Educational (1905) Department.

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[Despatch Abstract.]

Engineering

Passing orders on the report of the committee appointed to consider the extension and reorganisation of the ———.

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செப்பனிடுவதற்காக எடுத்தது கொள்ளப்பட்ட நாள் : 28.6.05

செப்பனிட்டு முடித்த நாள் 16.9.05

சரிபார்க்கும் மு.நி.பா.எ. கையொப்பம்

Govt. of Madras.

EDUCATIONAL DEPARTMENT.

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Recd. Enclosures

Regd. } 1905. Spare copies

ORIGINAL.

No. 655. 3rd October 1905.

N. P.

College of Engineering.

Passing orders on the report of the Committee appointed to consider the extension and reorganization of the —.

GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

Read—the following papers:—

I

G.O., No. 723, Educational, dated 12th December 1904.

Abstract.—Appointing a Committee to consider the revision of the syllabus of studies and the curriculum of the College of Engineering, Madras.

II

G.O., No. 754, Educational, dated 21st December 1904.

Abstract.—Referring to the Committee appointed by G.O., No. 723, Educational, dated 12th December 1904, certain proposals for consideration regarding the practical course of Apprentice Engineers in connection with the revision of the syllabus and curriculum of the College of Engineering, Madras.

III

Letter—from J. P. Davidson, Esq., President, College of Engineering Committee.
To—the Secretary to Government, Educational Department.
Dated—Chepauk, 31st March 1905.
No.—340.

I have the honour to submit the report on the College of Engineering of the Committee appointed in G.O., No. 723, Educational, dated 12th December 1904.

2. The appendices referred to under "Syllabuses," page 6 of report, have not yet been received from the printers. They will be forwarded as soon as received.

3. I would explain that owing to the absence of Mr. Spring on leave the Committee was not able to get to work till the 16th February on which date it held its first meeting.

Enclosures.

Report of the Committee appointed in G.O., No. 723, Educational, dated 12th December 1904, to consider the reorganization of the College of Engineering.

Preliminary.—The Committee was appointed under G.O., No. 723, Educational, dated 12th December 1904, to consider the revision of the syllabus of the studies and the curriculum of the College of Engineering, Madras, and three other subjects, viz.—

(*a*) whether any extension of the College buildings is necessary so as to provide sufficient accommodation for an increased number of students;

(*b*) whether any and if so, what additional laboratories should be constructed and what further facilities should be afforded for the practical out-door instruction of students in surveying and other Engineering subjects;

(*c*) the future location of the College, if the present site is deemed to be unsuitable for an extension of the buildings required to provide adequate accommodation both for students and instructors and for the practical training of the students in field work.

2. In its report the Committee has thought it advisable to go outside the limitations of the Government Order, as without doing so it was impossible for it to submit a report which would deal fully with the important questions put before it. Moreover since the issue of the Government Order No. 723, Educational, other questions bearing on the organization of the College have been sent to the Committee for discussion and opinion, a very clear indication that the limitations of the Government Order need not be closely observed.

Further, there can be no question that, when submitting revised syllabuses the adoption of which it recommends, the Committee is justified in considering how instruction in these syllabuses can best be given; and this naturally leads to a discussion on the efficiency and sufficiency of the existing staff, recruitment of the staff, and administrative and other cognate subjects, all of which the Committee has had under consideration.

3. The main subjects dealt with were the following, and they are taken in the order named:—

(*a*) Revision of the syllabus.
(*b*) Staff.
(*c*) Administration.
(*d*) Accommodation.

Under each of these main heads a number of cognate subsidiary questions arose, which were dealt with as they came up, and which will be referred to under the main heads.

4. *Revision of the syllabus.*—As a necessary preliminary to dealing with this subject the Committee felt it incumbent on it to consider very closely and fully three questions, viz, the educational qualifications requisite in the candidates for the different classes, the fees to be paid by these classes, and the time available for the instruction of the students in the College.

5. *Recruitment of the college classes.*—The Committee had no difficulty in deciding that the present system of recruiting the same class from candidates possessed of unequal educational qualifications is wholly wrong. It is unfair to the student and unfair to the teaching staff because it involves immense waste of time.

For these and other reasons the Committee is of opinion that the recruitment of the several classes should be as follows:—

The Engineer class from B.A.'s who have taken either Mathematics or Physics as optional subjects;

The Upper Subordinate Class from F.A.'s;

and all other classes in the College from Matriculates.

Before finally recommending the above modifications, the Committee has carefully considered the effect they will have on the recruitment for the several classes, and it is satisfied that there will be no difficulty in recruiting each class up to its full strength.

6. *Fees.*—As to the question of fees the Committee is of opinion that, in view of the recommendations for the extension of the College course of the Upper Subordinate Class (present Engineer Subordinate Class) and for the amalgamation of Sub-Overseer and Surveyor and Draftsman classes (*vide* pages 7 and 8), the scale of existing fees calls for some readjustment.

After full consideration of the effect the modifications it now proposes will have on the future recruitment of the classes, the Committee recommends the adoption of the following tentative scale of fees:—

	Rs.	
Engineer Class	360	for the full theoretical course, if paid in advance.
Upper Subordinate Class	180	
Lower Subordinate Class	100	

7. *The College year.*—With regard to time available for instruction, the Committee is unanimously of opinion that the present arrangement of the College year is very defective and gives too low a proportion of working days. After due consideration it has drawn up a College year which appreciably increases the number of working days and generally distributes work throughout the year in a more efficient manner.

The Committee recommends very strongly that the College year as now modified be accepted and given effect to with as little delay as possible.

The College year as now proposed will begin about July 15th; the 1st term will continue until about 1st October when there will be an interval for inspection tours, the 2nd term will last from the end of the inspection tours, *i.e.*, about October 10th, until the beginning of the official Christmas holidays; the survey camp will begin immediately after the termination of the Christmas holidays and last for about one month; the term will last until the end of April, during the last fortnight of which the annual examinations should take place; the long vacation should begin about 1st May and end about July 15th.

8 *Rules incidental to College reorganization.*—The following points also forced themselves on the attention of the Committee, and as the result of careful deliberation in each case it recommends the adoption of the rules which follow:—

(1) "A student who fails to obtain qualifying marks in the examination held at the end of the year's course shall not be promoted and must either leave the College or join the class below"—

"No student will be permitted to remain more than four years in the College".

"A student who is not promoted at the end of any year will not be eligible for any College prizes, honours or appointments."

This rule the Committee considers follows as a logical sequence of the alteration in the recruitment of the classes.

(2) "No student will be allowed to appear for any degree examination until he has completed his practical course satisfactorily."

(3) "The theoretical course of the Civil and Mechanical Engineer students will be one and the same during the first year, but from the end of this period the further instruction of the two classes of students will be on different lines; in other words the bifurcation of the civil and mechanical course will take place at the end of the first year."

(4) "The duration of the practical course shall be in the case of Civil Engineer students one year, and in the case of Mechanical Engineer students two full years, one of which must be passed in outside workshops, that is shops other than those under the direct control of the Public Works Department."

(5) "The Apprentice Engineership will be awarded by the Chief Engineer, Public Works Department, to the student, whether he be a Civil or Mechanical Engineer, who may have been selected conjointly by the Board of Examiners and the full Professorial Staff of the College."

The last three rules are intended to meet the requirements of the College in its new departure, viz., that of having a mechanical and a civil course. The Committee is of opinion that the instruction during the first year must be the same for the two classes of students, but that with the end of this first year the instruction given to the two classes must necessarily be different.

In the matter of the practical course, the Committee held the opinion very strongly that a 12 months' course in shops is too short for a student who wishes to become a really efficient Mechanical Engineer; they have therefore recommended the extending of this course by another 12 months; but recognising that this extension of the course will entail expense on the Mechanical Engineer in excess of that which falls on the Civil Engineer, it recommends most strongly that Government should bear the whole of this extra cost for a period of five years from the date on which a student leaving the College comes under this ruling.

Rule (5) explains itself, and the Committee feels it unnecessary to do more than point out that inasmuch as the Apprentice Engineer must be a member of the Public Works Department, it will naturally rest with the then Chief Engineer, Public Works Department, to decide the question of the students' practical course. The work of the department affords but few opening for the Mechanical Engineer pure and simple.

9. *School and College.*—There is one further recommendation the Committee would wish to make, and that is that the distinction between "School" and "College" should disappear, and the whole institution be regarded as a College.

10. *Syllabuses.*—Having disposed of all the points noted above, the Committee proceeded to the work of revising the syllabuses. These as revised for the three classes, viz., Engineer, Upper and Lower subordinate, are given in appendices I, II and III. The only alteration common to all is the excision of the language course. The Committee sees no necessity for wasting valuable time in College over learning languages, and considers that those who through the College seek employment in the public service should be required to learn and pass languages in the same manner as persons recruited from other sources. The main features of the alterations in the syllabuses will be alluded to under the several classes, and it only remains to add here that all the syllabuses are based upon an assumption of a twenty-five hour lecture week exclusive of out-door, workshop, and other morning attendances, and upon an assumed duration of three years for the theoretical course for each class.

11. *Engineer class.*—The syllabuses have been entirely recast to provide a theoretical course which affords common preliminary training for both civil and mechanical students, the bifurcation taking place at the end of the first year's course. After the bifurcation certain lectures which it is not necessary to specify in this report will be common to the two courses as far as the courses permit. It will be noticed that geology has been included in the Civil Engineer's course and mechanism and steam engine omitted. The Committee considers that a knowledge of the former subject is essential to the Civil Engineer and that he can acquire all the knowledge of the latter that is necessary during his College workshop course. As regards the Mechanical Engineer course, elementary electrical engineering has been introduced, the Committee being of opinion that some knowledge of this subject is now-a-days absolutely necessary for the Mechanical Engineer.

Turning to mathematics, the course is devised to develop practical as opposed to analytical methods, the former being what is required of the Engineer. The Committee anticipates that those graduates who have taken mathematics as their optional subject will devote a considerable portion of the mathematical lecture hours to science, and *vice versâ* in the case of those who have taken physics as their optional subject.

Freehand and model drawing have been eliminated from the syllabus itself, but the Committee considers that the College staff should insist on a qualifying standard in this subject, and that should any student fail to attain this standard he should be required to work extra hours at this subject until he has attained the standard required.

12. *Upper subordinate class.*—The Committee considers it advisable to alter the designation of the Engineer Subordinate class and recommends that in the future this class be known as the Upper Subordinate class.

The designation now in force is misleading, or at the best conveys no very definite meaning to the generality of employers. The new designation will be intelligible to the public and it has the further advantage of bringing this College in the matter of the designation of the class into line with the Roorkee College, and with the Public Works Department. In the latter the term Engineer Subordinate is unknown.

The Committee is further of opinion that in the case of this class the length of the present theoretical course, viz., 2½ years, is insufficient to enable the necessary instruction to be imparted and absorbed, and is of opinion that it is imperatively necessary to prolong the course by six months and to make it a three-year course.

The alterations made in the syllabus are in the main only verbal, except in applied mechanics and mechanism and the steam engine. The Committee is of opinion that the instruction in the first-named subject, so far as it goes, should be complete, and the syllabus has been altered accordingly.

As regards mechanism and the steam engine, the Committee considers that the syllabus recommended under the title of "Mechanical Engineering," together with the knowledge the students may be expected to acquire during their College workshop course, will give all the training necessary for the class of work the students will be called on to execute in after life.

13. *Military Subordinates.*—The higher educational qualifications which the Committee considers is necessary to insist on in the candidates for this class, viz., the F.A. standard, will, except in a few very exceptional cases, make it very difficult if not impossible for the present class of Military students to compete. It was originally hoped that by recruiting from the ranks of the army a leaven of British tradesmen born and bred out of India would be obtained in the subordinate ranks of the public service. This hope has not been realised, and, while recognising the fact that capable subordinates have occasionally been obtained by the present means of recruitment, the Committee considers that such cases are not sufficiently numerous to justify the continuance of this method of recruitment on the present lines. The majority of the Military students are sons of former and present Military Subordinates in the Public Works Department or of subordinates of other departments, who have enlisted with the idea of entering the Public Works Department by this means; they have in most cases been born and bred in the country. The home-bred Britisher is comparatively speaking a rarity, and unless in some measure a social derelict he seldom has the education necessary to ensure collegiate success. The Committee considers that no soldier student should be admitted unless he is a tradesman and has a first-class army school certificate, and that he should be British born and bred. Such students should be admitted to a probationary class for a period of one year to prepare them for a qualifying College examination which should be passed prior to their joining the Upper Subordinate class. All failures should at once rejoin their units. The Committee is of opinion that, should this system fail to produce men of the required stamp, then recruitment from the army should be abandoned, tradesmen when and if required being obtained from England under covenant.

14. *Lower subordinate class.*—The Committee considers that under this title a new class should be formed to replace the present sub-overseer and surveyor and the draftsman class.

The latter class has always been hard to fill, and now that, under the advice of the Director of Public Instruction, Government have ruled that the higher paid draftsman posts reserved for passed College draftsmen may in the future be filled by men with Overseer's qualifications the prospects of filling the draftsman class in the College with the right stamp of men are practically *nil*. Further the class itself has furnished and does furnish recruits to the sub-overseer and surveyor class, with the result that the best men do three years in the College, viz., one year in the draftsman class and two years in the sub-overseer and surveyor class, while in some successful instances men have actually taken both courses, which means a period of four years spent in the College. The average product of this class on its present footing is useless for anything except mere tracer's work. This is partly accounted for by the educational qualifications now necessary for admission being very low. At the last entrance examination only three qualified on the marks as originally allotted, and it was necessary to lower the qualifying minimum by 25 per cent. and to fill the remaining vacancies from the sub-overseer and surveyor candidates who had failed to obtain a place in that class. This moreover is by no means an isolated instance. The Committee considers that the new class, the formation of which it strongly recommends, will be capable of meeting all the demands now made both for sub-overseers, surveyors and draftsmen. The course proposed will, in its opinion, furnish more efficient men of the first-named class than is the case at present, and will remove the complaint now frequently made that these men cannot draw or plot their own work. The Committee recognises that in a few individual cases the abolition of the rule concerning draftsmen's qualifications will lead to some hardship. It is of opinion that these cases can be met by the grant of personal allowances to the individuals injured.

