

Government of Madras.

EDUCATIONAL DEPARTMENT.

Recd.

Regd.

} 1908.

Enclosures

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G.O., No. 33, 15th January 1908.

N. S.

PP-30

Laboratories attached to certain Technical Colleges in the United Kingdom.

Recording papers relating to the notes of Mr. W. H. James on his visit to the — and directing that copies of the same be forwarded to the Government of India.

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Educational (1908) Department.

ORDINARY PRINTED.

G.O., No. 33-34

DATED 15-1-08

V. U.



[Despatch Abstract.]

Laboratories attached to Certain Technical Colleges in the United Kingdom.

Receiving papers relating to the notes of Mr. W. H. James on his visit to the ~~to~~ ^{and} ~~Engineering~~ ^{that} copies of the same will be forwarded to the Secy. of India. Forwarding copies of the notes of Mr. W. H. James to the Secy. to the Govt. of India, Home Dept. (Education) on his visit to the —

Principal, Corps of Engineering Academies

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

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GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

READ—the following papers :—

I

Memorandum No. 2747-2, Educational, dated 25th November 1907.

The Director of Public Instruction is requested to obtain and submit to Government as early as possible the notes made by Mr. W. H. James, the Principal of the College of Engineering, on his visit to the laboratories attached to certain Technical Colleges in the United Kingdom during the last summer vacation.

(By Order.)

C. A. SOUTER,
Assistant Secretary to Government.

To the Director of Public Instruction.

II

Letter—from the Hon'ble Mr. A. G. BOURNE, D.Sc., F.R.S., Director of Public Instruction, Madras.

To—the Secretary to Government, Educational Department.

Dated—the 5th December 1907.

No.—Ref. on Cur. No. 8136.

With reference to Memorandum No. 2747-2, Educational, dated 25th November 1907, I have the honour to submit herewith the notes of Mr. W. H. James on his visit to the laboratories attached to certain Technical Colleges in the United Kingdom.

It would be inadvisable to print and publish these notes on account of the criticisms therein contained.

ENCLOSURE.

Inspection of Engineering Laboratories, etc., attached to Colleges in the United Kingdom, during the vacation—May and June 1907.

In accordance with instructions received from the Principal I left Madras on Wednesday, May 1st and Bombay by Mail steamer on Saturday, May 4th, arriving in London on Sunday, May 19th. The Government offices were closed on the following day as it was Whitsuntide but I reported my arrival on Tuesday, May 21st. I was at once directed by the India office authorities to place myself in communication with the Board of Education who were being asked to procure me facilities for visiting some of the chief laboratories attached to Technical Colleges in the United Kingdom.

On inquiring at the offices of the Board of Education I found that the officers I had been referred to, Dr. Heath and Mr. Ogilvie, were not in attendance but Mr. Twentymen who was himself unable to do anything directly in the matter arranged to communicate with them and arrange for interviews.

In the meantime I proceeded to get what information I could from various sources and proceeded to Cardiff to make preparations for the tour, and where I also desired to visit the laboratories attached to the University College with which I had previously been connected. They possess a well designed and equipped laboratory for testing the strength of materials, a complete steam engine plant and a moderate selection of electrical machines and apparatus, but owing to want of funds they have not made much progress within recent years. They are now however contemplating the addition of a modern suction gas plant.

On Friday, May 24th, I received a telegram fixing an appointment with Mr. Ogilvie, the Chief Technical Adviser to the Board of Education, for the Monday following at S. Kensington. After a short conversation he referred me to Mr. Buckmaster, the Chief Inspector of Technical Schools, and with him I went into the matter in more detail. They were not able to give me much direct assistance as the colleges I desired to visit had very little connection with the Board of Education. Mr. Buckmaster however being in touch, to some extent, with Engineering education was able to indicate the general lines on which many institutions were progressing and I had the benefit of his advice as to the most profitable colleges to visit.

I accordingly mapped out the tour on my own responsibility and I make mention of the colleges visited in the following brief notes. The time at my disposal being so short it was impossible for me to make arrangements beforehand with regard to my visits and I could only go direct and request the favour of being allowed to inspect the laboratories. In all cases this was very readily accorded and I was usually conducted round by the senior member of the staff present. Under these conditions there was one disadvantage in that as it was near the end of term at most colleges and the staff not in regular attendance I missed in many cases the opportunity of discussing matters with the Professor in charge.

I decided to devote the first week to colleges in London and started with the—

Northampton Institute (May 28th).—This institution appears to be much stronger on evening than day work. The workshop equipment is fairly satisfactory. The chief feature of the mechanical engineering laboratory is a new 75-ton Buckton machine fitted with an electrically-driven torsion gear and complete electrical arrangements for traversing the jockey weight at definite speeds. The electrical engineering laboratories are extensive and well supplied with apparatus for advanced work.

Battersea Polytechnic (May 29th).—This school is nominally much of the same standard as the last referred to but as regards engineering it is not developed to so great an extent. The apparatus generally is not very new with the exception of a well-arranged suction gas plant with 20 horse-power engine. There is also some provision for electrical work.

