and architecture. The electrical engineer's work must be based on a thorough knowledge of electricity, but he is not a laboratory worker. He must apply more mathematics and physics than any other branch of engineering. A well-balanced course in electrical engineering must lay stress on general principles, whether electrical, mechanical, or economic. Premature specialization is to be avoided and thorough groundwork in electrical engineering in its broadest sense to be obtained. Like all engineers, the mature electrical engineer may become a business exective, utilizing his scientific knowledge and manufacturing experiences in directing industrial enterprises. For this reason students are urged to elect coures in the literature, science, history, economics

business exective, utilizing his scientific knowledge and manufacturing experiences in directing industrial enterprieses. For this reason students are urged to elect coures in the literature, science, history, economics and arts.

LABORATORY FACILITIES

The Electrical Engineering Laboratory may be divided into a dynamo laboratory, communicstion laboratories, weak current laboratory, photometric laboratory and an electronic and high voltage laboratories. The photometric and high voltage laboratories are not well-equipped yet at the present.

The Dynamo Laboratory is equipped with direct and allernating current apparatus of various types and sizes. In all of the electrical laboratory work, special emphasis is laid upon the development of student's ability to analyzed the phenomena which he observes in the operation of electric machinery.

The laboratory is equipped with meters and instruments of various ranges types and makes.

The Communication Laboratory are quite well equipped for both practical and theoretical experimental study of communication by electrical means. Oscillators covering both the audio and radio frequency ranges, vacuum tube voltmeters and ammeters, and impedance bridges are provided for accurate

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measurements. Standards of inductance, capacity, and resistance are available.

The Weak Current Laboratory is well equipped for measuring and experimenting electrical phenomena. Meters and instruments of various ranges and types are provided.

Power Plant. The school is well situated with regard to both hydraulic and steam power plants of Sumitomo Electric Co. within a mile distance. Technical inspections of these plants are made in conjunction with the classroom work in appropriate courses.

The summary of the present laboratory facilities and the additional equipments to raise our school to the "Daigaku" are shown in Table III and IV respectively.

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TABLE III

THE PRESENT LABORATORY FACILITIES OF ELECTRICAL ENGINEERING

1) Dynamo Laboratory

Articles	Capacity	Number
Single phase Transformer	2 k.w.	3
Three phase induction Motor	2 H.P.	2
"	5 "	1
D.C. shunt generator	1 k.w.	5
"	2 "	1
"	3 "	2
D.C. shunt motor	2 "	8
"	5 H.P.	1
Single phase induction regulator	2 k.w.	2
Three phase induction regulator	"	"
D.C. series motor	"	1
D.C. compound motor	3 k.w.	1
D.C. compound generator	"	"
Three phase series commutator motor	2 H.P.	"
Three phase shunt commutator motor	"	"

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D.C. compound motor	3 k.w.	1
D.C. compound generator	"	"
Three phase series commutator motor	2 H.P.	"
Three phase shunt commutator motor	"	"
Three phase A.C. generator	3 k.w.	"
Phase generator		"
Eddy current braker	3 H.P.	"
Electrodynamo dynamometer	1 k.w.	"
Soame's braker	"	"
Epstein iron loss tester		"
Single phase induction motor	H.P.	"
"	"	"
"	"	"
Field sheostat	3 k.w.	15
Starter	"	10
Water resistance	Load	9
Thermometer	150 c	2
D.C. ammeter		44
D.C. voltmeter		16
A.C. ammeter		29
A.C. voltmeter		10

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Articles	Capacity	Number
Galvanometer		1
Single phase wattmeter		15
Three phase p.f. meter		1
Frequency meter		7
Induction type time limit over current relay		2
Induction type over current directional relay		"
Induction type differential relay		2
Induction type overvoltage relay		"
Induction type low voltage relay		"
Induction type ground relay		"
Induction type current transformer		1
Induction type potential transformer		4
Electrostatic ground ditester		2
Tacho-meter		9
Electric tacho-meter		2
Megger		"
Wooden base for electric machine		10

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Tacho-meter		1
Electric tacho-meter		2
Megger		"
Wooden base for electric machine		10
Oil switch		1
Tools		All set

2) Communication laboratory

Articles	Capacity	Number
Universal transformer		1
Battery		7
Slide sheostats		9
Sodium lamp		1
High pressure mercury lamp		1
Light Projector		1
Tungsten arc lamp		2
Variable air condenser		2
Standard mica condenser		1
Standard variable condenser		1
Standard variable inductance		3
No reactance variable sheostat for high frequency		5
Resistance box		2