15. *Board of Examiners.*—The revision of the syllabus disposed of, the Committee turned to the consideration of the composition of the Board of Examiners, staff, etc., subjects which are so intimately connected with those specifically set down for consideration that it was impossible for the Committee to ignore them.

The Committee is of opinion that the Board, as at present composed, should be increased and strengthened by the addition of two members of the College Professorial staff, who will be ex-officio members.

In making the above recommendation the Committee would explain that the two new members will not be examining members; their duty will be to guide the examining members through the syllabus, thereby ensuring that the papers set will not travel beyond the limits of the work actually done by the class.

This recommendation is based on past experience, and the Committee feels confident that these ex-officio members, while they will undoubtedly prevent the setting of unduly hard questions and questions outside the limits of the lectures that have been given, will in no way interfere with the independence of the Board.

16. *College Staff and Administration.*—On the subject of the College staff the Committee holds very strong views. It is of opinion that the College staff should be recruited from the Public Works Department, and that, consequent on this, the administration should naturally be in the hands of the chief of that department, who would, however, be subordinate as regards general policy to the Director of Public Instruction but independent in all other matters. As regards expenditure in connection with the College including cost of staff, this should, the Committee considers, be met by grants under Educational. The Committee is satisfied that the existing staff, handicapped as it is by incompetent and inadequate assistants, cannot efficiently teach up to the existing syllabus and *a fortiori* that it is inadequate for the revised syllabus. It further considers that the present method of recruitment is in no way suitable to the needs of the College.

There being no kindred institution in the Presidency, promotion for the technical assistants is only possible within very restricted limits. Further there is no means of automatically filling the senior assistants' places when the latter go on leave. The true cause of the existing evils lies in the fact that the assistants' posts are listed in the Provincial Educational Service, and consequently, owing to the rules regarding acting allowances, it is not possible to fill leave vacancies with men possessing suitable qualifications. The existing difficulties would disappear if the Committee's recommendation to transfer the staff to the Public Works Department were adopted. At the same time it considers that in order to attract the best men staff allowances of Rs. 30, Rs. 100 and Rs. 200 per month should be given in addition to the pay and allowances which those seconded would draw, were they employed on purely departmental duty in the Presidency town. The three grades of staff allowances will meet the cases of junior and senior assistants (now termed instructors) and professors respectively. The Committee recognises that in certain cases special recruitment from home must be resorted to, and is of opinion that the staff so recruited, who would as a matter of course form part of the Public Works Department establishment, should be non-pensionable and under covenant for a term of years (say 5), that the covenant should be renewable if the employé is satisfactory, and that a Provident Fund similar to the Provident Fund of Railway Companies in this country should be established for them. The Committee considers that all professors specially recruited from home should be engaged on such covenants, and that the initial pay should be Rs. 750 rising to Rs. 1,500. The Committee sees no reason why this system cannot be at once adopted, the cadre numbers of the Public Works Department being increased to cover the strength of the staff required. As regards the Principal of the College, the Committee is agreed that he should be an Engineer by profession, and that the post should carry free quarters, the minimum pay being that of a third-grade Superintending Engineer rising to that of a first-grade Superintending Engineer. It further considers that neither the principalship nor a professorship should be held by an officer for a period exceeding ten years without the officer doing at least one year's practical work for every five years' educational work.

Turning to the actual requirements as regards the strength of the staff which the classes and syllabus as revised require, the Committee considers that the following is the minimum staff which will meet requirements:—

Professor of Mathematics and one assistant. (It is preferable if the professor is an Engin

e Professor of Mechanical Engineering with five assistants, one of whom must be a Science Assista

e Professor of Civil Engineering and seven assistants.

In dition to the above a gymnastic and drill sergeant is required.

Should the staff remain organised on its present basis, one more professor and three more assistants will be required to cover leave vacancies; these, however, will not be required if the responsibility for staffing the College is handed over to the Public Works Department as recommended. The Committee is of opinion that the transfer of this responsibility from the Educational to the Public Works Department is reasonable, inasmuch as the latter is the chief employer of the students who pass.

The strength of the staff required is arrived at on the basis of a 15-hour lecture week and assumes that the Principal will be able to assist the two engineering professors by lecturing 8 hours a week. Three hours' lecturing a day is as much as can be expected of any man who has to keep himself abreast of modern developments in engineering and gives a reasonable time to the preparation of his lectures.

17. *Board of Visitors.*—With a view to check any tendency under a Public Works Department regimé to subordinate the College to the mere needs of the department, and also to assist Government in the future in the disposal of all questions of reorganisation, development, etc., the Committee recommends that a Board of Directors be established, composed as below:—

The Director of Public Instruction.
" two Chief Engineers.
" Consulting Engineer for Railways.
" Chief Engineer, Madras Railway Company.
" Chief Engineer, South Indian Railway.
" President, Faculty of Engineering, Madras University.
" Chairman of the Board of Examiners.
" Surgeon-General.
" Secretary in charge of Education.

Any available past Principals, Professors or Officers of the Public Works Department up to four in number with the Principal of the College ex-officio Member and Secretary.

It considers that the quorum of this body should be five. Of so much importance to the welfare of the College and to the furthering of professional education do the Committee consider the establishment of this Board or Standing Committee that it recommends Government to appoint it without any delay.

18. *The Removal of the College.*—The last question the Committee took into consideration was the suitability of the College, as at present placed, to meet all the demands of the present and the future which may come upon it. It is unanimously of opinion that neither the accommodation nor equipment gives the minimum that is absolutely necessary, and it further considers that it is not possible to erect suitable buildings on the existing site, nor is it possible suitably to extend those now existing so as to afford room for expansion in the future to meet modern developments. The Committee therefore cannot but consider that any large expenditure on the present site such as is needed for the immediate provision of laboratories will be sheer waste of money, and it urges upon Government the wisdom of at once arranging for the construction of new buildings in a suitable site, the present buildings being given up at the earliest possible date. Should the site of the Agricultural College become available in the immediate future, the Committee considers that that site will be in every way a suitable one for the location of the new College; should however this site not be available, then a site should be acquired in that neighbourhood or in the neighbourhood of St. Thomas' Mount or Guindy.

The Committee recommends that the College be residential. The success of residential institutions is undoubted and there is no reason to apprehend that the Engineering College would be any exception to the general rule. The Committee's recommendation regarding removal has not been put forward without due consideration of what will be the probable cost of this step. They append to this report an estimate of the cost so far as it is possible to do so without drawing up detailed plans and estimates, and from this it would appear that the cost is not likely to exceed 8 lakhs. This the Committee would point out, is a smaller sum by several lakhs than that which the Government of Bengal is prepared to spend on the removal of the Sibpur Engineering College. The Committee would point out that the erection of suitable hydraulic, mechanical, electrical, chemical and physical laboratories and the extension of the workshop is an urgent matter, and it again draws attention to the impossibility of erecting them economically near the existing premises. It is hardly necessary for the Committee to point out that every rupee spent on improving the intellectual equipment of the Engineering College graduates will be repaid twenty-fold to the pockets of the tax-payer with the spending of whose money they, the College graduates, are the principal primary agents. Taking the expenditure on public works at one crore per annum, a figure which, from inquiries made, is fairly accurate, and assuming that a saving of 2 per cent. on this sum (a moderate estimate) would result from the increased efficiency of the graduates educated in a College capable of educating up to the most modern standards, an outlay of 8 lakhs on the removal of the College does not appear unreasonable.

The Committee would emphasize the fact that this removal of the College is an event which must take place unless the College is permitted to take over the whole of the existing Public offices at Chepauk. This latter contingency, which would at best be an unsatisfactory arrangement, may be dismissed as improbable; and it only remains therefore for the Committee to press home the fact that, in the circumstances, the sooner the removal is carried out the less it will cost, and by so much the earlier will the College itself be able to develop and supply the needs of engineering student of the present day.

19. *Deputation of a Special Officer.*—The first step in the removal of the College is the preparation of well-considered plans and estimates for the new buildings; and to ad.nt of this being efficiently done, the Committee recommends that an officer be at once placed on special duty to draw up a complete scheme in consultation with the Principal of the College and to prepare the plans and estimates required. It will be necessary for this officer to pay a visit to Europe to study on the spot the best of the laboratories devoted there to the teaching of engineering.

The Committee is of opinion that the whole scheme of removal with complete plans and estimates might be submitted within eight months from the date the officer is placed on special duty.

20. In conclusion the Committee appends an Index to its recommendations. It would draw attention to the fact that in the case of Nos. 1 to 13 inclusive of these recommendations, immediate action is possible and most advisable.

Approximate estimate of cost of Removal of College.

	Rs.	Rs.
Required per student—		
3,000 cubic feet per student (200 square feet × 15) then		
for 300 students at 6 annas per cubic foot ..	3,37,500	
Add for Offices, Store rooms, etc.	1,12,500	
	4,50,000	
Hostel, for 300 students at Rs. 600 per student (Cost per student of the Victoria Students' Hostel.)	1,80,000	
	2,00,000	6,30,000
Workshop, Laboratories, etc.	1,50,000	8,30,000
Residences		9,80,000
Equipment		2,20,000
		12,00,000
Deduct book value of present buildings	2,48,000	
" " " Recreation ground	77,000	
" " " Principal's house and ground	75,000	
(This is a low figure) ..	4,00,000	
Net cost..		8,00,000

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IV

Letter—from J. P. Davidson, Esq., President, College of Engineering Committee.
To—the Secretary to Government, Educational Department.
Dated—the 10th April 1905.
No.—

...is promissed in ...raph 2 of my letter No. 340, dated 31st March 1905, I have the honour to forwa... ...ies of the syllabuses for the three classes of students.

Enclosure.

SYLLABUSES.

ENGINEER CLASSES.

Branch I.

I.—PURE AND APPLIED MATHEMATICS.

PURE MATHEMATICS.

Algebra—

Binomial theorem. Exponential theorem. Logarithms. Summation of series. Solution of equations by graphs: Approximate solutions of equations by Horner's Method.

Geometry—

Simple problems on the straight line, circle, parabola, ellipse, and hyperbola by analytical or pure geometry.

Mensuration—

Plane and solid.

Plane Trigonometry—

Practical use of logarithms. Adaptation of formulæ to logarithmic computation. Solution of triangles. Calculation of areas. Heights and distances. Circular and hyperbolic functions and the use of their expansions.

Differential Calculus—

Fundamental notions with special applications to Geometrical and Mechanical problems. Theorems of Taylor and Maclaurin. Maxima and minima of one variable. Tracing of well-known curves from their cartesian and polar equations. Curvature, Envelopes, Evolutes and Involutes. Change of the variable. Simple cases of partial differentiation.

Integral Calculus—

Integration of standard forms. Calculation of curve lengths and areas. Volumes and surfaces of solids of revolution. Formula of reduction. Integral as the limit of a sum. Double and Triple integrals as applied to Mass Centres and Moments of Inertia. Planimeters. Elementary standard forms of differential equations.

APPLIED MATHEMATICS.

Kinematics—

Displacement in one plane. Translation and rotation. The instantaneous centre. Composition and resolution of displacements, velocities and accelarations. Circular motion and simple harmonic motion.

Rotation of a rigid body in two dimensions.

Kinetics—

Equations of motion deduced from Newton's Laws of Motion. Conservation of Momentum, Work and energy. Motion under gravity including projectiles. Kinetics of simple harmonic motion in a straight line or curve. Pendulums, simple and compound. Impact. Moment of Inertia and radius of gyration.

Hydrostatics—

Transmission of fluid pressure. Thrusts due to fluid pressure on a plane area. Centre of pressure. Thrusts due to pressure of a fluid on bodies wholly or partially immersed. Principle of Archimedes. Conditions of equilibrium of floating bodies. Metacentre. Determination of specific gravities of solids and liquids. Hydrometers. The general phenomena of capillary elevation and depression.

Machines for raising water. The principles underlying the action of the suction pump, force pump, centrifugal pump, and jet pump. The syphon. The Hydraulic press.

II.—SCIENCE.

CHEMISTRY.

1. Physical and Chemical change: Constitution of matter: Simple and Compound substances: Chemical action: Chemical Nomenclature and Symbols: The Atomic theory: Equivalent, Atomic and Molecular weights: Specific and Atomic Heats: Calculation of Weights and Volumes of substances involved in Chemical Reactions: General properties of Gases: Liquefaction: Diffusion, Solution: Dissociation: Electrolysis.

2. The chemistry of the following non-metallic elements and their more important compounds:—Hydrogen, Oxygen, Nitrogen, Chlorine, Bromine, Iodine, Fluorine, Sulphur, Phosphorous, Arsenic, Boron, Carbon and Silicon.

3. Chemical and Physical characteristics of metals as illustrated by:—Sodium, Calcium, Iron, Zinc, Lead, Mercury, Copper, Silver and Gold.

CHEMISTRY:—Laboratory Course.

1. Preparation and examination of some of the more common gases, etc.—
Elements.—H, O, (air) N, S, Cl, Br, I.
Compounds.—HF, HCl, H_2S, NH_3, CH_4, C_2H_4, CO_2, CO, HNO_3, NO, NO_2, N_2O, SO_2, SO_3, H_2SO_4, KClO.

2. Qualitative Analysis—
Simple mixtures of the following metals and acids:—
Bases in the form of metal, oxide, sulphide, haloid or oxysalt:—
Na, K, NH_4, Mg, Ba, Sr, Ca, Zn, Mn, Ni, Co, Fe, Al, Cr., Hg, Pb, Bi, Cu, Cd, As, Sb, Sn, Ag.
Recognition of different valencies of Mn, Fe, Cr, Hg, As, Sn.
Acids.—CO_3, SO_4, SO_3, NO_3, NO_2, CrO_4, Cl, ClO_3, S, Br, I, F, PO_4, AsO_4, BO_3, SiO_3.
Distinction in easy cases between normal and acid salt:—
E.g.—Carbonate and bicarbonate, etc.

Note.—Careful attention must be paid to the preliminary examinations of the substance by dry tests.