King's College (May 29th).—This college claims to have been the pioneer of the system of complete training in college workshops, but they have now practically dropped the idea and are considering plans for the utilisation of the space occupied by the workshops. The plant in the mechanical engineering laboratory is fairly complete. They possess a fair number of testing machines and a limited amount of hydraulic apparatus. Considerable attention is being devoted to electrical engineering and the laboratories have lately been extended and provided with modern and suitable plant.

City and Guilds Technical College, Finsbury (May 30th).—This was possibly the first technical college of any importance established in London, but for some time past it has been regarded as more or less a feeder of students for more advanced work at the Central Institute, S. Kensington. They do not however appear satisfied with this secondary rôle and they are now extending their engineering laboratory. They are putting down a fairly complete hydraulic plant, and also a well-selected set of typical heat engines and appliances for the testing of materials. The electrical laboratory is not new, but it is well arranged for instructional purposes.

City and Guilds Central Technical College (May 31st).—The workshops are well fitted up although no attempt is made to give the students a thorough workshop training. In the elementary mechanics laboratory the apparatus for illustrating the fundamental laws of the science is very complete. The steam-engineering laboratory is, to some extent, combined with the workshop, and the plant although the greater portion is not very new is very suitable for the lines on which they work. For the electrical laboratory they have recently erected large dynamo and motor rooms with modern steam generators and all the necessary machines for a thorough course in this branch of engineering.

University College, London (June 1st).—The engineering laboratory was first established in 1879, but it was moved from its old site and equipped with new machinery in 1893. The workshop plant is only sufficient for the needs of the laboratory and they give the students very little workshop practice. The testing machines and in fact the greater portion of the laboratory plant date from some years back. The electrical laboratories although not very extensive are well furnished with modern machines and apparatus, and good provision is made for advanced work.

On Monday, June 3rd. I visited the recently erected laboratories at the *University of Birmingham*. They have made complete provision for very thorough training in civil, mechanical and electrical engineering, metallurgy and mining. The power house, which constitutes the steam-engineering laboratory, is a separate building some distance away from the other laboratories in the main block. It is remarkably well equipped with typical modern engines and every facility is provided for testing work. The machine shop is supplied with examples of modern machine tools and considerable use is made of them as this is one of the colleges where students receive a training as nearly as possible similar to that of the ordinary commercial workshop. The electrical laboratory is very well arranged and adapted for the needs of students in this branch of engineering. The hydraulic and materials-testing laboratories are well equipped for experimental work. The laboratories as a whole are very well arranged for the purposes intended and a very extended description would be necessary to do them justice.

At Manchester the following two institutions were inspected:—

Owen's College (June 5th).—The workshop and mechanical engineering laboratory are at present combined. The chief feature of interest in the steam laboratory is the quadruple expansion engine on which Osborne Reynolds carried out his researches. The present hydraulic laboratory is more on physical than engineering lines. They however contemplate considerable extensions and having purchased an adjoining plot of land are now engaged on the preparation of plans for new laboratories.

Municipal School of Technology (June 6th).—The equipment of these laboratories is very elaborate and money has apparently been a secondary consideration. The arrangements of the hydraulic laboratory, are good and present possibilities for varied work. In the steam-engineering laboratory they have a very fine experimental steam engine and other plant well adapted for research work. The generating station which is distinct from the laboratory is equipped with five engines of different types supplied with steam from three large boilers. A special feature of the testing laboratory is a large 900-ton compression machine. There are also gas and oil engine, machine-testing, and electrical engineering laboratories. In connection with the large workshops is a machine shop well supplied with modern tools.

Liverpool University (June 7th).—The Mechanical Engineering laboratories were instituted about 15 years ago and good work is still being done with the plant. Within late years improvements have been chiefly in the way of small apparatus but I was given to understand that the City authorities intended visiting the College at any early date to consider the best means for extending the laboratories. One peculiar feature is that they have an independent lecturer for applied mechanics with separate laboratories under his charge. The buildings for the Electrical Engineering laboratories were only completed in 1905, and the general arrangements and equipment are on most modern lines. Complete provision has been made in connection with all departments of Electrical Engineering and considerable stress is laid on research work.

On Saturday, June 8th, I left for Glasgow for the inspection of laboratories at that place and Edinburgh.

Glasgow and West of Scotland Technical College (June 10th).—It is claimed that this is the oldest technical school in the Kingdom having been first established in 1796. They have just obtained several new engines for their Steam Engineering laboratory, or as they term it Motive-Power Engineering laboratory, noticeable among which is an experimental horizontal steam engine with drop piston valves. The plant in the hydraulic laboratory was in course of erection but as far as could be seen they do not intend introducing anything much out of the ordinary lines. The testing equipment is good and although there is no outstanding feature in their electrical laboratories they are well suited for affording the students a good practical training.

Glasgow University (June 11th).—The Mechanical and Electrical Engineering laboratories are combined and under the control of one professor. All their arrangements are evidently designed to give the maximum amount of assistance and instruction to students with the plant available. They also possess a good hydraulic laboratory which contains a useful lot of machines and other appliances.