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Three element electromagnetic oscillograph	1
Standard variable oscillator	4
Resistance coupled amplifier	1
Reactance coupled amplifier	1
Transformer coupled amplifier	1
Photo-cell experimental set	1
Wavemeter	2
Resistance attenuator	1
Variable filter	2
Cathode-ray oscillograph	1
D.C. Ammeter	19
D.C. voltmeter	16
A.C. voltmeter	1
Thermocouple type ammeter	6
Thermocouple type voltmeter	2
Universal tester	1
Slidack	2
Choke coil	2
Receiver	1

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Slidack	2
Choke coil	2
Receiver	1

3) Weak Current Laboratory

Reflecting galvanometer and lamp-scale	15
Reading telescope	1
Reading microscope	1
Kelvin double bridge	1
Kohlrausch bridge	1
Potentiometer	2
Cadmium standard cell	2
PO type wheatstone bridge	12
Plug type resistance box	8
Precision plug type resistance box	2
Megohm box	2
Single core slide sheostat	5
Slide sheostat	3
Brush type sheostat	1
Standard resistance	8
Carbon resistance	3
Iron core variable resistance	1

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Slidack	2
Choke coil	2
Receiver	1

3) Weak Current Laboratory

Reflecting galvanometer and lamp-scale	15
Reading telescope	1
Reading microscope	1
Kelvin double bridge	1
Kohlrausch bridge	1
Potentiometer	2
Cadmium standard cell	2
PO type wheatstone bridge	12
Plug type resistance box	8
Precision plug type resistance box	2
Megohm box	2
Single core slide rheostat	5
Slide rheostat	3
Brush type rheostat	1
Standard resistance	8
Carbon resistance	3
Iron core variable resistance	1

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Iron core line bridge	8
Line bridge	10

TABLE IV

THE ADDITIONAL EQUIPMENTS TO RAISE OUR SCHOOL TO THE "DAIGAKU"

1) Dynamo Laboratory

Articles	Capacity	Number
Electrodynamo-dynamometer	10 H.P.	2
A.C. Generator, direct coupled with D.C. motor	5 k.w.	4
Synchronous, motor direct coupled with D.C. generator	"	2
Rotary converter	10 k.w.	2
Mercury rectifiers with the transformer	"	2
Three phase series commutator motor	5 H.P.	2
Three phase shunt commutator motor	"	2
Single phase series motor	"	2
Three phase induction		

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Three phase series commutator motor	5 H.P.	2
Three phase shunt commutator motor	"	2
Single phase series motor	"	2
Three phase induction motor	"	2
Single phase transformer		3
Three phase transformer		2
Three phase induction regulator	10 k.w.	5
Welding transformer		2
Welding Generator		1
A.C. volt-meter		10
A.C. ammeter		20
Wattmeter		10
Integrating wattmeter		3
Measuring instrument for low resistance		2
Synchronism indicator		3

Switchboad, Distributing boad, Distribution line, Hoist.

2) Practice Shop

Machine tools

Lathe	with motor	2
Turning mill	"	1

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Milling machine	with motor	1
Drilling machine	"	2
Shaper	"	1
Power press	"	1
Notching press	"	1
Metal sawing machine	"	1
Winding machine	"	3
Square shear	"	2
Cycle shear	"	1
Drying muffle		

Tools

Cutlery for machine	Each set
Iron press	"
Files	"
Vice	"
Square	"
Calipers	"
Compasses	"
Surface gauge	"

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Calipers		"
Compasses		"
Surface gauge		"
Surface plate		"
Scale		"
Drill		"
Tap		"
Dise		"
Coil winder		"

Switch boad, Distributing boad, Distribution line.

Cast iron		furnace
Cast coppor		"
Cost alminum		"
Pattern carious types of Patterns.		

3) High Voltage Laboratory Equipments

Three element selectromagnitic oscillograph		1
High voltage Cathode-ray oscillograph		1
Cathode-ray oscillograph		2
Electrostatic voltmeter		2
Impalse generator	300 k.v.	1
Cascade transformer	900 k.v.	1

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Cockroft & Walton D.C. high voltage Genrator		1
Oil filter		1
Schering bridge		1
High frequency high vollage source		1
Sphere gap	dia. 1.0m	1
"	" 50 cm	1
"	" 12.5 cm	1
Spectrum analizer		1
Rotaly vacum pump		1
Oil difusion pump		1
Spot welder		1
High voltage transformer		1
Xray generating device		1
Photographic camera		1
High voltage measuring apparatus		1
Surge current indicater		3
Klydonograph		1
Apparatus for measuring deelectric strength of oil		1
Switch boad, Distributing boad, Distribution line, Hoist		

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Surge current indicator	2
Klydonograph	1
Apparatus for measuring dielectric strength of oil	1