3. Qualitative Analysis—
(1) Gravimetric.—Estimation of Cu and water in pure crystals of Cu, SO_4, $5H_2O$.
Separation and estimation of proportions of Ag and Cu in a silver coin.
Estimation of silicon in a specimen of glass.
Estimation of Ca and CO_2 in Calc Spar or any other impure carbonate.
(2) *Volumetric.*—Preparation of standard solutions of permanganate, alkali and acid, and easy applications of these solutions to analysis, *e.g.*—Estimation of iron by titration with ferrous ammon. sulphate, etc.

PHYSICS.

Heat—

Temperature. The construction and use of instruments for measuring temperature. The expansion of solids, liquids and gases with change of temperature. Heat as quantity, and the methods of calorimetry. Change of state. Latent heat; the laws of evaporation; boiling. The conduction of heat. Phenomena attending convection in fluids. Radiation, and the laws of cooling. The nature of heat, determination of the dynamical equivalent of heat. The laws of thermodynamics with simple applications.

Light—

The Propagation of Light; rays and pencils; photometry. The laws of Reflexion and Refraction of Rays of Light; the sextant; passage of a ray through a prism. The direct reflection and refraction of small pencils at plane and spherical surfaces; passage through a lens. Formation of images. The telescope and microscope. The compound nature of white light, formation of a pure spectrum; the achromatic lens.

Electricity and Magnetism—

1. Magnets, magnetic bodies. The magnetic field; lines of force. Forces and couples on magnets in the magnetic field. The earth's magnetic field. The phenomena of magnetic induction; the magnetic properties of iron and steel; hysteresis.

2. Electrification, conductors and insulators, the electrostatic field, and electrostatic induction. Charge, potential, and capacity of condensers; discharge, current; energy of charged condensers.

3. The more common cells for producing currents. The magnetic field of current galvanometers. The source of energy for maintaining it. Electromotive force. Ohm's Law, resistance and its measurement; Wheatstone's Bridge. The heating effects of currents, fuses, incandescent lamps. Elementary phenomena of electrolysis. The Clark cell and the potentiometer system of measuring E.M.F., current, etc.

4. Pot. Energy of circuit carrying current placed in magnetic field and derivation of forces and couples on circuit. Application to moving coil instruments (ammeters, voltmeters, etc.).

5. Electromagnetic induction, Maxwell's Law. The variable and steady period of current in a circuit. Simple dynamo machines for producing continuous and alternating currents; induction coil.

GEOLOGY.—(For Civil Branch Only.)

Object of Geology.—Its relation to other sciences.

The Earth.—Envelopes: Liquid and Gaseous. The solid globe: the outer crust and interior or nucleus. Distribution of temperature and pressure in the crust.

Petrography.—Classification of rocks according to their character, origin and age. Rock-forming minerals. Determination of rocks. Megascopic examination. Tests in the field. Fracture. Specific gravity. Mechanical analysis. Chemical analysis. Treatment with acid and blowpipe tests, etc. Microscopic analysis. Preparation of slides of rocks and minerals. Microscopic characters of minerals, such as—quartz, orthoclase, plagioclase, augite, hornblende, etc. Microscopic characters and essential constituents of rocks more commonly met with such as—limestone, dolomite, quartzite, flint, gneiss, micaceous and chloritic schists: granite: quartz porphyry: syenite, trachyte, obsidian, pumice: diorite: diabase, dolerite: sand and gravel, sandstones, conglomerates, breccias, slab, clay: laterites: shell marl, chalk: peat, lignite, coal: anthracite, graphite, oil shale petroleum, asphalt: clay iron stone. Origin of above mentioned rocks.

Dynamical Geology.—Volcanoes and volcanic action. Geographical and geological distribution of volcanoes. Earthquakes. Secular upheaval and depression. Geological functions of air, water and ice: chemical and mechanical action: denudation and deposition: river valleys with special reference to Indian rivers. Geological functions of plants and animals.

Structural Geology.—Bedding. Surface marks. Concretions. Relative persistence of strata. Overlap. Groups of strata. Joints. Inclination of rocks; dip, outcrop and strike. Curvature: monocline, syncline, anticline. Nature and origin of faults. Igneous rocks: phase of eruptivity: bosses, sheets, veins and dykes, necks. Interbedded phase of eruptivity: lavas and tuffs. Metamorphism. Ore deposits. Unconformability.

Stratigraphical Geology.—Scope of historical geology. Fossils, their mode of petrifaction and uses. Classification of animals and plants. The leading stratigraphical laws. General outline of the stratigraphy of Southern India. The geological formations, their rock divisions, characteristic fossils and economic products.

MINERALOGY.

Crystallography—

Physical.—Cleavage. Fracture. Hardness. Optical and magnetic properties of minerals.

Geometrical.—Relation of physical properties to geometrical form: arrangement of molecules. Crystalline form: faces. Planes of reference: axes, parameters: indices, symbols. Symmetry. The six crystallographic forms characterized with reference to planes of symmetry. Simple forms and combinations.

Descriptive.—Detailed descriptions of the more common minerals.

Practical.—Application of above and blow pipe analysis to the identification of minerals.

Branch II.

ENGINEERING DRAWING.

1st Year
(*Civil and Mechanical Engineering*).

Geometry—

(*a*) *Practical Plane Geometry.*—Elementary problems dealing with Lines, Triangles, Quadrilaterals, Circles, Polygons: Methods of Construction and Problems relating thereto: Tangents; Inscribed and Described figures: Proportional Lines and Angles: Areas of Plane Figures: Plane Curves: Parabola, Ellipse and Hyperbola: Methods of Drawing and Chief Properties: Cycloidal, Spiral and other Common Curves.

(*b*) *Practical Solid Geometry and Projection.*—Lines. Points and Planes: Projection of Simple Solids: Regular Solids: Sections of Solids: Development of Plane and Curved surfaces: Tangent Planes and Solids: Interpenetration of Solids: Determination of Shadows: Isometric Projection: Elements of Perspective.

(*c*) *Graphics.*—Arithmetic: Determination of C.G. of Plane areas.

Machine Drawing—

Ability to copy accurately to scale and supply additional views: Drawings of simple machine parts from sketches: Ability to supply and give some idea of the proportions of the more simple machine details such as bolts, nuts, keys, cotters, etc.

Building Drawing—

Ability to copy plans accurately to scale and to make plans from sketches. *Masonry Details:* Bond in Brickwork, Gauged, Relieving and Inverted arches, Footings and ordinary Foundations; Uncoursed and Coursed Rubble, Ashlar, etc. Dressings such as:—Window Sills, Window and Door Jambs, etc. *Timber Details:* Joints, Halving, Lapping, Notching, etc., also as applied to Wall Plates, Floors, Ceilings, etc. Floors, Doors, Windows: Partitions: Roof Frames. *Iron and Steel Details:* Sections of Cast and Rolled Beams and simple applications: Simple Iron Frames.

SURVEYING.

A. Surveying.—Surveying with the chain, compass and plane table. Plotting surveys.

B. Levelling.—Levels; their adjustment and manipulation. Levelling. Contouring. Plotting.

C. Theodolite work.—Theodolites; their adjustment and manipulation. Traversing. Setting out straight lines and curves in the field.

D. Topographical Drawing.—Conventional signs, map-drawing. Representation of ground. Sections on contoured plans. Location of road or railway on contoured plans, showing cuttings and embankments. Estimation of areas.

Note.—Students may be sent out into camp for a fortnight or more at a time.
Students will be formed into small squads, the size of which will be regulated by the nature of survey under execution. Each student of a squad will be told off to a particular duty, and duties will be frequently interchanged. The instructor will show each squad how to commence work and will then leave it to its own resources, visiting it only occasionally. He will check independently the accuracy of the work performed. Each student must be fully practised in every detail of the work required in the field, such as chaining, holding levelling staves, observing, etc.
Third year students failing to qualify survey field work will attend the following survey camp and will be re-examined at the termination of the camp. Students failing at this re-examination will receive no certificate.

APPLIED MECHANICS (Civil and Mechanical).

1. *Stress, Strain and the Machanical Properties of Materials used in Engineering*—

(*a*) Modulus of Elasticity: Elastic Limit, Ultimate Strength, Resilience: Strain beyond the Elastic Limit: Fatigue of Metals: Applications of the Theory of Stress and Strain.

(*b*) Mechanical Properties of the Materials of Construction.

(*c*) The Testing of Materials.

2. *Applications of Statics to Structures*—

(*a*) Definition of a structure: Simple and Compound structures: Perfect, Imperfect and Redundant Frames.

(*b*) The Principles of Graphic Statics: Applications to Roofs, Bridges and similar structures.

(*c*) Beams: Bending Moment and Shearing Force: Load Diagrams: Deflection: Stiffness: The Continuous Beam.

(*d*) Strength of Struts and Columns.

(*e*) The Metal Rib and Hanging Chains.

(*f*) Theory of Torsion: Strength of Shafting and other practical applications.

(*g*) Shells and Thick Cylinders.

3. *Hydromechanics*—

(*a*) Floating Bodies: Stability of Floating vessels.

(*b*) General Principles applicable to designs of Dams, Gates, etc.

(For Mechanical Branch Only.)

4. *Kinematics and Pure Machanism*—

(*a*) Definition of a Machine; Machine Elements and Pairs: Links, Chains and Mechanisms.

(*b*) Simple Constrained Motion. Translation and Rotation: Instantaneous Centres: Centrodes.

(*c*) Virtual Motion in Mechanism.

(*d*) Linear and Angular Velocity: Speed: Diagrams of Relative Velocities for Elementary Mechanisms.

(*e*) Mechanisms other than Linkwork:—Spur Wheel Trains, Trains, etc, Altered Mechanisms, Expansion of Elements: Reduction of Links: Parallel Motions: Chains containing Non-rigid Links.

(*f*) Dynamics of Mechanism. Velocity and Acceleration: Linear Velocity and Acceleration Diagrams. Force, Mass and Weight: Momentum and Impulse, Work and Energy.

(*g*) Friction. Friction of Rest and Motion: Laws of Dry Friction: Friction of Lubricated Surfaces: Friction in Mechanism and Machines. Efficiency of a Machine.

5. *Applications of Statics and Kinetics to Machinery*—

(*a*) Inertia Forces in the Steam Engine and other Mechanisms.

(*b*) Effort and Resistance: Steadiness: Governors and Fly wheels.

CONSTRUCTION.

1. *Building Materials*—

Stones of Southern India.—Characteristics and preparation.

Bricks and Tiles.—Manufacture and uses.

Lime, Cement, Mortar, Concrete and Plaster.—Sources of supply preparation and working.

Timber.—Varieties used for building purposes, seasoning, preservation.

Metals.—Iron and Steel: Elementary description of metallurgical processes for production. Varieties and suitability for use. Other common metals, such as copper, zinc, lead, tin and alloys.

2. *Theory and Design of Structures in Wood*—Iron, Steel, Masonry and Earth—

(*a*) *Masonry Structures.*—Foundations: Buildings: Bridges: Retaining walls: Tunnels.

(*b*) *Structures in Iron and Steel.*—Roofs, Bridges, Gates and Shutters.

(*c*) Ability to make intelligible dimensioned sketches of structures and simple machines.

3. *General Principles governing the Design of*—Railways, Roads, Harbours and other works.

Note.—The above syllabus connotes Building drawing exercises, designs, and estimating.

HYDRAULIC ENGINEERING.

1. *Discharge from Orifice and Notches.*—Volume of flow. Principle of continuity. Small orifices. Velocity of discharge. Co-efficients of velocity, contraction, and discharge. Adjutages. Short pipes. Large orifices. Rectangular notch and orifice. Triangular notch. Velocity of approach. Submerged and partly submerged orifices. Submerged notch.

2. *Practical cases of Discharge from Orifices and Notches.*—Tank surplus weirs. Drowned weirs. Gauging weirs. Anicuts with clear overfall or drowned. Sluices: head, under, tank, weir, lock and irrigation. Bridge openings. Afflux, backwater. Modules.

3. *Discharge under variable Heads.*—Free discharge from prismatic vessels. Time of emptying or filling. Discharge during a given time. Canal locks. Discharge from irregular basins. Discharge from one prismatic vessel into another.

4. *Flow of water in Pipes.*—Fluid friction. Velocity in pipes. Virtual slopes. D'Arcy's co-efficients of friction. Velocity and discharge. Short pipes. Siphon sluice. Inclination of pipes. Branched mains. Pipes not running full. Minor losses of head. Jets.

5. *Flow of water in Channels.*—Open channels. Co-efficients: Channel section. Discharge. Trapezoidal section in earth. Practical data. Channels of minimum border. Channels for variable discharge. Variation of velocity in a cross section. Falls. Standing waves.

6. *Pumps and Waterlifts.*

7. *Rivers.*—Estimation of discharge. Maximum flood discharge from catchment basins. Discharge formulæ. Bends in rivers. Regime of rivers.

8. *Storage and distribution of water.*—Supply for irrigation, navigation or to a town. Rainfall. Supply from wells, rivers and reservoirs.

9. *Masonry works in irrigation projects.*

10. *Canals and Channels.*—Irrigation canals in deltaic and non-deltaic country. Supply from rivers and tanks. Capacity of canal. Limiting velocities. Fall. Side slopes. Alignment. Disposal of cross drainage; Height of banks. Navigable canals.

11. *Tanks.*—Isolated rain-fed tanks. Tanks in groups. Tanks supplied by rivers or streams; Capacity. Irrigating duty. Loss of water by evaporation and absorption. Construction of earthen bunds. Puddle walls. Revetment of earthen bunds. Design and construction of surplus weirs. Tank sluices and their regulation. Repairs to bunds, and closing breaches.

12. *Water-supply of Towns.*

13. *Town drainage and sewage disposal.*

Note.—The above syllabus connotes Building drawing exercises, design and estimating.

MECHANICAL ENGINEERING.

1. *General Machine Design.*

Fastenings.—Botls, nuts, keys and cotters: Rivetted joints and connections generally: Pipes and cylinders: Shafting and journals: Pedestals: Wall fixings, etc., Belt and rope gearing: Friction and spur gearing.

2. *Boilers and Fuel*—

(*a*) Coal, wood, gas and petroleum: Physical characteristics: Approximate chemical composition: Heat of combustion: Evaporative powers: Air of dilution.