Edinburgh University (June 12th).—Part of the buildings of the old High School have within the last two years or so been taken over for the Engineering department and the laboratories are accommodated on the ground floor. In accordance with the understanding entered into with the Heriot-Watt College the University devotes itself chiefly to Civil Engineering. There is not much new apparatus in the strength of materials laboratory. The hydraulic laboratory is well arranged on lines somewhat similar to that of Glasgow University and with the space provided there are possibilities about the laboratory although at present they do not possess a very large number of machines.

Heriot-Watt College (June 12th).—The courses for Mechanical and Electrical Engineering are taken here in conjunction with the University. The steam engineering plant consists of a number of small units which are used for running trials and also to some extent for supplying motive-power for the workshop. The place being somewhat crowded, they have already started to extend the buildings and they purpose re-arranging the laboratories. There is nothing exceptionally noteworthy in their electrical laboratories.

Armstrong College, Newcastle on Tyne (June 13th).—Courses in Engineering, Mining and Metallurgy are provided for. The chief feature of the engineering laboratory is a 200 h.p. vertical quadruple expansion engine which is designed for carrying out trials under various conditions as to expansion in the different cylinders, relative crank angles, etc. There is some apparatus for hydraulic work. The electrical laboratories have recently been extended and the equipment is quite new. Although not very elaborate it is well arranged and should prove serviceable for instructional purposes.

Leeds University (June 14th).—The Engineering laboratory is much on the usual lines. The 100 ton vertical machine is provided with an extension to the floor below to enable long struts to be tested in the machine. The rooms are well supplied with testing apparatus and machines for various experimental purposes, and they have in addition a few machine tools. The hydraulic machines and apparatus are in somewhat confined positions. They are also very much handicapped in their electrical laboratories owing to want of space but I understand that they have already decided to build new laboratories for electrical engineering and to extend the mechanical engineering laboratories.

City of Bradford Technical College (June 15th).—This institution is not affiliated to any university but they grant College diplomas to successful students. They possess a very fine workshop which they utilize partly for the training of a kind of artisan class who get very little theoretical instruction and who complete their apprenticeship under ordinary conditions in commercial workshops. The College is thus able to make full use of plant on remunerative work sent in from outside which would otherwise be employed to any considerable extent only for evening classes. The equipment of the laboratories is quite suited to the standard of work carried on.

Sheffield University (June 17th).—The workshops are large and well equipped and considerable attention is paid to workshop practice but chiefly from what I could gather in connection with the evening students. The Mechanical and Electrical Engineering laboratories are combined but the latter department is not as yet developed to any great extent. Much of the plant is fairly old but still in good working order. The Metallurgical department which works to some extent in conjunction with the Engineering department, is very complete and considerable extensions have been made recently.

Cambridge University (June 18th).—The laboratories contain a useful lot of machines which however are accommodated in buildings not very well suited for the purposes of technical laboratories. It is in contemplation to clear away the present workshop which I understand was established some years back. The chief feature of interest in the laboratory is a new 30 h.p. Crossley gas engine with which researches are at present being carried out. There is a good supply of apparatus for Electrical Engineering.

From Cambridge I returned to London and on June 18th visited the *National Physical Laboratories, Bushy Park*. Considerable developments are taking place here both in the Mechanical and Electrical laboratories. The buildings of the former have been extended by the addition of a new bay which will be about double the accommodation, and it is intended to utilize this fresh space for machines connected with the testing of the strength of materials and for general investigations. The electrical laboratories are just about being completed and ample provision has been made for all kinds of testing and standardization work.

I called at the India office on the following day, Thursday, June 19th, to inquire as to whether they had any fresh instructions for me and also to apprise them of the approaching completion of my tour, and in the afternoon I left for Devonport. The next day was devoted to the inspection and study of the methods of working at the *Royal Naval Engineering College, Keyham*. The discontinuance of the college on its present lines has been decided on by Government, but it is interesting from the educational point of view as perhaps the only institution where a real and effective effort is made to give students a thorough practical training during the theoretical course. This is done by making considerable use of the dockyard shops in which the students devote a specified time to each particular craft with the exception that for ordinary fitting and machine tool work there exists a very finely equipped shop for the special use of the college. In addition some time is devoted to actual repair and overhauling work on some of the ships undergoing refitment.

On Saturday, June 22nd, I proceeded to Cardiff in order to make preparation for the return journey and I left London for Marseilles on Wednesday, June 25th, arriving at Bombay on Friday, July 12th, and Madras, July 13th.