Switch boad, Distributing boad, Distribution line, Hoist

4) Photometry Laboratory Equipments

Stationary photometer ---Bunsen photometer head

Lummer-Brodhum photometer head

Martens photometer head

Turning device for measurement of distribution curve

Ulbricht Kugel flux meter

Macbeth illuminometer

Sharp-Millar Photometer

Weber Photometer

Martens Photometer

Tratter illuminometer

Foot-candle meter

YY type illuminometer

Osram illuminometer

Lummeter

Sperrschicht photo-cell

Photoelectric illuminometer(Photometer)

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Mazda transmission meter

Mazda reflection meter

Glossmeter

Raifo photometer

Flicker photometer ---Bechstein flicker photometer head

Simmance-Abadyflicker photometer head

Guild flicker photometer head

Lummer-Brodhum spectrophotometer

Koning-Martens spectrophotometer

Nutting spectrophotometer

Three colour-colourmeter

Single colour-colourmeter

Radiometer Selenium Thermocouple

Exposing resistance Tarafide

Photo-cell

Incandesent lamp

Sereis arc lamp ------

Shunt arc lamp ----Magnitide Carbon flame Arc

Compound arc lamp------

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Sereis arc lamp ——
Shunt arc lamp —— Magnitide Carbon flame Arc
Compound arc lamp——

Mercury vapour arc lamp

Tungsten arc lamp

Mercury bitelight arc lamp

Neon tube

Neon discharge tube

Moor tube

No electrode discharge tube

Hot cathode discharge tube

Sodium vapour lamp

Low-pressure mercury vapour lamp

High pressure mercury vapour lamp

Super high pressure mercury vapour lamp

Fluorescent discharge tube

Illumination apparatus

5) Electro-Chemical Laboratory Equipments

Electrorytic baths

Apparatus for Electric Plating facilities

Large D.C. Current equipment

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Switch boad, Distributing boad, Distribution line, etc.

6) Electro-Magnetic Measuring Laboratory Equipments

Tangent galvanometer	2
Thomson galvanometer	1
A.C. vibration galvanometer	5
Dynamometer type galvanometer	2
Duddel's thermo-galvanometer	2
Universal shunt	5
Decade type Wheatstone bridge	2
Bush type wheatstone bridge	2
Slide wire bridge	2
Leeds & Northrup ohmmeter	1
Carey Foster bridge	1
Yocogawa double bridge	2
Kohlrausch bridge	4
Potentiometer	5
Volt box	3
Yocogawa A.C. potentiometer	3
Tuning fork oscillator	2

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Potentiometer		5
Bolt box		3
Yocogawa A.C. potentiometer		3
Tuning fork oscillator		2
Valve oscillator		3
High frequency sine wave motor generator	1 K.W. 1000	1
Directly reading frequency meter		1
Insulating resistance tester		1
No Vibrating Stand for meter		5
Thermocouple thermometer		2
Magnetometer		2
Barro permeameter		1
N S type permeameter		1
Tomson permeameter		1
Yuing permeability bridge		1
Megohm box		3
Slide rheostat	3000 20,2A	5
"	5A 20,2	5
Plug type resistance box		5
Bruxtype inductor		5
Block type standard mica condenser		3
Standard variable air condenser		2

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Receiver		5
Inductance bridge		2
Capacity bridge		3
Impedance bridge		3
High frequency precision bridge		2
Universal tester		3
1 kw electric furnes		1
Precise D.C. voltmeter, precision	50MV 1000MV	2
" , Common	100MV 1000MV 10V	3
D.C. Ammeter, precision	50MA 100MA 5A	3
" , Common	50MA 5A	2
A.C. voltmeter, precision	100MV 1V 20V 150V	4
" , Common	1V 100V	2
A.C. Ammeter, precision	300MA 1A 10A	3
" , common	500MA 5A 10A	3
Ohmmeter		2
For Research Works		
Transformes		1
Induction coil		1
Electromagnetic oscillogram	3 elment	1

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For Research Works		
Transformes		1
Induction coil		1
Electromagnetic oscillogram	3 elment	1
Small universal motor		3
Gass constant temperature buth		1
Liquid " " "		1
P.H. measurment apparatus		1
A.C. meter, precision	500MA	1
A.C. meter precision	1A	1
"	75V/ 150V	1
D.C. meter "	100MV	1
"	300MA	1
High frequency meter	50MA	1
"	700MA	1
"	500V	1
"	100V	1
7) Communication laboratory		
1 Resistance		
High frequency constant resistance	10.20.5A	1
" "	50.20.2A	1