(*b*) *Draught.*—Natural, forced and induced: Chimney design.

(*c*) *Boilers.*—Ordinary forms of stationary: Locomotive, marine, water-tube and other types: Heating surface: Fire-grate area: Boiler efficiency: Feed pumps and injectors: Feed heaters: Mountings: Management and cleaning.

3. *Theory of Heat*—

(*a*) Thermodynamical Principles: Joule's Law: Carnot's Cycle: Perfect Heat Engine: Second Law: Laws of Gaseous expansion.

(*b*) Air Engines: Stirling and other forms.

(*c*) The Internal Combustion Engine.—The Gas Engine, The Oil Engine.

(*d*) *Steam.*—Thermodynamics of the Generation, Expansion and Condensation of steam: Heat diagrams, etc.

(*e*) The Steam Engine: Early forms and modern developments: High speed Engines: Efficiencies of non-condensing, condensing, simple, compound and multiple expansion types: steam jacketing: superheating.

(*f*) *Steam Turbines.*—Parson, De Laval and other types.

(*g*) *Engine Testing.*—Consumption of steam and Fuel, Gas and oil: Brakes and Dynamometers: Indicators and Indicator Diagrams.

4. *Engine Accessories and Details*—

(*a*) Condensers, air pumps, circulating pumps, cooling tanks, etc.

(*b*) Cylinders, pistons, cross heads, guides, connecting rods, cranks, governors, fly wheels, valves and valve gears, glands and pipes.

5. *Hydraulic Machinery*—

(*a*) Bucket and Plunger: Piston forms: Valves: Air vessels and stand pipes: Efficiency of pumps.

(*b*) Water wheels: Theory, design and efficiency: Undershot, overshot, breast and other forms.

(*c*) Turbines: Theory, design and efficiency: Parallel, outward and inward flow: Governing.

(*d*) The Centrifugal pump: Pulsometer: Rams: Air Lift Pumps, etc.

(*e*) Hydraulic transmission of power: Accumulators: Valves, etc.

6. *Machine Tools and Mechanical Manipulation—*

(*a*) Cutting of Metals: Tool Steels: Shape and preparation of tools: Lubrication of tools Speed of cutting and power required.

(*b*) Surface Plates: Callipers and gauges.

(*c*) Lathes: Early forms and modern developments: Turret and other lathes adopted for special purposes: Screw cutting: Tools and chucks.

(*d*) Screw Machines: Boring and turning mills, Milling machines: Planing machines: Shaping machines: Slotting machines: Drilling machines: Sawing machines: Gear cutting machines: Grinding and other miscellaneous machines.

(*e*) Methods of driving and general arrangement of machine tools: Shafting: Electrically driven machines.

N.B.—Stress will be laid on the ability to make intelligible dimensioned sketches. The above syllabus connotes all Machine Drawing and Design.

ELECTRICAL ENGINEERING (for Mechanical Engineering Students).

1. *Fundamental Laws, Units and Standards.*

2. *Electrical Measuring Instruments and Testing Processes.*

Measurement of Current, Potential Difference, Resistance and Power: Galvanometers, Ammeters and Voltmeters: The Potentiometer and other Standard Instruments. Testing and Checking Electrical Instruments. Electric Meters.

3. *Magnetism and Electro-magnetism considered in Relation to Electrical Energy—*

Magnetisation of Iron: Practical Determination of Magnetic Qualities of Iron and Steel: Electro-magnetic Induction.

4. *Design and Construction of Dynamos—*

Series, Shunt and Compound Machines: Simple and Polyphase Alternators: Methods of Testing: Characteristic curves.

5. *Electric Distribution and Power supply—*

System of Electric Supply: Continuous Current: Simple and Polyphase Alternating Systems: High and Low Tension. Transformers: Rotary Convertors: Accumulators: Lamps: Mains, etc.: Electric Traction. General Principles of Artificial Illumination: Photometry.

CIVIL ENGINEERING.

Branch—II.

Engineering .. 6,400. — Physical Exercise.? 100 — Grand Total .. 8,000.

Mathematics (1st and 2nd years).				Science:—?			
Pure and Applied .. 900				Chemistry	100	1st year.	(25)
				Physics	300		(75)
				Geology	200	2nd year.	(50)
				Total .. 1,500.			
Drawing.?				Surveying.?			
Geometrical Drawing	Geometry	..	300 (100)	Chain Compass Plane Table ..	300	(200)	1st year.
	Free-hand	..	50 (50)	Level	300	(200)	2nd year.
	Model	..	50 (50)	Theodolite	400	(300)	3rd year.
Building Drawing		..	200 (100)				
Machine Drawing		..	200 (100)	Total ..	1,000	(600)	
Total ..			800 (400)				

N.B.—The bracketed marks show those allotted by the College, while the total is shown unbracketed.

MECHANICAL ENGINEERING.

Branch—I.

Mathematics (1st and 2nd years). Pure and Applied .. 900 — Chemistry .. 100 — Physics .. 1,300 (100) — Science.? .. .. .. — Physical Exercise. (100) — Grand Total .. 8,000

Drawing 1st Year.				Electrical Engineering:—			
Geometrical Drawing	Geometry	..	300 (100)	Applied Mechanics, 2 papers ..	800	(100)	
	Free-hand	..	50 (50)	Mechanical Engineering, Theory and Practice, 3 papers ..	100	(100)	
	Model	..	50 (50)	Note-Books, etc.	300	(300)	
Building Drawing		..	200 (100)	Drawing, 4 papers	200	(100)	
Machine Drawing		..	200 (100)	Engineering Laboratory (including Strength of Materials, Heat Engines, etc.) ..			
Total ..			800 (400)	Note-Books	200	(200)	
				Examination in Lab.	200		
				Workshop (Mechanical and Electrical Practice)	400	(400)	
				Total ..	4,500	(1,200)	

N.B.—The bracketed marks show those allotted by the College, while the total is shown unbracketed.

SYLLABUSES.

UPPER SUBORDINATE CLASS.

Branch I.

I.—MATHEMATICS *.

A.—Arithmetic—

Use of decimals in preference to vulgar fractions for practical calculations. Degree of accuracy of measurements. Contracted multiplication and division. Labour-saving methods; (1) use of tables of squares, cubes, square roots and cube roots; evaluation of the forms $\sqrt[a]{b}$, $\frac{a}{\sqrt[a]{b}}$, $\sqrt{\frac{a}{b}}$, $\sqrt[3]{\frac{a}{b}}$, $\frac{a+\sqrt{b}}{c+\sqrt{d}}$; (2) use of logarithms and antilogarithms in multiplication and division, involution and evolution.

B.—Algebra—

Factorisation. Simplification. Rules of indices. Easy problems leading to simple and quadratic equations. Determination of constants in equations of known form such as $y = ax + b$, $y = ax^2 + bx + c$. Arithmetical progression; geometrical progression.

Co-ordinates of a point in a plane. Plotting observations on section paper. Probable intermediate values. Plotting of simple functions, such as $y = mx$, $y = mx + n$, $ay = x^2$, $y = ax^2 + bx + c$, $y = (x-a)(x-b)$, $y = (x-a)(x-b)(x-c)$. Use of section paper for obtaining maximum and minimum values and roots of equations.

Note.—The co-efficients in equations like $y-ax^2 + bx + c$, etc., will be numerical. Discussion of the forms of graphs for different values of a, b, c is not required.

C.—Geometry—

The inscribed, escribed and circumscribed circles of a triangle. To describe the following regular polygons, (1) on a given base, (2) in a given circle, (3) about a given circle;—(*a*) square, octagon; (*b*) hexagon, equilateral triangle, dodecagon; (*c*) decagon, pentagon, quindecagon. The in-and circum-scribed circles of regular figures. Area of a parallelogram = base × altitude; area of triangle = ½ base × altitude. Deduce Euclid VI, 1 and corollary. Euclid VI, 2, 9 to 13, 3, A. To describe a triangle equiangular to a given triangle (1) on a given base, (2) in a given circle, (3) about a given circle. Euclid VI, 4, B, C, D, 8, 24. Ratio of two triangles or parallelograms having one angle of the one equal to one angle of the other. Similar triangles are to one another as the squares on the homologous sides or lines. Ratios of similar figures and solids. Euclid VI, 5, 6, 26. Explanation of the enunciation of VI, 33 and illustrations.

Note.—The geometrical analogues of the propositions in Algebra relating to four quantities in proportion will be assumed.

D.—Mensuration—

Rule for length of circumference of a circle. Rules for area of triangle, parallelogram, circle, sector and segment of circle. Area of irregular plane figure by mid-ordinate rule and Simpson's rule. Rules for surface and volume of prism, cylinder, cone, sphere and ring. Volume of an irregular solid by plotting ordinates representing areas of cross sections. Estimation of areas, surfaces and volumes from actual measurements of objects. Measurement of areas and volumes by weight or displacement. Meaning of specific gravity. Calculation of the weight of a body when its volume and specific gravity are known.

E.—Plane Trigonometry—

Measurement of angles in degrees and radians. Definitions of sine, cosine, etc., and graphic determination of their values. Setting out angles from values of sine, cosine, etc. Use of tables of natural sines, cosines, etc. Solution of right-angled triangles by calculation and drawing. Formulæ for the sine, cosine and tangent of the sum and difference of two angles, and of the double and half angle. Other simple formulæ required in the solution of triangles. Use of logarithmic tables. Solution of triangles heights and distances.

Note.—Four figure tables of logarithms only will be used; angles will be estimated only to minutes.

ENGINEERING DRAWING.

Geometry—

(*a*) *Practical Plane Geometry.*—Elementary problems dealing with lines, triangles, quadrilaterals, circles: polygons: methods of construction and problems relating thereto: tangents: inscribed and described figures: proportional lines and angles: areas of plane figures: plane curves: parabola, ellipse and hyperbola: methods of drawing and chief properties: cycloidal, spiral and other common curves.

* This syllabus and mark distribution are first applicable to the class joining in July 1902.

(*b*) *Practical Solid Geometry and Projection.*—Lines, points and planes: projection of simple solids. The regular solids: sections of solids: development of plane and curved surfaces: tangent planes and solids: interpenetration of solids: determination of shadows: isometric projection: elements of perspective.

(*c*) *Graphics.*—Arithmetic, determination of C. G. of plane areas.

Machine Drawing—

Ability to copy accurately to scale and supply additional views: drawings of simple machine parts from sketches: ability to supply some idea of the proportions of the more simple machine details such as bolts, nuts, keys, cotters, etc.

Building Drawing—

Ability to copy plans accurately to scale: *Masonry Details*:—Bond in brickwork, gauged, relieving and inverted arches, footings and ordinary foundations: uncoursed and coursed rubbles, ashlar, etc. Dressings such as:—Window sills, window and door jambs, etc. *Timber details*:—Joints halving, lapping, notching, etc., also as applied to wall plates, floors, ceilings, etc. Floors, doors, windows: partitions: roof frames. *Iron and steel details.* Sections of cast and rolled beams and simple applications: iron roof frames of small span.

Freehand and Model Drawing—

Ornamental outlines. Applications of elementary perspective to model drawing of simple objects.

Note.—*Machine Drawing. Building Drawing* and *Hydraulic Engineering Drawing*, and *Estimating* a special teaching in these subjects will be given during the courses of lectures in which Mechanical Engineering, Construction and Hydraulic Engineering are respectively taught. Marks will be allotted by the College for the drawing work done by students during these courses. A paper will also be set by the Board of Examiners in each of the above three branches of drawing.

HYDRAULIC ENGINEERING

1. *Hydrostatics.*—Hydrostatic laws. Pressure at a point and on a surface. Equal transmission of pressure. Atmospheric pressure. Siphon. Specific gravity. Flotation.

2. *Discharge from orifices and notches.*—Small orifices. Velocity of discharge. Co-efficients of velocity, contraction and discharge. Rectangular orifice and notch. Triangular notch velocity of approach. Submerged and partly submerged orifices. Submerged notch.

3. *Practical cases.*—Tank weirs. Drowned weirs. Gauging weirs. Anicuts, sluices, head, under, lock and tank. Modules.

4. *Discharge under variable head.*—Free discharge from prismatic vessels. Time of emptying or filling locks. Discharge from one prismatic vessel into another.

5. *Flow in pipes.*—Fluid friction. Velocity in pipes. Virtual slope. Discharge. Inclination of pipes. Pipes not running full.

6. *Flow in channels.*—Sections for channels. Co-efficients. Discharge of channels. Practical data. Channels of minimum border. Falls.

7. *Rivers.*—Cross sections. Measurement of velocity and discharge. Flood discharge from catchment basins. Bends. Regime of rivers.

8. *Storage and distribution.*—Irrigation, navigation and town supply. Rainfall. Supply from wells, rivers and reservoirs.

9. *Masonry works in irrigation projects.*

10. *Canals and channels.*—Irrigation in deltas and elsewhere. Supply from rivers. Storage in tanks. Capacity of channel, limiting velocity. Surface fall, side slopes alignment. Cross drainage. Navigation canals.

11. *Tanks.*—Isolated rain-fed tanks. Tanks in groups. Tanks supplied from rivers or streams. Catchment and capacity of a tank. Irrigating duty of water. Tank bunds, puddle walls, revetment. Surplus weirs. Tank sluices. Closing breaches.

This syllabus connotes drawing and design of works mentioned.

APPLIED MECHANICS,

1. Mechanical properties of Engineering materials: stress and strain: modulus of elasticity: elastic limit: ultimate strength: factor of safety and working stress.

2. Statics and applications to structures: coplanar forces: parallelogram, triangle and polygon of forces: applications by graphical methods to simple frames with pin joints, such as cranes, etc. Wind pressure or roofs.

3. Elementary study of beams: bending moment and shearing force: sections in iron, steel and wood.

4. Struts and columns: formulæ of Gordon and Euler.

5. Simple shear and torsion: strength of shafts.

6. Elementary application of theory in design of small bridges and arches generally, retaining walls and dams.

7. Principle of work: potential and kinetic energy: centrifugal force.

MECHANICAL ENGINEERING

Transmission of motion and power.—Shafts, couplings, clutches, pedestals and wall fixings. Belts, ropes and pulleys. Telodynamic transmission. Toothed gearing, spur and bevil wheels, rack and pinion, worm gearing. Cam's examples of uses of above in ordinary machines.