I append clear of notes a list of the institutions visited:—

Cardiff	..	..	..	..	University College.
					{ Northampton Institute.
					{ Battersea Polytechnic.
					{ King's College.
London	..	..	..	..	{ Finsbury Technical College.
					{ Central Technical College.
					{ University College.
					{ National Physical Laboratories.
Birmingham	..	..	..	..	University.
Manchester	..	..	..	..	{ University (Owen's College).
					{ Municipal School of Technology.
Liverpool	..	..	..	..	University.
Glasgow	..	..	..	..	{ Glasgow and West of Scotland Technical
					{ College.
					{ University.
Edinburgh	..	..	..	..	{ University.
					{ Heriot-Watt College.
Newcastle	..	..	..	..	Armstrong College of Science.
Leeds	..	..	..	..	University.
Bradford	..	..	..	..	Technical College.
Sheffield	..	..	..	..	University.
Cambridge	..	..	..	..	University.
Devonport	..	..	..	..	Royal Naval Engineering College,
					Keyham.

10th September 1907.

W. H. JAMES,
Professor of Engineering.

Order—No. 33, Educational, dated 15th January 1908.

Recorded.

2. Thirty-two copies of Mr. James' notes on the laboratories attached to the Technical Colleges in the United Kingdom will be forwarded to the Government of India with reference to paragraph 3 (6) of their despatch to the Secretary of State, dated 2nd October 1902, No. 6.

(True Extract.)

H. D. TAYLOR,
Ag. Secretary to Government.

To the Director of Public Instruction.

GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

No. 34.

From

H. D. TAYLOR, Esq., I.C.S.,
Acting Secretary to Government of Madras,
Educational Department,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
HOME DEPARTMENT (EDUCATION).

Dated Fort St. George, the 15th January 1908.

Sir,

With reference to paragraph 3 (6) of the despatch of the Government of India, Home Department, to the Secretary of State, dated 2nd October 1902, No. 6, I am directed to forward thirty-two copies of the notes made by Mr. W. H. James, now Principal of the College of Engineering, Madras, on the laboratories attached to Technical Colleges in the United Kingdom which he was deputed, in view of the reorganization of the College of Engineering, Madras, to visit during the last summer vacation of the College.

I have the honour to be,

Sir,

Your most obedient servant,

H. D. TAYLOR,
Ag. Secretary to Government.

EDUCATIONAL DEPARTMENT.

NOTES CONNECTED WITH G.O., No. 33, EDUCATIONAL,
DATED 15TH JANUARY 1908.

[SUBJECT.—Notes on the laboratories attached to the Technical Colleges of the United Kingdom by Mr. W. H. James.]

From the Director of Public Instruction, dated 5th December 1907, No. 8136.

In G.O., No. 249, Educational, dated 27th April 1907, the Government approved the suggestion of Colonel Love to depute Mr. W. H. James, Professor (now Principal), College of Engineering, who proceeded to England during the last vacation of the college, to visit some of the chief laboratories attached to Technical Colleges in the United Kingdom.

2. The Director of Public Instruction now submits the notes prepared by Mr. James on the laboratories attached to the Technical Colleges visited by him.

3. With reference to paragraph 3 (6) of the despatch from the Government of India, No. 6, dated 2nd October 1902, printed in G.O., No. 49, Educational, dated 30th January 1903, "an officer so deputed will be required to make careful notes of the studies which he pursues and the observations which he makes, and to submit them on return to the Director of Public Instruction." The Local Governments have, in due course, to forward copies of them to the Government of India.

4. Mr. James, however, was not placed on *deputation* in its strict sense. He

Cf. Secretary's note, dated 20th April 1907, on page 3 of K.W. G.O., No. 249, dated 27th April 1907, and G.O., No. 711, dated 21st October 1907.

Mr. James has since contended that he *was* deputed at Government expense for the journey.

H. D. TAYLOR.

notes observes that "it would be inadvisable to print and publish these notes on account of the criticisms therein contained."

5. In these circumstances, no copies of the notes need perhaps be sent to the Government of India. The notes may, it is submitted, be recorded and printed "For Record only."

6. The draft placed below is submitted for approval.

P.R.—10-12-07.

Page 2 of the notes with G.O., No. 249, Educational, dated 27th April 1907.

In paragraph 10 of his letter No. 2080-C., dated 24th January 1907, recommending the deputation of Mr. James Colonel Love observed—

"In regard to the deputation of a special officer to prepare plans and estimates for the new college at Saidapet referred to in paragraph 2 of G.O., No. 657, Educational, dated 16th October 1906, I venture to suggest that, in view of the large sum of money which must be expended on workshops and laboratories, it would tend towards both economy and efficiency if Mr. W. H. James were deputed during the ensuing vacation to visit some of the principal Technical College laboratories in England and on the continent."

2. It is not clear whether the deputation of Mr. James is a deputation within the meaning of the despatch from the Secretary of State, No. 146, Public, dated 28th November 1902, and it is for consideration whether the proposal that Mr. James' notes need not be published may be accepted.

K. RANGASWAMI AIYANGAR—10-12-07.

H. D. TAYLOR.

The notes may be printed up and recorded for office use only.

C. A. SOUTER—11-12-07.

There is no need to publish these notes or even, I think, to send them on to India. Mr. James was deputed not on general duty, but for the specific purpose of deciding the lines on which the laboratories to be attached to the new College of Engineering should be constructed and equipped.

Yes with due regard to the difference in requirements of an Engineering College in India and of a Technical Engineering Institute in England.