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High frequency constant resistance	100.20.1A	1
" "	500.20.05A	1
" "	1,000.20.03A	1
" "	5,000.20.01A	1
" "	10,000.20.005A	1
Slide resistance	10.2 5A	5
" "	50.2 1A	10
" "	10k20.1A	5
" "	100k20.01A	3
2 Inductor		
Variable inductor	15-100MH	3
" "	80-420MH	3
" "	150-1000MH	3
3 Condenser		
Variable air condenser	500UUF	1
" "	1,000UUF	1
" "	1,500UUF	1
" "	2,000UUF	1
" "	2,500UUF	1

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"	"	1,500UUF	1
"	"	2,000UUF	1
"	"	2,500UUF	1
Variable air condenser for short wave		30 UUF	1
"	"	50 UUF	1
"	"	100 UUF	1
"	"	300 UUF	1
"	"	500 UUF	1
Variable oil condenser		3,000 UUF	1
"	"	4,000 UUF	1
"	"	5,000 UUF	1
Variable mica condenser		1.0 UF	1
"	"	0.1 UF	1
"	"	0.01 UF	1
"	"	0.001 UF	1
4 Resistance measuring sets			
Ohm meter		0-5,000.Ω	1
5 High frequency sources			
Microphone hummer oscillator		500 ~	1
"	"	1,000 "	1
Tuning fork oscillator		800 "	1

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Funing fork oscillator	1,500 ~	1
Valve oscillator	200-5,000"	1
" "	1,000-100,000 "	1
" "	30,000-500,000 "	1
Ultra short wave oscillator	300-3,000M "	1
Low frequwncy oscillator	20-30,000 "	1
6 Amplifiers		
Audio frequency amplifier	40-50	1
" "	200-300	1
" "	800-1000	1
" "	2000-3000	1
Carrier frequency amplifier	40-50	1
" "	200-300	1
" "	800-1000	1
" "	2000-3000	1
7 Detecting apparatus		
Valve voltmeter	0-20V	5
Receiver		5
Thermal milli-ammeter	10MA	3

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7 Detecting apparatus			
Valve voltmeter	0-20V		5
Receiver			5
Thermal milli-ammeter	10MA		3
" "	100MA		3
8 Frequency measuring sets			
Frequency bridge	5-100kc		1
Absorption typw wavemeter	20-1,500kc		1
" "	300-6,000kc		1
" "	1,000-30,000kc		1
Heterodyne wavemeter	100-20,000kc		1
9 Measuring instruments for communication engineering			
Variable attenuator	25-75db		1
" "	30-85db		1
Variable wave filter	200 ~	low range	1
" "	500 "	"	1
" "	1,000 "	"	1
" "	5,000 "	high range	1
" "	150 "		1
" "	400 "	"	1
" "	1,000 "	"	1
" "	4 000 "	"	

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10. Others

Sonic wave oscillator	1
Sonic wave receiver	1
Valve tester	1
Electromagnetic oscillograph	2
Cathode-ray oscillograph	3
Television equipment	1
Electron microscope	1
Xray productor	1
Apparatus for glasswork	2
Vacum pump	1

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MINING ENGINEERING

Mining engineering is devided into groups, such as mining, ore dressing prospecting, and moning machinery, which correspond to the specialities of practing mining engineers. Since the divisions have come about gradually through the requirements of actual practice, it is inevitable that there should be considable overlapping of various fields. The competent mining engineer must have a broad understanding of the scientific principles underlying all of groups as well as high degree of skill in applying those principles to the specialized problems of his own group.

While the training of the mining engineer is essentially technical, it is not always as a technician that he achieves his greatest usefulness. It is especially true in the ever increasing demand of coal and mineral fields where a background of technical training and experience in planning and executing important work is a valuable aid to the administrator.

The student is required to elect such courses in mathematics and in the general sciences as are necessary to a proper understanding of the technical and nontechnical courses which follow. He is also required to elect courses in mechanical, electrical and metallurgical engineering, since narrow

general sciences as are necessary to a proper understanding of the technical and nontechnical courses which follow. He is also required to elect courses in mechanical, electrical and metallurgical engineering, since narrow specialization by undergraduates is discouraged.

Laboratory Facilities

The Laboratory, which has 661 square meters of floor space, is equipped with the necessary apparatus for the testing of laboratory works. Among the more important pieces of apparatus and equipments are a crusher, metallographic grinding machine, minerals grinding and polishing machine, floatation Testing machine, ore jigger test machine, coal dressing test machine, roller mill, Will Fley's table, air compressor, rock drill, rock drill coal pick hammer, rock drill stopper, calculating machine, reducing instrument pentagraph, mining assay balance, anolytical work balance, hydrogen ion caluculator, estimation of carbon tester in Iron, blowpipe analysis, methane gas analysis, metallurgical microscope of photography and all king of surveying instruments.

The summary of the present laboratory facilities and the additional equipments to raise our school to the Daigaku are shown in Table VII and VIII.