Boilers.—General description and management of Cornish, Lancashire, vertical, locomotive flash and water-tube boilers. Feedheaters, economizers, superheaters and other accessories and mountings.

Steam and other Heat Engines.—Description and method of working of stationary and locomotive engines. Steam turbines. Gas and oil engines. Engine accessories and details:—condensers, air and circulating pumps, cylinders, pistons slide valves, governors, fly wheels, etc.

Hydraulic Machinery.—General description of ordinary forms of force and centrifugal pumps, pulsometer and rams. Water wheels, parallel, outward and inward flow turbines. Presses and rivetters. Hydraulic transmission of power, accumulators, valves, etc.

Machine Tools and Mechanical Manipulation.—Cutting of metals. Surface plates, calipers and gauges. Arrangement of drilling shaping, planing, slotting and milling machines. Lathes, turning and boring mills. Punching and shearing machines.

This syllabus connotes drawings of works mentioned.

CONSTRUCTION.*

Construction Materials †—

1. *Stone.*—Varieties met with in Southern India. Quarrying. Blasting with powder and dynamite. Dressing. Average strength and weight of stone.

2. *Bricks and Tiles.*—Brick earth. Tempering. Hand and machine moulding. Drying. Burning in clamps and kilns. Hoffman's kiln. Coloured bricks and tiles. Pressed bricks. Roofing, flooring and drain tiles. Fire bricks. Average strength and weight of brick. Characteristics of good bricks and tiles.

3. *Lime, Cement, Mortar, Concrete, Plaster.*—Sources and properties of lime. Burning in intermittent and running kilns. Slaking. Mortar mixing. Fat and Hydraulic limes. Portland cement manufactured in England and in Madras. Hydraulic mortar. Surki. Concrete. Practical tests for limes and cements. Strength of mortars and concretes. Plaster and plastering. Pointing. White and colour washing.

4. *Timber.*—Growth. Felling. Seasoning, natural and artificial. Conversion. Preservation of timber. Varieties of timber used in Southern India—teak, saul, erool, karimaridoo, padowk, vengay, benteak, aynee, red and white cedar, rosewood, casuarina, mango, palmyra, cocoanut, bamboo. Strength and weight of timber. Characteristics of good timber.

5. *Metals.*—Iron ores. Smelting. Grey and white pig iron. Castings. Pipes and columns of cast iron. Chilled castings. Strength of cast iron. Brief description of the manufacture of wrought iron. Forms of wrought iron. Galvanized and corrugated iron. Tests and strength of wrought iron. Rivets and bolts. Punching and drilling holes. Riveting. Cutting plates and bars. Welding. Steel, hard and mild. The Bessemer process. Strength of steel. Copper. Zinc. Lead. Tin. Alloys. Soldering metals.

6. *Paints and Varnishes.*—Ingredients of paint. Litharge. Turpentine. Linseed oil. Mixing paint. Painting old and new work. Wood oil. Coal tar. Distemper. Varnish Papering. Putty. Glazing.

7. *Masonry.*—Coursed and uncoursed rubble. Block in course. Ashlar. String courses. Copings. Bricklaying. English and Flemish Bond at angles of walls, in footings with offsets, between main and cross walls, at door and window openings and in circular pillars. Foundations and footings. Plinth. Damp proof course. Thickness of main and cross walls. Wall plates. Wood bricks and plugs. Openings for timber beams, for doors and windows. Corbelling. Flat, segmental, pointed and relieving brick arches. Inverts. Centres for small arches. Bond in brick and stone arches. Small oblique arches. Enclosure walls. Buttresses and counterforts. Retaining and breast walls. Scaffolding.

8. *Foundations.*—Excavation. Masonry and concrete foundations. Unequal settlement. Pressure on soil under foundations. Foundations on rock, good and bad soils. Piles. Coffer dams and caissons. Well foundations. Brick and iron wells. Mode of sinking wells. Patent excavators for well sinking. Setting out buildings from working plans.

* Great stress will be laid on the importance of making large size detail sketches completely dimensioned. V... inspection will be made to buildings and bridges in progress, and note-books of sketches will be submitted. Build... and bridges will be set out on the ground. Arches will be set out on a floor and skewbacks and courses marked.
In connection with this subject, Building drawings will be executed as part of the Drawing course.

† During this course, visits of inspection will be made to the following and other works:—
(*a*) Pallâvaram stone quarries.
(*b*) Perambûr brickfields.
(*c*) Government brickfield, Poonamallee Road.
(*d*) Lime-kilns, Cochrane's basin.
(*e*) Madras cement works.
(*f*) Gun Carriage Factory or other foundry.
Written reports are not required, but students will submit note books of dimensioned sketches illustrative... processes witnessed.

9. *Carpentry.*—Mortice and tenon joint. Fishing and scarfing. Iron straps and bolts. Roof and bridge frames, nature of stress in the different members. Detail of joints. Frames of timber and iron combined. Trussed beams. Timber floors. Stairs, designing and setting out. Doors and windows. Centerings for arches. Striking centres.

10. *Roofs and Floors.*—Terrace roofs and floors on joists, beams joists, or iron girders and joists. Bengal terrace roofs. Fire-proof floors. Brick arched roofs. Pitched roofs. Couples. Trusses. Rafters, purlins and reepers. Roof coverings of thatch, tiles, slates and shingles. Ceilings. Floors of stone, brick, tiles, concrete, timber and asphalte. Simple forms of iron roof. Use of tee, angle and channel iron in compression, and of rods and flat bars in tension. Joints and connections. Shoes, rivets, bolts. Iron and timber purlins. Brackets. Patent tiles, corrugated iron, lead and zinc roofing. Modes of attachment. Ventilators.

11. *Bridges.*—Names of parts. Thickness of arch-ring, wing-walls, centerings. Setting out arches full size.

12. *Roads.*—Road construction and maintenance.

This syllabus connotes Building Drawing, designs and estimates.

SURVEYING.

A. Surveying.—Surveying with chain, compass and plane table. Plotting surveys.

B. Levelling.—Levels: their adjustment and manipulation. Levelling. Contouring. Plotting.

C. Theodolite.—Theodolites their adjustment and manipulation. Traversing. Gale's traverse system. Setting out straight lines and curves in the field.

D. Topographical Drawing.—Conventional signs, map-drawing, representation of ground by contours. Sections on contoured plans. Plan of road or railway on contoured ground showing cuttings and embankments. Estimation of areas.

Students may, however, be sent out into camp for a fortnight or more at a time.

Branch I.		Branch II.			Physical Exercises.	
Mathematics.	700	Engineering.			100	(100)
		Construction	700	(100)		
		Hydr. Engineering ..	700	(100)		
		Applied Mechanics ..	700	(100)		
		Mechanical Engineering ..	400	(100)		
		Drawing	500	(250)		
		Surveying	700	(400)		
	700		3,700	(1,050)	100	(100)

N.B.—The bracketed marks show those allotted by the College while the total is shown unbracketed.

SYLLABUSES.

LOWER SUBORDINATE CLASS.

ENGINEERING DRAWING.

Geometry—

(*a*) *Practical Plane Geometry.*—Elementary problems dealing with Lines, Triangles, Quadrilaterals, Circles: Polygons: Methods of Construction and Problems relating thereto: Tangents: Inscribed and Described figures: Proportional Lines and Angles: Areas of Plane Figures: Plane Curves: Parabola, Ellipse and Hyperbola: Methods of Drawing and Chief Properties: Cycloidal, Spiral and other Common Curves.

(*b*) *Practical Solid Geometry and Projection.*—Lines, Points, and Planes: Projection of Simple Solids. The Regular Solids: Sections of Solids: Development of Plane and Curved ...es: Tangent Planes and Solids: Interpenetration of Solids: Determination of Shadows: ...ric Projection: Elements of Perspective.

(*c*) *Graphics.*—Arithmetic, Determination of C.G. of Plane areas.

...ne Drawing—

...bility to copy accurately to scale and supply additional views: Drawings of simple ...ne parts from sketches: Ability to supply some idea of the proportions of the more simple ...e details such as bolts, nuts, keys, cotters, etc.

... Drawing—

...bility to copy plans accurately to scale: *Masonry Details*:—Bond in Brickwork, Gauged, ... and Inverted Arches, Footings and ordinary Foundations: Uncoursed and Coursed ... Ashlar, etc. Dressings such as:—Window Sills, Window and Door Jumbs, etc. *Timber*

Details :—Joints Halving, Lapping, Notching, etc., also as applied to Wall Plates, Floors, Ceilings, etc. Floors, Doors, Windows: Partitions: Roof Frames. *Iron and Steel Details.* Sections of Cast and Rolled Beams and simple applications :—Iron Roof Frames of small span.

Freehand Model Drawing—

Ornamental outlines. Application of elementary perspective to model drawing of simple objects.

Note :—*Machine Drawing*. *Building Drawing* and *Hydraulic Engineering Drawing*, and *Estimating* a special teaching in these subjects will be given during the courses of lectures in which Mechanical Engineering, Construction and Hydraulic Engineering are respectively taught. Marks will be allotted by the College for the drawing work done by students during these courses. A paper will also be set by the Board of Examiners in each of the above three branches of drawing.

SURVEYING.

Field work same as Upper Subordinate. Theory the same, with due regard to mathematical limitations.

A. Surveying.—Surveying with the chain, compass and plane table. Plotting surveys.

B. Levelling.—Levels; their adjustment and manipulation. Levelling. Contouring. Plotting.

C. Theodolite work.—Theodolites; their adjustment and manipulation. Traversing. Setting out straight lines and curves in the field.

D. Topographical Drawing.—Conventional signs, map-drawing. Representation of ground. Sections on contoured plans. Location of road or railway on contoured plans, showing cuttings and embankments. Estimation of areas.

Note.—Except during the month of April, one day will be set apart for field work. Students may be sent out into camp for a fortnight or more at a time.

Students will be formed into small squads, the size of which will be regulated by the nature of survey under execution. Each student of a squad will be told off to a particular duty, and duties will be frequently interchanged. The instructor will show each squad how to commence work and will then leave it to its own resources, visiting it only occasionally. He will check independently the accuracy of the work performed. Each student must be fully practised in every detail of the work required in the field, such as chaining, holding levelling staves, observing, etc.

Third year students failing to qualify in survey field work will attend the following survey camp and will be re-examined at the termination of the camp. Students failing at this re-examination will receive no certificate.

ENGINEERING.

Materials—

1. *Stone.*—Varieties met with in Southern India. Quarrying. Blasting with powde dynamite. Dressing.

2. *Bricks and Tiles.*—Brick earth. Tempering. Hand and machine moulding. D Burning in clamps and kilns. Pressed bricks. Tiles. Strength and weight of brick. Ch teristics of good tiles and bricks.

3. *Lime, Cement, Mortar, Concrete, Plaster.*—Sources and properties of lime. Burn intermittent and running kilns. Slaking. Mortar mixing. Fat and hydraulic limes. Po cement. Hydraulic mortar. Surki. Concrete. Practical tests for limes and cements. P sources and plastering. Pointing. White and colour washing.

4. *Timber.*—Seasoning, natural and artificial Conversion. Preservation of timb Varieties of timber used in Southern India. Strength and weight of timber. Characteristics o good timber.

5. *Paints and Varnishes.*—Ingredients of paint, litharge, turpentine, linseed oil. Mixin paint. Painting old and new work. Wood oil. Coal tar. Varnish. Putty. Glazing.

CONSTRUCTION.

1. *Masonry.*—Coursed and uncoursed rubble. Block in course. Ashlar. String course Copings. Bricklaying. English and Flemish bond. Bond at angles of walls, in footings wit offsets, between main and cross walls, at door and window openings and in circular pillars. Founda tions and footings. Plinth. Thickness of main cross walls. Wall plates. Wood bricks an plugs. Openings for timber beams, for doors a dows. Corbelling. Flat, segmental, pointe and relieving brick arches. Centres for small Bond in arches. Small oblique arches.

2. *Foundations.*—Excavation. Masonry concrete foundations. Unequal settlement Foundations on rock, good and bad soils. We foundations. Setting out buildings from wo plans.

3. *Carpentry.*—Mortise and tenon joint fishing and scarfing. Iron straps and Simple roof and bridge frames. Detail of join Frames of timber and iron combined. and windows.

4. *Roofs and floors.*—Terrace roofs and flo n joists, beams and joists, or iron girde joists. Bengal terrace roof. Pitched roofs; uples. Trusses. Rafters, purlins and p Roof covering. Ceilings. Floors of stone, b , tiles, concrete, timber and asphalte. forms of iron roofs. Joints and connections. n and timber purlins. Ventilators.

5. *Bridges.*—Names of parts. Thickness arch-ring, wing-walls, centerings. Se arches full size.

6. *Roads.*—Road construction and mainte nce.

7. *Tanks and Channels.*—Supply from wells, tanks and rivers. Discharge from catchment areas. Construction of tank bunds, escapes and irrigation sluices. Use of simple formulæ for the discharge of escapes and sluices. Discharge of channels. Permissible limits of fall and velocity in minor channels. Laying out and construction of channels. Regulation of supply from head sluices.

This syllabus connotes all Drawings, designs and estimates.

APPLIED MECHANICS.

1. *Stress and Strain.*—Hooke's law. Modulus of elasticity. Elastic limit. Ultimate strength. Factor of safety and working stress.

2. *Elementary Statics.*—Parallelogram, triangle and polygon of forces. Easy graphical applications to ordinary frames. Wind pressure on roofs.

3. *Elementary Study of Beams.*—Bending moment and shearing force. Sections in iron, steel and wood.

4. *Simple Shear.*—Examples of applications in ordinary structures.

5. Easy applications of theory and the use of empirical formulæ in the design of small bridges, arches and retaining walls.

6. *Principle of work.*—Graphic representation. Simple applications to machines. Potential and kinetic energy.