G. S. F[ORBES].

The Public Works Department may now be asked to take up the question of design and buildings generally for the new College of Engineering in consultation with Mr. James.

H. D. TAYLOR—12-12-07.

See above.

G. S. F[ORBES]—13-12-07.

H. D. TAYLOR—14-12-07.

Please see the drafts submitted for approval.

C.S.--21-12-07.

K. RANGASWAMI AIYANGAR—21-12-07.

Issue.

C. A. SOUTER—3-1-08.

H. D. TAYLOR—4-1-08

Demi-official from H. D. Taylor, Esq., I.C.S., Acting Secretary to Government, Educational Department, to the Principal, College of Engineering, dated 11th January 1908, No. 2911 -1.

I am directed to send you a proof copy of the notes on your visit to the laboratories in the United Kingdom, for examination and return. It is proposed to send copies of the notes to the Government of India, but in view of the criticisms contained in your notes, it is considered desirable that you should examine the proof.

Demi-official from W. H. James, Esq., Principal, College of Engineering, to the Secretary to Government, Educational Department, dated 23rd January 1908.

I return herewith proof of notes with some modifications. I need hardly say that it was never intended they should be printed and circulated; my idea was they would be something more for Government than merely a list of institutions visited.

Have these printed sharp please.

C. A. SOUTER—25-1-08.

[G.O., No. 33, Educational, dated 15th January 1908.]

CURRENT FILE.

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Papers of the department to which the current belongs.

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Papers of other departments.

Department.	Number.	Date.	Original (=O.) or spare copy (=S. C.).	Despatcher to note the return of the papers to the departments concerned.

Educational Department.

(Cur. No. 2747)

MEMORANDUM: - 2747-2
25-11-7

The Director of Public Instruction
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K.R.
21-11-07.

C.A.S.
21-11-07.

To

The D. P. I.

26/11/7

7c 29/10/07

Dr 21.11.07

Recd. 25/11/7

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ENCLOSURES.

No.

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MEMO 2747-2
25/11/07
EDUCATIONAL DEPARTMENT.

Edl C. No. 2911-

Received.....190, Registered 612 1907.

Subject.

Submitting the notes of Mr. W. H. James on his visit to the laboratories attached to certain Technical Colleges in the United Kingdom.



Ref on Our No. 8138/07.

Station Madras, Dated the 5th December 1907.

From (Name) The Hon'ble Mr. A.G. Bourne, D.Sc., F.R.S.,

(Designation) Director of Public Instruction,

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To the Secretary to the Government of Madras,
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Sir,

Your most obedient servant,

C. Krishnaswami

For Director of Public Instruction.

T.R.
M.S.S.

3 S.P.

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On inquiring at the offices of

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✓ V.S.P.

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the first technical college of any

importance established in London, but for
some time past it has been regarded as
more or less a feeder of students for more
advanced work at the Central Institute,
S. Kensington. They do not however appear
satisfied with this secondary rôle and
they are now extending their Engineering
laboratory. They are putting down
a fairly complete hydraulic plant,
and also a well selected set of typical
heat engines and appliances for the
testing of materials. The Electrical
laboratory is not new and although
well arranged for instructional pur-
poses it will probably be necessary to
overhaul it very soon to bring it into
line with the other laboratories.

May 31st. City and Guilds Central Technical
College. The workshops are well fitted up
although no attempt is made to give the

20
students a thorough workshop training. In the elementary mechanics laboratory the apparatus for illustrating the fundamental laws of the science is very complete. The steam engineering laboratory is to some extent combined with the workshop and the plant although not new is very suitable for the lines on which they work. For the electrical laboratory they have recently erected large dynamo and motor rooms with modern steam generators and all the necessary machines for a thorough course in this branch of engineering.

June 1st. University College, London.

The Engineering laboratory was first established in 1879 but it was moved from its old site and equipped with new machinery in 1893. The workshop plant is only sufficient

11 575.P.
for the needs of the laboratory and they give the students very little workshop practice. The testing machines and in fact the greater portion of the laboratory plant date from some years back and the laboratory seems on the whole somewhat crippled for want of funds. The electrical laboratories although not very extensive are well furnished with modern machines and apparatus, and fair provision is made for advanced work.

On Monday, June 3rd, I visited the recently erected laboratories at the University of Birmingham. They have made complete provision for very thorough training in Civil, Mechanical and Electrical Engineering, Metallurgy and Mining. The power house, which constitutes the steam engineering laboratory, is a separate building some distance away from the

other laboratories in the main block.

It is remarkably well equipped with typical modern engines and every facility is provided for testing work. The machine shop is supplied with examples of modern machine tools and considerable use is made of them as this is one of the Colleges where students receive a training as nearly as possible similar to that of the ordinary commercial workshop. The electrical laboratory is very well arranged and adapted for the needs of students in this branch of engineering. There is nothing very striking about the hydraulic and materials testing laboratories but taking the laboratories as a whole they are very well arranged for the purposes

intended and a very extended description would be necessary to do them justice.