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TABLE VII

THE PRESENT LABORATORY FACILITIES

NAMES	CAPACITY	NUMBER
1) MACHINES		
Crusher	1/2 HP.	1
Metallographic grinding machine		1
Minerals grinding & polishing machine		1
Floatation testing machine	2	2
Floatation Testing machine	2kg. ¼HP	1
Floa tation testing machine (Kyoto Daigaku type)		2
Ore jigger testing machine	¼ HP.	1
Coal dressing test machine	¼ HP.	1
Roller Mill		1
Will Fley's Table	¼ HP.	1
Air Compressor	1/2 HP.	1
Rock Drill	N 75 drifter	1
Drock Drill Coal Pic hammer		1
Rock Drill Hand Drill		1
Rock Drill Stopper		1
Calculating Machine		2

Drock Drill Coal Pic hammer		1
Rock Drill Hand Drill		1
Rock Drill Stopper		1
Calculating Machine		2
Ventilater		2
2) Surveying Instruments		
Plane Table		25
The Determining the Direction of Right Angle		1
Pocket Compasses		10
Hanging Compasses		2
Plumb Bob		10
Prism Binocular		5
Hand Level		10
Pedometer		10
Weissecher		1
Clinometer		1
Electric Current Meter		1
Y-level	15"	12
Dumpy Level		2
Transit		20
Mining Transit		5

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Surveying Bamboo Scale		15
Surveying Chain		10
Measuring Rope	50, 100 M	15
Steel Tapes		10
Line Tapes	30 M	30
Poles	2 3 & 4	40
Leveling Rods	5 M	50

3) Instruments

Viscosimeter		1
Anemometer	1000 M	3
A.C. Voltmeter	150 V	3
A. C. Ammeter	15 A.	3
A.C & D. C. Ammeter	5 - 10 A	2
Watt Meter	100 - 200 V 10 A.	3
Voltmeter	75-150-300 V.	2
Scleroscope		2
Case Thermometer		10
Aneroid Barometer		10
Hardness Meter		8
Reducing Instrument Pentograph		2

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Stereoscope			
Case Thermometer			10
Aneroid Barometer			10
Hardness Meter			8
Reducing Instrument Pentagraph			2
Planimeters			10
4) Chemical Measuring Apparatus			
Hydrogen Ion Caluculator			2
Station Pointer			20
Hand Counter			8
Estimation of Carbon Indicator in Iron			1
Methane Gas Analysis			2
Spring Balance Jolly			5
Blowpipe Analysis			3
Station Pointer			2
Metallurgical Microscope of Photography		Yashima Y M B	1
" " "		Yashima with Trans.	1
" " "		Yashima YMEME2	1
" " "		Yashima M D	1
5) Balances			
Mining Assay Balances			4
Balances for Phamacists			2

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Balances for Anolytical Works		3
6) The Type Standard Screen Scale Services		
Screen	80 mech	5
"	100 "	5
"	170 "	5
"	270 "	5
"	150 "	5
"	200 "	5
"	250 "	5
"	325 "	5
"	48 "	5
7) Specimens and Samples		
Petrological Microscop of Photography		1
Model Showing Stratification of Wood		1
Section of Mineral For Observating Optical Oxies		1
Collection of Foseils	160 Gr. 100 species	1
Models Showing St ratification of WOOD	6 species	8
Collection of Volcanic Products		1
Collection of Polymorphous Minerals	15 species	1

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Models Showing St ratification of WOOD	6 species	8
Collection of Volcanic Products		1
Collection of Polymorphous Minerals	15 species	1
Collections of Coale Mine form Noted Field	15 species	1
Collection of Minerals to demonstrate the Whereabout of Elements	100 species	1
Elementary Crystal Models of Symmetry	12 species	1
Collection of Minerals Showing Brilliancies		1
Geological Relief Map of Japan	Japan Proper	1
" " "	Tyubu District	1
" " "	Kinki District	1
" " "	Kyusyu District	1
" " "	Tyugoku & Shikoku District	1
Model of Well-equipped Mine		1
Model of Coal-field & Its Institution		1
Mineral Specimens		1
Section of Mineral Showing Cleavages	15 species	1
Collection of Minerals Showing Hardness	10 species	1
" " " Specific Gravity		1
" " " Diaphaneities		1
" " " Lustries		1

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Collection of Minerals Showing	Various Phenomena of Lustres		1
"	"	Streak Colours	1
"	"	Colours	1
"	"	Fusibilities	1
"	"	Tenacities	1
"	"	Fractures	1