Marks—

First year—		
Surveying	800	(400)
Geometrical Drawing	600	(300)
Engineering	1,000	(500)
Workshop	200	(200)
Second year—		
Surveying	800	(400)
Geometrical Drawing	400	(200)
Engineering	1,200	(600)
Workshop	200	(200)
Third year—		
Surveying	800	(400)
Geometrical Drawing	100	(50)
Engineering	1,500	(750)
Workshop	200	(200)
	7,800	(4,200)
Physical Exercises	100	(100)
	7,900	(4,300)

Note.—The unbracketed figures show the total marks whilst the bracketed figures show the marks to be allotted by the College staff.

V

Memorandum No. 310, Educational, dated 2nd June 1905.

The report is referred to Mr. Chatterton for remarks.

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

A. Chatterton, Esq., through the Director of Public Instruction.

VI

Telegram—from the Secretary to Government, Educational Department.
To—A. Chatterton, Esq., School of Arts, Madras.
Dated—the 27th June 1905.
No.—29.

Please return at an early date file regarding reorganization Engineering College.

655 Edl.—6

VII

Telegram—from A. Chatterton, Esq., School of Arts, Madras.
To—the Secretary to Government, Educational Department.
Dated—the 27th June 1905.

File returned to Director of Public Instruction with remarks on the 16th.

VIII

Telegram—from the Secretary to Government, Educational Department.
To—the Director of Public Instruction, Madras.
Dated—the 28th June 1905.
No.—30.

Please expedite submission of [the] file regarding reorganisation [of the] Engineering College.

IX

Letter—from A. Chatterton, Esq., Professor of Engineering on special duty, School of Arts, Madras.
To—the Director of Public Instruction.
Dated—the 16th June 1905.
No.—524.

In reply to Ref. on Cur. No. 7291 of 1904, I have the honour to submit the following remarks upon the report of the committee on the reorganisation of the College of Engineering, Madras. It will be convenient to deal with the report of the committee under the same heads and in the same order as therein set forth.

2. *Revision of the Syllabus.*—I fully concur with the recommendations of the committee that the educational qualifications of candidates for admission to the Engineering College should be raised and I consider that the standards they have set are no more than necessary.

3. The proposed rearrangement of the college year will, I think, be a great improvement upon that which has hitherto existed. The shortening of the Christmas holidays and the lengthening of the Summer vacation will prove of advantage to both students and staff. The transfer of the end of the college year from December to April is logical and convenient. The objection may possibly be raised that it is better to hold the examinations in the cold weather, but to this I am inclined to attach no weight whatever. Under existing arrangements students of the Engineer classes generally spend the month of January cramming for the F.E. or the B.E. examination of the University which examinations are usually held during the last week of the month. If students are still to go up for the University examinations, and if the proposal to hold the survey camp immediately after the termination of the Christmas holidays is approved of, it will, I think, be necessary to get the Syndicate of the University to alter the date of the examinations and it will probably be convenient to hold them at the beginning of July before the college reopens. Those going up for the F.E. will be able to do so without any interruption to their college work and those going up for the B.E., which they usually take up at the end of their college course, will have two clear months to rest or to cram as they choose between the college and the University examinations. It may be here pertinent to raise the question as to whether the University examinations are of any practical value. The college examinations are held by an independent Board and differ but little in general character from those of the University. Except in the case of the Engineer student who obtains the guaranteed appointment of apprentice Engineer in the Public Works Department the taking of University degree in Engineering is purely optional matter and I think it also should be so in his case. At the present time the majority of passed students from the Engineer class obtain the B.E. degree of the University mainly because the courses of study prescribed by the University have naturally had to follow more or less closely those laid down by the Engineering College.

The institution of separate courses of study for Mechanical Engineer students will mark a real advance in the development of the college and I am in general agreement with the recommendations of the committee on this point. The appointment of an apprentice Engineer is a great prize for students in the Engineering College and, unless it is made perfectly clear that it will be awarded to the best student in the college quite irrespective of whether he is a Mechanical or Civil Engineer, it is probable that all the best students will select that branch of engineering in which they have the best chance of getting this appointment. The committee remark: "The work of the department offers but few openings for the Mechanical Engineering pure and simple." This is quite true, but men who have been trained as Mechanical Engineers are likely in the long run to prove just as good men in the department as those who have received a Civil Engineering training. In any case the Civil Engineering side of the college is always likely to be more popular than the Mechanical Engineering and I would suggest the desirability of considering whether it would not be possible to offer one of the Government of India technical scholarships to the senior Mechanical Engineer student if he does not obtain the apprentice Engineer appointment and if in the opinion of the College authorities he is likely to be able to make good use of such a scholarship. The scholarship would be awarded, not to enable him to continue his studies in Mechanical Engineering but to enable him to acquire a practical knowledge of some industry in which his previous engineering training would be of value.

4. The duplication of examinations is undoubtedly a great evil and either the College or the University examinations ought to be abolished. I believe it would be quite practicable to arrange that the University should conduct the examinations and that the necessary control would be secured by appointing a strong Faculty of Engineering. If this be objected to, then as an alternative a joint Board consisting of six or eight examiners might be annually appointed, half of the members to be nominated by the Syndicate of the University and half of them by Government. This Board would conduct all the examinations of the college and the B.E. degree might be awarded to those who pass out at the end of the third year. Practically the F.E. examinations would disappear and there would be two annual examinations previous to the degree examination. The college diploma would be merged in the University degree.

5. To carry this scheme through, it will be necessary for the University to accept definitely the courses of study prescribed for the Engineering classes of the College of Engineering. I should imagine that the Senate of the University would welcome some such change as now proposed, since it would give the University through its Faculty of Engineering much more complete control over the engineering education than it now enjoys.

6. The recommendation of the committee, that the distinction between the school and the college should disappear, automatically comes into effect if the proposal that the Matriculation examination be adopted as the lowest qualifying examination for entrance to any class, as educational institutions dealing with Matriculates are recognised by the Educational Department as colleges.

I have gone carefully through the new syllabuses and I consider them a great improvement on those at present in force. The proposal to abolish instruction in vernacular languages is perfectly sound, but I am distinctly opposed to the idea of the committee that in each week there should be 25-hour lectures, exclusive of outdoor, workshop, and other morning attendances. Instruction should be mainly imparted in the workshop, drawing office and laboratory and I consider it perfectly practicable to so arrange the courses that each student is not required to attend more than twelve lectures per week, the rest of the time being spent at practical work. A student may well work under the supervision of the College authorities for 35 hours per week arranged as follows:—

	Hours.
Lectures	12
Drawing office	8
Workshop	6
Laboratories	9

7. From the Mechanical Engineering course Surveying has been entirely omitted, but I think that some provision should be made for giving Mechanical Engineers some knowledge of surveying instruments. A Mechanical Engineer has often to measure up ground, to set out buildings, and to take levels and I would strongly suggest that the Mechanical Engineering students be given a short course of instruction in Surveying. This might well be done in the Science course and need not be extended beyond one morning a week for a period of about three months.

8. The Civil Engineering students are now to be taught Geology and Mineralogy and are left to pick up their knowledge of mechanism and steam engines during the workshop course. I do not altogether approve of the change. The teaching of Geology is likely to become a farce unless a specially qualified geologist is appointed to deal with the subject, and the time spent in the workshops can be more usefully employed than in trying to obtain an elementary knowledge of mechanism and the construction of engines. The position of the Committee is somewhat inconsistent in this matter as they have provided that the Upper Subordinate class should receive instruction in these subjects under the heading "Mechanical Engineering."

9. In connection with the remarks of the Committee upon the Military Subordinates I think that similar proposals were sent up to the Government of India about ten years ago and were negatived on the ground that they were not prepared to take any steps to diminish the prospects of the British soldier in India. In lieu of the Committee's proposals I would suggest that only soldiers who are non-domiciled Europeans should be admitted to the College, that the probationary class should be abolished and that they should be required to possess at the outset general educational qualifications sufficient to enable them to take advantage of the course of instruction for Upper Subordinates. I do not attach any importance to the suggestion of the Committee that the soldier student should be a tradesman as that is a very vague term and may include printers, bricklayers, butchers, cobblers, etc., and even if he be a tradesman he may be and very likely will be a very bad one, as good artisans do not as a rule enlist in the army. The abolition of military students from the College altogether, by increasing the prospects of the Upper Subordinates, would make the Upper Subordinate class much more popular and would attract a higher class of students.

10. The proposal to abolish the present Sub-Overseer and Surveyor class and the Draftsman class and to substitute in their place a Lower Subordinate class commends itself to me as a very practical one and the only criticism I have to offer on the proposed syllabus is that Elementary Applied Mechanics have been introduced somewhat unnecessarily and the proposed course of instruction does not go far enough to be of any practical value. I should therefore recommend that it be omitted.

11. *Board of Examiners.*—In this connection the Committee recommend that the Board should be strengthened by the addition of two members of the College Professorial staff. Apart from my previous remarks on the subject of the College examinations I do not consider it desirable to accept this proposal. I am aware that there have been in the past disputes between the College authorities and the Board of Examiners regarding questions which were said to have necessitated work beyond the range of the College syllabus, but no real hardship or injustice was ever caused thereby and the collective experience of the Board of Examiners should be sufficient to enable them to do their work in a satisfactory way without any assistance from the College Professors. The objection to the Professors of the College occupying any position whatever on the Board of Examiners is due to the fact that they acquire a knowledge of what examination questions will be set a month or two before the end of the term and they are thereby placed in a somewhat difficult position with regard to lectures which they may still have to give. These may or may not deal with subjects upon which questions have been set by the Board of Examiners and it will be difficult for them to go on with their work exactly as though they had no knowledge of the examination papers. Moreover they will constantly be pestered by students endeavouring to get by indirect means some hint as to the nature of the forthcoming examinations.

12. *College Staff and Administration.*—On this subject the Committee state that they hold very strong views but have not considered it necessary to exhibit the

basis upon which their strong convictions are founded. They are of opinion "that the College staff should be recruited from the Public Works Department and that consequent on this, the administration should naturally be in the hands of the Chief of that department, who would, however, be a subordinate as regards the general policy to the Director of Public Instruction but independent in all other matters." The experience of the last 15 years clearly shows that the Public Works Department would be quite incapable of supplying the necessary College staff, as on each occasion when application has been made to them for the service of a Professor of Engineering there has always been a great difficulty in getting any one to take the post, and on the last two occasions the Education Department have been compelled to apply to the Secretary of State for the services of temporary men and on these conditions both Mr. James and Mr. Griffith came out. But even supposing that the Public Works Department did supply the College with its staff, it is hardly a reason for removing the College from the Education Department and placing it in the hands of the Chief Engineer. At present it is true that the Public Works Department gives employment to the majority of students who pass out of the College, but in the future, when Mechanical Engineering and Electrical Engineering are properly provided for, the percentages of those who will not go into the Public Works Department will be much larger. The expedient proposed by the Committee "to check the tendency under a Public Works Department régime to subordinate the College to the mere needs of the department" by the appointment of a Board of Visitors is a cumbrous one, which in practice is not likely to prove very effective.

13. It appears to me that the Committee have not sufficiently considered the qualifications necessary for a successful teacher of Engineering and they have assumed that the grant of staff allowances will be sufficient to enable the College to secure at all times a competent teaching staff whether among the Professors or the Assistants. As a matter of fact, it might be possible to obtain a Professor of Engineering and some of his staff from the Public Works Department, but it is pretty certain that all the others would have to be obtained from England and I see no reason why such officers should be placed on a non-pensionable establishment. The proposed method of recruitment is contrary to the principles upon which practically the whole of the Government services have been appointed and it ignores the fact which is especially true in the case of professional men that, if you want to get good men out in India, you must catch them young or pay them very highly.

The difficulties pointed out by the Committee regarding the recruitment of the staff of the College of Engineering are no doubt very real, but it is questionable whether the measures they propose are calculated to satisfactorily remedy matters.

14. The Committee recommend that besides the Principal there should be three Professors and thirteen Assistants and in addition, to cover the leave vacancies, one Professor and three more Assistants. The line of demarcation between the various professorships in the College of Engineering is not a very rigid one and it may be assumed with more or less certainty that every Professor knows something about the other Professor's work. For instance, every Engineering Professor should be a sufficiently good mathematician to be able to teach any mathematics required in the College and though the work of teaching mathematics should be properly entrusted to a Professor of Mathematics, that man ought to be an Engineer who has a special knowledge of engineering mathematics. There ought also to be a Professor of Electrical Engineering as future developments in that direction are likely to become of great practical importance and he will necessarily be more or less a mathematician also. Similarly the dividing line between the Professors of Civil and Mechanical Engineering is likely to be a faint one and it should be possible for one man to act for the other when occasion demands it without any very serious detriment to the College work and finally the Science Assistant ought at any time to be capable of temporarily acting for either Professor of Electrical Engineering, so that with a staff consisting of a Principal, three "A" class Professors, a Science Assistant, and with the possibility of obtaining men from the Public Works Department to act as Professors of Civil Engineering there should be no great difficulty in arranging for leave vacancies.

As regards the subordinate staff dependence must be placed to a large extent on men trained in the Public Works Department and as far as possible getting

out subordinates from England on covenants should be avoided. The proposal to give men employed in the college staff allowances is the only effective way of securing the services of competent men.

16. *Board of Visitors.*—I am not in favour of the establishment of the proposed Board of Visitors, as I doubt whether it will serve any useful purpose and it would be likely to hamper subsequent developments; but if Government consider otherwise, then I would suggest certain alterations in its composition (1) by adding representatives of at least two of the large firms in Madras who directly or indirectly have a great deal to do with engineering work and give employment to a considerable number of Mechanical Engineers and (2) by reducing the number of the Board from 14 to not more than 10.

17. *The removal of the College.*—I am in complete agreement with the Committee as to the recommendation regarding the removal of the college, but I am doubtful if the approximate estimate of the cost of the removal is sufficient. It will be necessary to spend a good deal of money upon electrical equipment and without doubt the hostel, residences and part of the workshops should be equipped with electric light, so that there may be available plant on a sufficient scale to give students adequate training in running electrical machinery. It is very essential also that the college should be provided with a well devised hydraulic laboratory as such does not exist at present in India and is greatly needed. For the working of this laboratory fairly powerful pumping machinery will have to be provided and it seems to me doubtful if the Committee have made any attempt whatever to formulate even a vague idea as to how the Rs. 2,20,000 they have allotted for workshops and laboratory should be expended.