13
At Manchester the following two institutions were inspected.

June 5th Alders College. The workshop and mechanical engineering laboratory are at present combined. The machine tools are very ordinary and apparently are not used to any great extent by the students. The only feature of interest in the steam laboratory is the quadruple expansion engine on which Osborne Reynolds carried out his researches. The hydraulic laboratory is more on physical than engineering lines. They fully appreciate the inadequacy of their existing arrangements and having purchased an adjoining plot of land are now engaged on the preparation of plans for new laboratories.

June 6th Municipal School of Technology.

The equipment of these laboratories is very elaborate and money has apparently

14
been a secondary consideration. The arrangements of the hydraulic laboratory, although possibly somewhat cramped owing to the limited space available, are good and present possibilities for varied work. In the steam engineering laboratory they have a very fine experimental steam engine and other plant well adapted for research work. The generating station which is distinct from the laboratory is equipped with five engines of different types supplied with steam from three large boilers. A special feature of the testing laboratory is a large 900 ton compression machine. There are also gas and oil engine, machine testing and electrical engineering laboratories. In connection with the large workshops is a machine shop well supplied with modern tools.

15 179 S.P.
June 7th. Liverpool University. The mechanical Engineering laboratories were instituted about 15 years ago and are now hardly modern although good work is still being done with the plant. Within late years improvements owing to want of funds have been chiefly in the way of small apparatus but I was given to understand that the city authorities intended visiting the College at any early date to consider the best means for bringing the place up to date. One peculiar feature is that they have an independent lecturer for Applied Mechanics with separate laboratories under his charge. The buildings for the Electrical Engineering laboratories were only completed in 1905 and the general arrangements and equipment are on most modern lines. Complete provision has been made in connection with all

16
departments of Electrical Engineering and considerable stress is laid on research work.

On Saturday June 8th I left for Glasgow for the inspection of laboratories at that place and Edinburgh.

June 10th. Glasgow and West of Scotland Technical College. It is claimed that

this is the oldest technical school in the Kingdom having been first esta-

blished in 1796. They have just obtained several new engines for their steam

Engineering laboratory, or as they term it Motive Power Engineering

laboratory, noticeable among which is an experimental horizontal steam

engine with drop piston valves. The plant in the hydraulic laboratory

was in course of erection but as far as could be seen they do not intend

introducing anything much out of the ordinary lines. The testing equipment

17 ✓ 1058
is only moderate and although there is no outstanding feature in their electrical laboratories they are well suited for affording the students a good practical training.

June 11th. Glasgow University. The mechanical and electrical engineering laboratories are combined and under the control of one professor. The greater part of the plant is not very new but all their arrangements are evidently designed to give the maximum amount of assistance and instruction to students with what is available. They also possess a very fair hydraulic laboratory which contains a useful lot of machines and other appliances.

June 12th. Edinburgh University. Part of the buildings of the old High School have within the last two years or so been taken over for the Engineering

196
department and the laboratories are accommodated on the ground floor. In accordance with the understanding entered into with the Heriot-Watt College the University devotes itself chiefly to civil engineering. There is very little new apparatus in the Strength of Materials laboratory and nothing of much note. The hydraulic laboratory is well arranged on lines somewhat similar to that of Glasgow University and with the space provided there are possibilities about the laboratory although they possess at present comparatively few machines.

June 12th. Heriot-Watt College. The courses for Mechanical and Electrical engineering are taken here in conjunction with the University. A sort of half-hearted attempt is made to give workshop training in a somewhat poorly

19/11/58
equipped workshop, which also contains some of the testing apparatus. The steam engineering plant consists of a number of small units which are used for running trials and also to some extent for supplying motive power for the workshop. The whole place is very crowded and they have already started to extend the buildings and they purpose re-arranging the laboratories. There is nothing noteworthy in their electrical laboratories.

June 13th. Armstrong College. Newcastle on Tyne. Courses in Engineering, mining & Metallurgy are provided for. With the exception of a few very ordinary machine tools they possess practically no workshop equipment. The chief feature of the Engineering laboratory is a 200 H.P. vertical quadruple expansion engine which is designed for carrying

out trials under various conditions as to expansion in the different cylinders relative crank angles etc. There is very little apparatus for hydraulic work and that only on a small scale. The electrical laboratories have recently been extended and the equipment is quite new. Although not very elaborate it is well arranged and should prove serviceable for instructional purposes.

June 14th. Leeds University. The Engineering Laboratory is much on the usual lines. The 100 ton vertical machine is provided with an extension to the floor below to enable long struts to be tested in the machine. The rooms are well supplied with testing apparatus and machines for various experimental purposes, and they have in addition a few machine tools. The hydraulic

48 12
machines and apparatus are in very confined positions and of no great moment. They are also very much handicapped in their electrical laboratories owing to want of space but I understand that they have already decided to build new laboratories for electrical engineering and to extend the mechanical engineering laboratories.

June 15th. City of Bradford Technical College.