TABLE VIII

THE ADDITIONAL LABORATORY EQUIPMENTS TO RAISE OUR SCHOOL TO DAIGAKU

1)Mining testing equipments

Drifters and its Chisels	Ingersol-land N-75 L-74 Demver D-7L	3
Hand Hammers and its Chisels	Ingersol-land S-49 R-39 Demver S-45 S-55 Ashio ASD-11	5
Stopers and its Chisels	Ingersol-land CC-11 CA-31 Ashio ASD-12	3

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	S-49 R-39 Denver S-45 S-55 Ashio ASD-11	5
Stopers and its Chisels	Ingersol-land CC-11 CA-31 Ashio ASD-12	3
Electric Rock-Drill and its all tributary instruments	Nakayama's	1
Pripots of Rock Drills		1
Water hose	dia. 1/2	50
Air Hose	" 1	50
Air Manhold Compleat	3 2	1
Air distributing pipes	3 4	1
Air distributing Cupplers		1
Dust Collectors	Ashio type	1
Ashio's Line oilers		1
Coal picks	Siemen's H-423 Flottmann CA-5 CA-7 Boiler BA-7 Mike's MDE	5
Electric Augers	Siemen's	1
Air Compressor		1
Motor	10 HP	1
Paynter Rock drill testing machine		1
Askania's Air meter		1

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Apparatus for tisting the CH_4-gas explossions		1
Safty-lamps, for testing of the CH_4-gas	Wulf's test lamp Piller's test lamp Rosen test lamp Siegfried test lamp	4
Testing apparatus for the % of CH_4-gas	Riken's CH_4-gas test machine Hokushintanke's CH_4-gas test machine Wetterlicht, CH_4-gas test machine Ringrose Alarm	7
Testing apparatus for the Coal-dust explossions		2
Testing Air pipes for the CH_4 and the Coal-dust explossions		1
Fun and motor	2 HP	1
Manometer, with water tube and scales		1
Manometer, with the inclined U-type and scales		1
Chadoc's inclined manometer		1
Taka thermometers		2
Amperemeters, A.C		2
Voltmeters, A.C		2
Integlating Watt meters, A.C		2
Rotating Measure		2

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Amperemeters, A.C		2
Voltmeters, A.C		2
Integlating Watt meters, A.C		2
Rotating Measure		2
Safety Lamps	Honda's Bonnet type Yokota's " " Edo's " " Wolf and Edison's - Etype H-type Honda's H-type Wolf's 830-B and C Uasa's safty lamp Kamatsuka's Safty-lamp Yano's " " National's " "	16
Acetylen lumps Mitsubishi type		50
Instruments for electric Blustings	Torii-shirushi's electric Blusting instrument for 10	1
Mine-Rescue Apparatus	Dregger's Kairyo, No4.	1
Pul motor	Kawasaki-type	1
Models of the mine Roads		1
Model of windings		1
Potable Machine of Photograph		1
Apparatus for the estimation of CO_2 Wolberto's		5
Apparatus for the estimation of CO_2 Hoolamite's		5
Apparatus for the gas analysis		1

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Working Costs for setting of machines		1
Working Costs, for distributing of electric power lines		1
Laboratory tables		10
Chinos universal Electric furnace		1
Electric muffle furnace		1
Pt-Rc thermo Cupple		1
Quartz pipe and Cooler		1

2) Explosive testing equipments

Abeles, Bearing Heat tester	T.R.K.2140	4
Silver Bottle tester	T.R.K.2154	4
Vacuum silver bottle		5
Weighting bottle for Heat tester		10
Constant temperature electric drying oven	Chino. C.K.Stype 215 No. 5400	1
Glass bottles for the testing of free-acides		10
Blue litomas test papers		10
Flush test apparatus for the explosives	Shimazu	4
Single-self screan for avoiding from danger	T.R.K.2146	4
Test-tube for the lead line of explosives		10
Iron Crucibles for heat testers		4

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Push-pull apparatus for the explosives	Shimazu	4
Single-self screen for avoiding from danger	T.R.K.2146	4
Test-tube for the lead line of explosives		10
Iron Crucibles for heat testers		4
Bunsen burners		4
Iron rods of the red-heat tester		4
Asbestos plate		4
All other small tools		1
3) Prospecting equipments		
Electric prospecting machine, Kyo-dai type's		1
Tarlcin and Tivergs Magnetometers		1
Elastic Wave's prospecting machine		1
Gravimetric Prospecting Machine		1
Burettes		50
Burette Stand		50
Pipettes		100
Pipette Stand		30
Measuring Flasks		100
Desiccators Glass		50
Measuring Cylinder		50
Water Baths		50