18. I endorse the proposal that a special officer should be deputed to draw up plans and estimates for the new buildings, but I think he should do so in consultation not only with the Principal of the College but also with each of the professors as in an important scheme of this kind it is desirable that the responsibility for the final arrangements should rest with the expert who has to make use of them.

N.R.O.C. No. 7291 *of* 1904, *dated* 23*rd June* 1905.

Submitted to Government with reference to Memorandum No. 310, Educational, dated 2nd June 1905, herewith returned with enclosures.

A. G. Bourne,
Director of Public Instruction.

Order—No. 655, Educational, dated 3rd October 1905.

The Government have considered the report of the Committee appointed by their order No. 723, Educational, dated 12th December 1904, to advise on the proposed extension and reorganization of the College of Engineering, Madras. They have also considered the opinions of the Principal of the College and the Professor of Engineering on special duty, who were on leave when the Committee was appointed, and of the Director of Public Instruction and the Chief Engineer.

2. *Removal of the College.*—The Government will defer passing orders on this important matter till they have had an opportunity of discussing it further at Madras with the assistance of the members of the Committee and other authorities.

3. *Recruitment of the College classes.*—The Committee recommend that the Engineer class should in future be recruited from those who have taken the Bachelor of Arts degree with mathematics or physical science as their optional subject, the upper subordinate class from those who have passed the First Examination in Arts and other classes from those who have passed the Matriculation examination. These recommendations are accepted in principle.

4. *Fees.*—The Committee recommend that the fees for the several classes be fixed as follows:—

	Rs.	
Engineer class	360	for the full t
Upper subordinate class	180	course if
Lower „ „	100	advan

This recommendation is accepted, but the students will have the option of paying slightly enhanced rates by the year or term as at present.

5. *The College year.*—The Committee are of opinion that the college year should consist of—

(*a*) a first term from about the 15th of July to about the 10th of October, the last fortnight of it being devoted to inspection tours;

(*b*) a second term from about the 10th of October to about the end of April with a break in the middle of about nine days on account of the Christmas holidays and with survey camp for about a month after the termination of those holidays;

(*c*) the long vacation from about the 1st of May till about the 15th of July.

The Government consider that a more suitable arrangement will be to divide the college year as follows:—

(*a*) a first term from the 15th of June to the 31st of October, the last fortnight of it being devoted to inspection tours;

(*b*) a second term from the 1st of November to the 31st of March including the Christmas holidays and the survey camp as proposed; and

(*c*) the long vacation from the 1st of April till the 15th of June.

6. *Rules incidental to college reorganization.*—The Government accept the first three of these rules, but as regards the fourth which fixes the duration of the practical course in the case of Civil Engineer students at one year and in the case of Mechanical Engineer students at two years, they consider that its practical effect would be, if the additional year were made compulsory, to deplete the class of Mechanical Engineer students. The additional year for these students should therefore be entirely voluntary. Inducements to go through it may be held out, but Government cannot undertake to bear the whole of the extra cost involved as suggested by the Committee. With regard to the fifth rule which relates to the selection of the apprentice Engineer, the examiners should send up the name of one Civil Engineer and one Mechanical Engineer student for the Chief Engineer to select from.

The Committee also recommend the abolition of the distinction between the school and college departments. This recommendation is accepted. The whole institution will in future be a "College" for statistical and other purposes.

7. *Revision of Syllabuses.*—The syllabuses drafted by the Committee will be remitted to it for further consideration. The Government approve of the excision of the language course and of other recommendations of the Committee. But the Committee should consider—

(1) whether more time should not be spent in the workshop: at Roorkee working hours are divided equally between lectures and practical work;

(2) whether architecture should not be included in the Civil Engineering course;

(3) whether Civil Engineering students should not be taught as much mechanical engineering as upper subordinate students;

(4) whether a short survey course should not be prescribed for mechanical engineering students;

(5) whether the electrical engineering course for mechanical engineering students should not be more thorough.

Some modification seems also to be called for in the distribution of marks between the Civil and Mechanical Engineering classes.

8. *Reorganization of classes.*—The Committee's recommendations that the course for the Engineer subordinate class be extended from $2\frac{1}{2}$ years to 3 and its designation altered to "Upper subordinate class" are accepted.

The recommendation that the present sub-overseer and surveyor and draftsman classes be thrown together into a new class to be called the "Lower subordinate class" is accepted.

9. *Military Subordinates.*—The Government consider that the Committee's recommendations go too far and that to accept them would be tantamount to abolishing recruitment from the army, a result by no means to be desired. Some change in the

present regulations for the admission of soldiers to the college is, however, in the opinion of the Government, advisable and they propose to adopt in their entirety the rules of the Roorkee College relating to the matter. A copy of the new regulations should be furnished to the Commanding officer of every British regiment or battery as soon as it arrives in the Presidency with the request that it may be posted up in a conspicuous place with a synopsis of the career open to soldiers in the Public Works Department.

10. *Board of Examiners.*—The Committee recommend that the Board of Examiners as at present composed should be strengthened by the addition of two members of the College Professorial staff.

This recommendation is accepted provisionally until the University have decided when the examinations are to be held and whether they will combine them with the College examinations.

11. *Staff.*—The Committee are of opinion that the College staff should be recruited from the Public Works Department and that the administration of the College should be in the hands of the Chief Engineer. The Chief Engineer is entirely opposed to these proposals and considers that the College should remain under the Educational Department and the superior staff be recruited from home and from the Educational Department, the Public Works Department being indented upon to supply temporary vacancies only. He also considers it desirable that the senior assistants should be recruited from home, but if there are difficulties in the way of doing this the Public Works Department should provide the men. In that case they should, in his opinion, be given presidency pay and allowances *plus* a staff allowance of Rs. 50 for upper subordinates and Rs. 30 for lower subordinates. He would also fix the Principal's pay at Rs. 1,000—50—1,500 if the Principal is a civilian, and military pay proper *plus* a staff allowance to be decided in each case if he is a Royal Engineer officer. For the Professors Rs. 500—50—1,000 with a personal allowance after ten years is considered suitable. The Government concur generally with the Chief Engineer. The Public Works Department have no men available to fill the posts of Professors and are not likely to have them in the future, while the present method of recruiting the staff is not known to be productive of harm in any way save that the staff being a small one cannot be provided with a reserve for leave vacancies. Before however a final decision is arrived at, the Committee will be requested to reconsider this question in the light of these remarks and favour Government with their further remarks thereon.

12. *Board of Visitors.*—The Committee's proposal to appoint a Board of Visitors will be unnecessary if the College remains under the Director of Public Instruction.

13. On receipt of the Committee's further remarks now called for, the Director of Public Instruction will be requested to submit proposals for the introduction of the scheme of reorganization and for the revision of the rules of the College.

14. The thanks of Government are due to the Members of the Committee for the labour they have already undertaken in connection with this question of reorganization and for the clear and concise report submitted by them. They are requested to submit their remarks on the points referred to them for further consideration as early as may be practicable.

(True Extract.)

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

To the Director of Public Instruction.
,, the Public Works Department.
,, J. P. Davidson, Esq.
,, F. J. E. Spring, Esq., C.I.E.
,, R. Ll. Jones, Esq.
,, M.R.Ry. A. V. Ramalinga Aiyar Avargal.
,, H. T. Keeling, Esq.
,, Capt. W. Carew Smyth, R.E.
,, W. H. James, Esq.

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Educational Department.

NOTES CONNECTED WITH G.O., No. 655, EDUCATIONAL, DATED 3rd OCTOBER 1905.

[Subject.—*Report of the Committee appointed to consider the Reorganization of the College of Engineering.*]

From the President, Engineering College Reorganisation Committee, dated 31st March 1905, No. 340.

From the same officer, dated 10th April 1905, No. 360.

The report is clear and concise; but the Committee has travelled somewhat outside the subjects referred to them when they suggest in connection with the College staff that they should be largely recruited from the ranks of the Public Works Department and that the College should be under the direct administration of the Chief Engineer, Public Works Department.

2. Apart from this, and purely academical questions, the chief proposals of the committee are—

(*a*) A separate standard of qualification for recruitment to the different classes.

(*b*) A special standard of qualification for soldier students.

(*c*) Strengthening of the Board of Examiners and the inclusion therein of two members of the College Professorial staff.

This latter, it is submitted, is an undesirable innovation. The Examiners should be quite independent of the staff.

(*d*) The appointment of a Board of Visitors.

(*e*) The removal of the College to Saidapet or to the neighbourhood of St. Thomas' Mount or Guindy, and its establishment on a purely residential basis at a cost of Rs. 8 lakhs.

For this purpose it is proposed to depute a special officer for eight months to draw up plans and estimates.

(*f*) The placing of the staff under Public Works Department, and the special recruitment of professors and instructors from home for terms of five years.

3. The above note does not deal with purely academical and educational matters which are referred to the Director of Public Instruction for favor of early remarks.

H. D. Taylor—1-5-05.

To the Director of Public Instruction.

I proceed to note upon various matters in the order in which they are dealt with in the report.

Recruitment of the College classes.—The Committee has taken for granted that the present arrangement of the University examinations will remain in the future. Until any change is made the recommendations appear suitable, but if a science degree is established one course for that degree might include Mathematics (Pure and applied), Chemistry, Physics, Geology and Mineralogy. Such a course might be insisted upon from candidates for the Engineer class and the teaching of these

subjects omitted from the Engineering curriculum. There is and would be considerable waste of funds in teaching these subjects in special courses during the Engineering course and they would, in all probability, not be so well taught. If any further reference to the Committee is made this matter might be mooted for their consideration: it would be well to hear any arguments they put forward against the course being adopted. The qualifications proposed for entry to the upper subordinate class and other classes may need slight revision in consequence of University changes.

2. *The College year.*—I see no objection to the proposals, but a calculation might be made to show whether they appreciably increase the number of working days as they are stated to do.

Nothing is said about the dates of the University examinations for which the students of the Engineer class would present themselves. They might be held however in May even if no other change were made.

I think however, that, some arrangement should be made to combine the examinations upon which the University relies for the grant of a degree with the College examinations. This is the only college presenting candidates and the present system of holding two similar examinations is hardly justifiable.

I am very strongly in favour of internal and external Examiners in all such examinations and think that the ideal system would be to have some or all of the College staff combined in a Board with the Examiners appointed by the University. I am proposing an extension of this system to all University degree examinations. I think it only right that the College should share the responsibility of stamping a man as fit or unfit. With a board of outside Examiners only, the College staff take no responsibility and if a man turns out unsuccessful in after life can always say that they did not approve of his work in College but that the Examiners let him through. Again more attention should be paid to the work in the College throughout the course and less to the result of any final examination.

I should much prefer to keep the Board of Examiners distinct from the College staff. Anyhow members of the College staff should not *set* the papers or be *actual* examiners. They would unconsciously make the papers follow too closely the line of their own lectures.

I understand there were cases last year in which some students passed the University examination but could not enter the public service for failure by one or two marks to pass the College examinations, but I have no details.

H. D. Taylor.

The above remarks are introduced here as the whole question of the University examinations is more or less bound up with the College year.

If a change in the year is to be made I see no objection to beginning the year's course over again next July with the students now in the College and this would be the more appropriate as the College has been understaffed during the term. The Principal could no doubt make suitable arrangements for the various classes.

3. *Rules incidental to College reorganisation*—

Rule 1 as to promotion, etc., may be approved.

Rule 2.—My suggestion as to a combined College and University examination might require some modification of the proposal.

Rule 3.—If the non-professional science subjects are studied before entry into the College this would require modification.

Rule 4.—May be approved if it is feasible.

Rule 5.—May be approved.

There has been some idea, I think, that the mechanical course was the easier; at any rate more and more students have appeared for the degree in that branch and if there is no demand for them the course may well be left a little more expensive.

4. *School and College.*—The distinction is, I suppose, kept up for budget and report purposes. I see no objection to its removal, and the reorganisation may involve the question as to whether the College should remain in my budget.

5. *Syllabuses.*—I cannot pretend to comment upon the professional subjects. I have referred to the non-professional science subjects above.

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The Committee do not set a good example when they print H, O, and other symbols which have definite meaning whereas they simply refer to Hydrogen, Oxygen, etc., or when they use such awful abbreviations as "Pot. energy" but this is a detail for which they are probably not responsible.

6. I have touched upon all the purely academical and educational matters referred to me, but I should like to add that when I first mooted the removal of the College to Saidapet I contemplated the use in part at any rate of the Agricultural college buildings. If the latter is abolished or moved elsewhere some of the lecture rooms wanted will be available, also there is the Principal's residence and some other residential quarters. The hostel accommodation may be something very much more simple than that provided at Chepauk. Finally I very much doubt whether the elaborate arrangements to be found in the best laboratories in Europe which are intended for research work are necessary for a College whose main function must be for years to come the outturn of efficient Public Works Subordinates.

7. Colonel Love who has been Principal for so many years has had no opportunity of expressing his opinion upon the proposals as he was on furlough at the time.

A. G. Bourne—2-5-05.

Should this report be referred to Colonel Love for remarks before it is further considered?

H. D. Taylor—3-5-05.

Most certainly. The man who ought to know the best and the worst of the Engineering College should have his say in full.

J. T[homson]—4-5-05.

Referred to Colonel Love, R.E., Principal, Engineering College, for remarks.

H. D. Taylor—5-5-05.

Returned to the Educational Secretary with the following remarks on the Committee's report. The paragraphs of the report are dealt with *seriatim*.

1. *Recruitment of College classes.*—The raising of the standards of general education proposed by the Committee has long been contemplated; but the change has not actually been recommended as doubt was felt whether it would not prejudicially affect the numbers of students. I think, however, the time has arrived when the experiment may be tried.

2. *Fees.*—The fees proposed are suitable; but students should have the option of paying slightly enhanced rates by the year or term.

3. *College year.*—The proposals of the Committee are deemed advantageous on the whole. As the long vacation will be increased by about two weeks, and the Christmas vacation reduced by three weeks, there will be a small net increase in the number of working days. The survey camp will be held at a better time of year than at present. The alteration in the College year does not necessarily involve any change in the dates of the University examinations. The two terms proposed by the Committee are very unequal in length. They should be equalised if term fees are to be retained.