This institution is not affiliated to any University but they grant College diplomas to successful students. They possess a very fine workshop which they utilize partly for the training of a kind of artisan class who get very little theoretical instruction and who complete their apprenticeship under ordinary conditions in commercial workshops. The College is thus able to make full use of plant on remunerative

work sent in from outside which would otherwise be employed to any considerable extent only for evening classes. The equipment of the laboratories is rather limited but quite suited to the standard of work carried on.

June 17th. Sheffield University: The workshops are large and well equipped and considerable attention is paid to workshop practice but chiefly from what I could gather in connection with the evening students as the ordinary day classes do not appear to be very well attended. The Mechanical and Electrical Engineering laboratories are combined but the latter department is not as yet developed to any great extent. Much of the plant is fairly old but still in good working order. The Metallurgical department which works to some extent

23
in conjunction with the Engineering department, is very complete and considerable extensions have been made recently.

June 18th. Cambridge University. An attempt has been made to adapt a somewhat unsuitable building to the needs of technical laboratories with the result that as extensions have been made from time to time, the arrangements in general are hardly what they should be for a university of this standing. It is in contemplation to clear away the workshop which was established before the laboratories and contains a very poor assortment of tools. The only thing of much interest in the laboratory is the new 30 H.P. Crossley gas engine with which researches are at present being carried out. Little work of value is done in connection with hydraulics. Electrical Engineering

laboratory work is provided for in a number of inconveniently situated rooms.

From Cambridge I returned to London and on June 18th visited the National Physical Laboratories, Bushy Park. Considerable developments are taking place here both in the Mechanical and Electrical laboratories. The buildings of the former have been extended by the addition of a new bay which will be about double the accommodation, and it is intended to utilize this fresh space for machines connected with the testing of the strength of Materials and general investigations. The electrical laboratories are just about being completed and ample provision has been made for all kinds of testing and standardisation work.

I called at the India Office on the following day, Thursday, June 19th.

25th 16.5.18
to inquire as to whether they had any fresh instructions for me and also to apprise them of the approaching completion of my tour, and in the afternoon I left for Devonport. The next day was devoted to the inspection and study of the methods of working at the Royal Naval Engineering College, Keyham.

The discontinuance of the College on its present lines has been decided on by Government but it is interesting from the educational point of view as perhaps the only institution where a real and effective effort is made to give students a thorough practical training during the theoretical course. This is done by making considerable use of the dock-yard shops in which the students devote a specified time to each particular craft with the exception that for ordinary fitting and machine tool work there exists a very finely equipped shop for the

special use of the College. In addition some time is devoted to actual repair and overhauling work on some of the ships undergoing refitment.

On Saturday June 22nd I proceeded to Cardiff in order to make preparation for the return journey and I left London for Marseilles on Wednesday June 26th arriving at Bombay on Friday July 12th and Madras July 13th.

I append clear of notes a list of the institutions visited.

Cardiff. University College

London. Northampton Institute.

Battersea Polytechnic.

Kings College.

Finsbury Technical College.

Central Technical College.

University College.

National Physical Laboratories.

Birmingham. University.

Manchester. University (Owen's College).
Municipal School of Technology.

Liverpool. University.

Glasgow. Glasgow & West of Scotland Technical College.

University.

Edinburgh. University.

Heriot-Watt College.

Newcastle. Armstrong College of Science.

Leeds. University.

Bradford. Technical College.

Sheffield. University.

Cambridge. University.

Devonport. Royal Naval Engineering College, Keyham.

(Signed) W. H. James

Professor of Engineering
10.9.07

(True Copy)

J. J. Davis.

Col R.S.

Principal.

15-1-08

C. 2911 From the 509 No. 8736, dated 5-12-1907.

SUBJECT Notes on the laboratories attached to the Technical Colleges of the United Kingdom by Mr. W. H. James.

A.

In G.O. 249 of 27th April 1907, the Govt. approved the suggestion of Col. Love to depute Mr. W. H. James, Professor (now Principal), College of Engineering, who proceeded to England during the last vacation of the College to visit some of the Chief laboratories attached to Technical Colleges in the United Kingdom.

2. The Director of Public Instruction now submits the notes prepared by Mr. James on the laboratories attached to the Technical Colleges visited by him.

G.

3. With reference to para 3(b) of the despatch from the Govt. of India n. 6 of 2nd October 1902 printed as in G.O. 49 of 30th January 1903 "an officer so deputed will be required to make careful notes of the studies which he pursues and the observations which he makes, and to submit them on return to the D.P.I." The Local Govts have, in due course, to forward copies of them to the Government of India.

4. Mr. James, however, was not placed on deputation in its strict sense. He was allowed to visit the institutions on the occasion of his visit to England during the vacation. The Govt. did not consider it necessary to extend the period of vacation so that Mr. James should extend his visit to laboratories on the continent - vide G.O. 249 of 27. 4. 07. The Director of Public Instruction is submitting

cf. Secretary's note of 20-4-07 on page 3 of his G.O. 249 of 27. 4. 07.
+ G.O. 711 of 21-10-07. K.
Mr. James has been considered that he was deputed, at his expense to the country

A.

submitting Mr. James' notes observes that "it would be inadvisable to print and publish these notes on account of the criticisms therein contained".