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Bunsen Gas burners	100
Thermometers	50
Reagent Bottles 250cc	1,000
Ditto 500cc	500
All other small tools	1
Balances, updishtype	5
Balances for pharmacists	5
Analytical Balances	6
Blowpipe	50
Fractional oil Distillation apparatus	2
Flash Test Apparatus	2
Agate morters 5 cm	20
Colour meters	2
Viscosi meter	2
Electric Drying apparatus	6
Potentiometers	2
Centrifugal precipitation apparatus	1
Thermostat (Ostwalds)	1
Distillation apparatus	1

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Potentiometers	1
Centrifugal precipitation apparatus	1
Thermostat (Ostwalds)	1
Distillation apparatus	1
Distillation Water Bottles	5
Platinum Crucibles	5
Nikel Crucibles	10
Safty Air-gas producers	1
Electrometric titration apparatus	1
Platinum Evaporating Dishes	5
Rectifier	1
Appratus for the Estimation of carbon in iron	1
Appratus for the Estimation of sulphidin iron	1
Chemical Lagoratory Table	12
Chemical Laboratory Chair	48
Reagent Bottles stands	12
Sample shelfs	2
Shelfs	6
Tables of the Glas works	1
Boxes for the transportating of small tools	5
Desiccators stands	4
Tables for Electric furnace	3

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Working Costs, for Setting of Electric power lines	1
Working Costs, for Water Inpplysand drinages	1
Working Costs, for setting air gas pipes	1
Working Costs, for setting of Machines	1
(Multiple Unit,) Electric Combustion furnace	1
Electric crucible Furnace, for the estimation of Ash in Coal, Siegrom's	1
Electric furnace, for Measuring the melting point of Ash in Coals,	1
Electric Crucible furnace, for measuring the Volatile matter in Coals	1
Calorimeters	1

Ore-dressing testing equipments

Continous laboratory testing equipments

General equipments

Laboratory desks

Chemicals

Electric meters

Electric dryer with automatic regulator

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Chemicals

Electric meters

Electric dryer with automatic regulator

Thermostatic bath

Rough balance

Weighing capacity

Sensibility

Time-switch

Laboratory ball mill

Motors

Laboratory Ore-briquetting apparatus

Ore-polishing machine

Electric heater

Electric-wires

Wiring accessories

Ore-dressing

Standard testing sieves

Riffle-sampler

Binocular microscope ba Ore-dressing

Mineralogical and petrographic microscope(with illuminator)

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Laboratory ore-briquetting apparatus

Comparator for hydrogen-ion concentration

Laboratory ball mill

Laboratory Wilfley table

Laboratory desks

Abbe's refractometer

Comparators

Electric dryer with automatic regulator

Hot-plate

Balance up-dishtype

Tachometer

Time-switch

Stop-watch

Calculating machine

Variable resistors

Ammeters

Voltmeters

Motors

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Variable resistors

Ammeters

Voltmeters

Motors

Electric-wires and wiring accessories

Chemicals

Desicators

Glass bottles

Electric furnace (University) Electric Pgrometer Air Compressor, with morters(10HP) Lithe small type 2, Drilling machine 1, Sharpner 1, Ore Cutter 1,

Reflecting microscope	5,	Polarizing microscope	1,
Ore polishing machine	1,	Mineral specimens	

Polarizing microscope	10
Reflecting microscope	8
Total refractometer	1
Universal stage	1

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Universal micro-photographic apparatus		1
Burner producing monochromatic light		1
Crystal model (made of wood)		1
Specimens of ore deposits		1
Fossil specimens		1
Section of rock and mineral		1
Universal heater		4
Fairbank's CementTensile Testing Apparatus	Improved	2
Michaeli's Cement Tensile Testing Apparatus	JMS Complate Shot	4
Bohme's Automatic Hammer Machines	J.E.S With Two Set of Complate Improvement and Electric Motor	2
Automatic Cement Morter Mixer	J.E.S With Electric Motor	2
Complate Improvement making Tensile Mould for Hammer Machine	Plate, Tensile Mould, Guide, Push Iron	5
Mould for Tension		30

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Automatic Cement Mortar Mixer	3 H.P. 3 Ph. Electric Motor	1
Complete Improvement making Tensile Mould for Hammer Machine	Plate, Tensile Mould, Guide, Push Iron	5
Mould for Tension		30
Complete Improvement Making Compression Mould for Hammer Machine	Plate Compression Mould, Guide, Push Iron	5
Mould for Compression		30
Shot for Testing Apparatus		30 kg
Spoon, large		10
Spoon, small		10
Knife		10
Flat Hammer		10
Trowels		10
Pitcher		5
Flat Iron		5
Flat Marble		5
Michaeli's Briquette Press		5
Improved Briquette Press.		5
Vicat's Needle Tester	With all Accessories	5
Boiling Pan		5
Desiccator		5
Mixing Pan		5

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Balance	5 kg	5
Sieves	3 per set, best, for Cement, No1 for Sand, No2 for sand	5
Bauschinger's Cement Extensometer		1
Concrete Compression Moulds, large.		10
Concrete Compression Moulds, small.		10
Slump Tester	Complete Cast Iron Plate, Mould, Filling Rod, Scale, Plate	5
Tyler Concrete Standard Set Sieves, for Sand.	6 Sieves Per Set, Complete with Top and Bottom plate.	1
Tyler Concrete Standard Set Sieves, for Gravel.	"	1
Tyler System, Ro-Tap Testing Sieve Shaker.	Complete with electric motor and Time Switch.	1
Amster Type Cement Compression Testing Machine, with Autographic Attachment.		1
Amsler Type Water Permeability Tester.	10 kg/cm^2	1
Asphalt extractor, with Motor.		1
Penetrometer for Asphalt		1
Ductile meter for Asphalt	Complete with 3 standard briquette	1

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Asphalt extractor, with Motor.		1
Penetrometer for Asphalt		1
Ductile meter for Asphalt	Complate with 3 standard briquette moulds	1
Leuner's Stress Recorder	Stain Recorder	1
Flow Tester		5
Vertical-type Tensile Testing Machine with lever.		1

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METALLURGICAL ENGINEERING

The metallurgical engineer finds his principal work in the extraction of metals from their ores, the melting, refining, alloying and casting, fabrication and heat treatment of metals, and their utilization in the various industries. The metallurgical engineer finds his field of endeavor not only in the industries involved directly in the production of metals and metal products but also to an ever increasing extent in the industries utilizing and dependent for their existence on metals and metal products. No better example is to be found than that offered by the machinery industry, where he is concerned primarily with the heat treatment and use of metals, and where he is recongnized as an important member of the organization. In the metallurgical industries proper he is concerned with the quality and general improvement of both product and process. Constantly diminishing natural resources and the ever increasing demand for new alloys of superior qualities offer unlimited opportunities for research in both extractive metallurgy and the development of new products.

LABORATORY FACILITIES

The Metallurgical Laboratories are most well equipped in our school,

metallurgy and the development of new products.

LABORATORY FACILITIES

The Metallurgical Laboratories are most well equipped in our school, having its floor space 319 sq. M, Adjacent to Foundry and Metal Working and Testing Laboratory of Engineering Shops. Equipments for heat treating and melting is provided in a large furnace room equipped with standard electric and gas furnaces. Facilities are provided for electro-metallurgical work and experimental electric furnace work in this room.

For instruction in metallography facilities are provided in the way of a large grinding and polishing room, a microscope and camera room, and well-equipped darkrooms. A smaller room fully equipped with grinding, polishing, and microscopic equipment, and special camera and darkrooms are availabe.

For testing physical properties of metals such as Amsler Universal Testing Machine, Fatigue Testing Machine, Sharpy Impact Testing Machine, Brinnel Hardness Testing Machine, Shore Hardness Testing Machine and other are available in Mechanical Engineering Laboratory.

For temperature measurement usual facilities are provided. The equipment includes several types of millivoltmeters, indicating and recording potentiometers, optical and radiation pyrometers, various types of thermocouples, and ample facities for calibrating and checking pyrometric apparatus.

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The summary of the present laboratory facilities and the additional equipments to raise our school to the "Daigaku"are shown in Table V and VI respectively.

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TABLE V

THE PRESENT FACILITIES OF THE METALLURGICAL ENGINEERING LABORATORY

(I) Machine Name	
Metal pdishing Machine	2
Metallographical Microscope Photographic apparatus	1
Metallographical Microscope	11
G.S. Object Magic lantern	1
Lamp scale	4
Honda & Sato's Diato-meter	2
Accumulater	1
Mercury Vapour vectifier	1
Ohino's Disto meter	1
Gas Producer	1
Boiler	1
Quarty Spectreum Analysis apparatus	1
Colori-meter	2
Nephelo-meter	2
Orsat Gas apparatus	10
Flue Gas analysis apparatus	1

Colori-meter	2
Nephelo-meter	2
Orsat Gas apparatus	10
Flue Gas analysis apparatus	1
Steel and pig carbon detector apparatus	5
Steel and pig carbon detector apparatus	5
(II) Balances	
Assay-balance	3
Chemical-balance	21
Rough-balance	2
Thermo-balance	1
(III) Specimen	
Yahata iron smelter's Blast furnace	1
Steel and pig Microstructure samples	1
(IV) Others	
High Frequency Induction furnace	1
Crypthol furnace	1
Ele-bath furnace	1
Special Hardening furnace	1
Multiple furnace	8
Silit furnace	9

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