5. In these circumstances no copies of the notes ^{perhaps} need be sent to the Govt of India. The notes may, it is submitted, be recorded and printed "For Record only".
6. The draft placed below is submitted for approval.

10-12-07

In para. 10 of his letter No. 2080-C, dated 24th January 1907, recommending the deputation of Mr. James, Col. Lane observed "In regard to the deputation of a Special officer to prepare plans and estimates for the new College at Sardapat. referend to in paragraph 2 of G.O. No. 657 Est. dated 10th October 1906. I venture to suggest that in view of the large sum of money which must be expended on workshops and laboratories, it would tend towards both economy and efficiency if Mr. W.H. James were deputed during the ensuing vacation to visit some of the principal Technical College laboratories in England and on the Continent."

2. It is not clear whether the deputation of Mr. James is a deputation within the meaning of the Despatch from the Secretary of State No. 146 Public, dated 28th November 1902.

Page 2 of the notes
with G.O. No. 249 Est. A.
27.4.07

H.

on page 3 of G.O. 49 Est. - 9
30.7.03

1902, and it is for consideration whether
Mr James' notes ~~may~~ need not be published,
may be accepted.

RD
10.12.07

Sec.

The notes may be printed
up & records for office use only.

Ch
11.12.7.

There is no need to publish these notes or
even. I think it is well that or to
India. Mr James was deputed not on
general duty, but for the specific
purpose of deciding the lines on which
the laboratories to be attached to the
new College of Engineering should
be constructed and equipped.

But Mr James is asked to
take up the question of design
and buildings generally for the
new College of Eng. in
coll. in India & a technical
collaboration with Mr James
an Eng. Institute in England

Yes - with due regard
to the difference in
requirements of an Eng. Coll. in India
an Eng. Institute in England

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J.T. H.M.

Legal Secy 12/12/07

J.T. 3/12

1/12
14.12.07

14/12

* (found drafts)

Please see the drafts submitted for approval

CS
21.12.07
21.12.07

Lee
Cal
3.1.08.

Issue.

(Exhibit also as it is put up Sept as

Cost of Inf. is a separate file.)

CS
21.1.08

CS
attends to this
21.1.08

Extract taken
+ submitted as per
CS
21.1.08.

D.O. No. 2911-1 of 11-1-08.

Dear Mr. James,

I am directed to send you a proof copy of the notes on your visit to the laboratories in the United Kingdom, for examination and return. It is proposed to send copies of the notes to the Government of India, but in view of the criticisms contained in your notes, it is considered desirable that you should examine the proof.

CS
20.12.07
21.12.07

CS
3.1.08.
1/2
C.C. (1)

To

W.H. James Esq.
Principal, College of Engineering.

Deposited with
proof
11/1/08

b / El. no 1700/25-2
29



College of Engineering,
MADRAS.

have these printed
Sharp please.
28.1.8
I return herewith proof
of notes with some modifications.
I need hardly say that it was
never intended they should be
printed and circulated; my
idea was they would be something
more for God. than merely
a list of institutions visited.
25/1/08 Yours truly
W. J. J. J.

X

Looked with reference to G.O. no. 33-34

Col dated 15 Jan 1908.

20
30.1.28

21.1.8

20

Recd

[$\frac{E.}{12}$]

1,000-2-3-05.

190

37 " " " " ? "

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Cf. G. n.º 448 XXVIII
13-7-07

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2. Thirty-two copies of Mr. James' ~~report~~ notes on the Laboratories attached to the Technical Colleges in the United Kingdom will be forwarded to the Govt of India with reference to ~~the~~ para. 3(b) of their despatch to the Secy. of State, dated 2nd October 1902, No. 6.

9
 21.12.07
 200
 24.12.07
 21.12.07
 2.1.08
 202

LETTER:- 34 of 15-1-08 6100

To
The Secretary to the Government of India,
Home Department (Education).

Sir,

With reference to paragraph 3 (6)

Inc. No. 49
30.1.03 G

of

Recd

Cf. letter no. 449 ^{XXVIII}
12.7.07

Vide para 10 of Col. Davis letter
in p. 2 of the notes connected
with go. no. 249 dt. 27.4.07 A

17P
3)

3.

of the despatch of the Government of India, Home Department, to the Secretary of State, dated 2nd October 1902, No. 6, I am directed to forward ^{thirty-two} ~~now~~ copies of the ^{new} ~~now~~ notes by Mr. W.H. James, Principal of the College of Engineering, Madras, on the laboratories attached to Technical Colleges in the United Kingdom which he was deputed, in view of the ^{reorganization} ~~construction~~ of new buildings of ^{of Engineering Madras,} ~~the~~ the college to visit during the last summer vacation of the College.

I have etc.

21.12.07
21.12.07

Chd
3-1-08
62
a.c.c.

P.T.O.

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Returned for signature.

Despatched in print.

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190

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NOTES.