The change in the College year could be introduced from July 1906, the next entrance examination for (*a*) the Engineer classes, (*b*) the junior class or classes being held in April 1906 instead of in November 1905. The entrance examination for the Engineer subordinate class is, under existing rules, held in April. While the present and new rules operate concurrently, the Board of Examiners must hold examinations twice a year, *viz.*, in December under the existing rules, and in April under the revised ones.

4. *Rules incidental to College reorganization.*—The first and third rules are accepted. The second is a matter for the University. Rule 4 is open to objection. A practical course of two years is probably desirable for Mechanical Engineers; but if the prescribed course for these students exceeds in duration that for Civil Engineers, the class of Mechanical Engineers will be depleted. The additional year might be voluntary, and inducements to go through it be held out. As regards rule 5, there will, with different courses in the College for Civil and Mechanical Engineers, be difficulty

in awarding the single guaranteed appointment. The mode suggested by the Committee may be accepted *faute de mieux*, but unless the Board Acts as a united body rather than an assemblage of independent individuals, the onus of selection will virtually fall on the College staff. The Committee's remarks that the selected student's practical course will rest with the Chief Engineer is not understood. The practical course will be settled after the student's first year in College. The selection will not be made till the end of the third year.

5. *School and College.*—The change proposed is highly desirable. The present system is inconvenient and misleading, and representations regarding it have repeatedly been made.

6. *Syllabuses.*—The abolition of the language course will afford relief. The course was instituted chiefly with the idea that it would contribute to overcome the objection of natives to serve in districts where their mother tongue is not spoken. With the development of communications this objection has come to possess less force.

(*a*) *Engineer Class.*—The remarks of the Committee are generally agreed to.

(*b*) *Upper Subordinate Class.* The remarks of the Committee are generally agreed to.

(*c*) *Military Subordinates.*—I doubt whether the country-born have swamped the British-born to the extent the Committee supposes. The qualification suggested in regard to certificate of education is accepted, but I do not think it would be expedient to insist on the other conditions. Preference, however, might be given to non-commissioned officers and men who have a trade and who are British-born. A probationary year of study will be necessary. The soldier students leaving the College should be available for employment in the Military Works Service as well as in the Public Works Department.

(*d*) *Lower Subordinates.*—The Committee's remarks are agreed to. It is assumed that classes of double strength will be admitted, so that all posts hitherto occupied by Sub-overseers, Surveyors and draftsmen may still be filled from the new class. As 30 to 35 students are the maximum number that can be dealt with at a time by a teacher, the class must be sub-divided. The new class can be formed in July 1906, no students for the existing junior classes being accepted for January 1906.

7. *Board of Examiners.*—The recommendations of the Committee are assented to. It will be of advantage for two members of the College staff to sit on the Board as advisory (not examining) members. I am strongly of opinion, with reference to the remarks of the Director of Public Instruction put up with the file, that the College should continue to grant its own diplomas and certificates on the results of the final examinations conducted by the Board, supplemented by the marks awarded by the College staff for practical work. The University examinations, which at present are open to the Engineer class only, confer honourable distinction, but they cannot replace the College tests for certificates of qualification for employment. It may be remarked that the Board of Examiners costs Government nothing. All the charges are met from the examination fees paid by entering and leaving students of the College. The Board is on the whole a satisfactory machine, as past experience shows; but its efficiency would be increased if such instructions were issued as would cause it to act as a united body.

8. *College Staff and Administration.*—The staff, while the most important, is, under present arrangements, the weakest feature of the College. I agree with the Committee that the method of recruitment is not well suited to the needs of the Institution. The members of the staff are virtually divided into four classes, each of which is complete in itself, promotion from class to class being impracticable—

(i) Principal and Professors.

(ii) Senior Assistants (now called Chief Instructors).

(iii) Junior Assistants (now called Assistant Instructors).

(iv) Workshop staff.

All, or practically all the members of these four classes must possess Engineering qualifications. The College is the only engineering institution under the Educational department; hence no departmental promotion outside the College

possible, and there exists extraordinary difficulty in filling temporary or permanent vacancies, especially in classes (i) and (ii). When a vacancy occurs in either of these classes there are only two courses open, viz., to indent on the Secretary of State or to apply to the Public Works Department for the loan of an Engineer or European Upper Subordinate. Hitherto a temporary vacancy in the Principalship has always been filled from the Public Works Department, but this source has lately been unequal to the supply of a Professor of Engineering. Both the present Professors of Engineering have been sent out by the Secretary of State. In class (ii) there are three senior Assistants; one has been supplied from England; the other two have been transferred from the Public Works Department to the Provincial Educational Service. Vacancies in this class, whether permanent or temporary, are filled with great difficulty and after long delay which is most prejudicial to the efficient working of the College. Even when vacancies in classes (i) and (ii) are filled from the Public Works Department, there is a constantly recurring difficulty about pay, as the rules do not permit of officers attached to the Educational Department drawing the salaries which they would draw in the Public Works Department if they were stationed at the Presidency.

Class (iii) should be filled by native graduates in Engineering who have gained experience on public works; but owing to the appointments in this class being insufficiently paid, we are obliged to accept men who possess as a rule no higher qualification than that of Surveyor or Draftsman—qualifications which imply the Lower Secondary as the standard of general education. The first requirement is to substantially raise the salaries of the class; but even if this were done, the prospects of promotion would be too small to attract the best men from the Public Works Department.

In class (iv) there is no serious difficulty, as practical experience in the Public Works Department is not a necessity. When larger workshops are provided, however, the salary of the Workshop Instructor must be raised, and the workshop staff increased.

I am not [illegible] denied that the proposal of the Committee to transfer the College staff to the Public Works Department would obviate most of the difficulties now felt, and would tend to improvement in the qualifications and efficiency of the staff. A reasonable flow of promotion would be ensured, vacancies could be filled without difficulty or delay, the salary troubles would be removed, and provision made for refreshing the practical experience of the staff. It would, however, introduce the inconvenience of divided authority, and there would probably be a tendency to treat the College solely as a recruiting ground for the Public Works Department.

The only alternative seems to be to recruit class (ii) as well as class (i) entirely from England, and to augment materially the salaries of class (iii). To provide for leave vacancies in class (i) an additional Professor will, as the Committee points out, be needed. Leave vacancies in class (ii) might perhaps be filled temporarily (if the Public Works Department should be unable to assist) from class (iii), provided the latter is recruited from native graduates in Engineering.

Having regard to the development of the College during the last forty years, I agree with the Committee that the Principal should have the standing of a Superintending Engineer. I also agree in thinking that it would be an advantage for the Professor of Mathematics to be an Engineer. I am of opinion that the strength of the staff proposed is suitable, assuming that the Lower Subordinate class, which is to take the place of the present Sub-Overseer and Surveyor and Draftsman classes, will be of double strength. The total number of classes will be 15, viz., Engineer class 5 (one first-year, two second-year, two third-year), Upper Subordinate class 3 (one for each year), Lower Subordinate class 6 (two for each year), Military Probationers' class 1.

9. *Board of Visitors.*—Should the staff be transferred to the Public Works Department as proposed by the Committee, I think it will be desirable to create a Board of Visitors.

10. *Removal of College.*—The Committee considers that neither the accommodation nor equipment of the College is sufficient for existing needs. I am of opinion that the accommodation in regard to lecture-room and drawing-office space is adequate for present requirements, but that it is insufficient in respect of Laboratories and Workshops. I consider that, so long as the College continues to be non-residential, there is

room at Chepâk for the additional buildin equired now, or likely to be required for many years to come. A scheme was s nitted upwards of a year ago for new workshops and laboratories to be built betw the College and canal; and when more class rooms are wanted, there is space fo new block (to be separated from the present building by an open quadrangle) o e east side. Such an addition need not detract from the architectural beauty of th hepak buildings. The present site has the advantages of a healthful and fairly c al situation, proximity to Engineering works of great variety, open ground close and for surveying, good water-supply, and the neighbourhood of a canal.

If, on the other hand, the College is to come a residential one, the first point to consider, in view of the advantages of th resent site, is whether students' quarters could be built near the existing structure. ossibly a site for a hostel could be found south of the Presidency College. The a occupied by the *Langarkhana* would furnish a desirable extension of the recre n ground; and the Military Students' quarters near the Victoria Hospital migl be given an upper storey to provide accommodation for those members of the su dinate staff who ought to reside on the spot.

Should this suggestion prove impracti e then the location of the College must be changed. The Committee proposes the s of the Agricultural College at Saidapet, supposing that to be available; and it rou estimates the cost of new buildings at 12 lakhs. I have examined the Saidapet erty, and do not find it an ideal site. It is inconveniently far from the industrial tre of Madras. The inspections which are made of such works as the Government kfields, the Limekilns, Cement Works, Buckingham Mills, Harbour Works, Gun iage Factory, Massey & Co.'s Works, etc., would each occupy a full day instea f half a day as at present, and time would be lost in travelling. The area occu l by the Agricultural College proper is altogether too restricted for the purpose l. If, however, the whole of the farm land south of the Mylapore tank was nel were made available, there would certainly be sufficient space for new Co buildings, tories, residences, hostel, recreation ground, gym etc., the Commissariat slaughter-yard can hard an advantage. existing Agricultural College buildings wou use. Their site would probably be used for the residences of the P l and Professors. The drawing offices, lecture rooms, workshops and labor s would be built further east, and the hostel (for not less than 250 student at a still greater distance in that direction.

Should the removal of the College of Eng eering from Chepauk be resolved on, search ought in my opinion to be made for some central position in Madras. Failing such a position, it would be worth while to sider whether the institution might not be transferred to some other large town, like angalore, where there is undulating or hilly ground for surveying purposes, and ere undoubted climatic advantages exist.

11. *Deputation of a Special Officer.*—The y College should in my opinion be modelled on modern lines, and be equipped in th most complete manner. I entirely agree with the Committee that, when a site has en selected, a special officer should be deputed to visit engineering laboratories in E ope prior to drawing up a complete scheme with plans and estimates. Money, I ve re to think, should not be stinted. Far less is spent on the Madras College than on se of Roorkee, Sibpur and Poona. All expenditure will be many times repaid by th vings which well trained students will be able to effect when they are entrusted wi the spending of public funds.

12. *Appendices.*—The syllabuses which fo the appendices to the report seem generally suitable; but I am inclined to think at the principles of architecture should find a place in the course for Civil Engin , and that some modification is called for in the distribution of marks for the Ci nd Mechanical Engineer classes. These, however, are matters of detail which may eft for future consideration.

H. D. Love—22-5-05.

Forwarded to the Director of Public Instruct for any further remarks he may wish to offer.

H. D. Taylor—24-5-05.

To the Director of Public ruction.

Some of the questions involved are of extreme importance. Mr. Chatterton's views would I think be valuable, as he has ideas in regard to the enlargement of the scope of the College.

2. If Government concur as to the desirability of obtaining his views I should prefer to defer my remarks until I can see what he has to say.

3. Shall I refer the report to him officially for remarks?

A. G. Bourne—27-5-05.

Mr. Chatterton may be consulted?

H. D. Taylor—29-5-05.

There is a certain amount of inconvenience and impropriety in these references after a duly constituted committee has done its work. At the same time both Colonel Love and Mr. Chatterton happened to be absent when the committee sat and would no doubt have been on it or heard if present, and the present office and past service of Mr. Chatterton would render it inexpedient to refrain from obtaining his opinions.

2. The matter of change of location has been a serious question to me since it was first mooted and does not lessen in gravity after reading Colonel Love's opinions.

3. The report—but not these notes—may go to Mr. Chatterton for his observations.

J. T[homson]—30-5-05.

Please draft official memorandum accordingly.

H. D. Taylor—31-5-05.

A draft is placed below for approval.

2. The reference may, it is presumed, go to Mr. Chatterton through the Director of Public Instruction. In that case alone Mr. Chatterton will submit his reply through the Director of Public Instruction and the Director will be enabled to add his remarks. Moreover Mr. Chatterton is, in his capacity of Inspector of Technical schools, subordinate to the Director of Public Instruction.

T. Kanakasundaram Pillai—31-5-05.

A. Galletti—31-5-05.

Yes.

H. D. Taylor—1-6-05.

[Memorandum No. 310, dated 2nd June 1905.]

Mr. Chatterton may be reminded by telegram to resubmit the file regarding reorganization of the Engineering College with his remarks at an early date.

H. D. Taylor—27-6-05.

A telegram is placed below for approval.

N.L.R.—27-6-05.

T. Kanakasundaram Pillai—27-6-05.

Issue.

A. Galletti—27-6-05.

[Telegram No. 29, dated 27th June 1905.]

Telegram from A. Chatterton, Esq., dated 27th June 1905.

Deferred telegram to the Director of Public Instruction to expedite submission.

H. D. Taylor—28-6-05.

A draft telegram is submitted for approval.

N.L.R.—28-6-05.

Issue.

A. GALLETTI—28-6-05.

[Telegram No. 30, dated 28th June 1905]

From the Director of Public Instruction, dated 23rd June 1905, No. 7291.

Papers please early, with a comparative statement showing cost of staff as proposed by the Committee as compared with present cost.

H. D. TAYLOR—28-6-05.

The present cost of staff of the College of Engineering is shown below :—

		Pay. Rs.	Average. Rs.
Principal		1,000—50—1,250	1,166-10-8
They are eligible for senior and junior allowances, Indian Educational Service. A. GALLETTI.	Professor of Civil Engineering	500—50—1,000	805-8-11
	Professor of Mechanical Engineering	500—50—1,000	805-8-11
Professor of Mathematics		200—700	416-10-8
Instructor in Engineering		200—700	416-10-8
Instructor in Surveying and drawing ..		200—700	416-10-8
Instructor in Mechanical Engineering ..		350	350- 0-0
Assistant Instructor in Surveying and drawing		150—10—200	183- 5-4
Assistant Instructor in drawing		100—10—150	133- 5-4
Assistant Instructor in Surveying ..		100—10—150	133- 5-4
Second Assistant Instructor in drawing ..		75—2½—100	90- 4-5
Second Assistant Instructor in Surveying.		75—2½—100	90- 4-5
Additional Assistant Instructor		75—2½—100	90- 4-5
Assistant in Vernacular		60—2—80	72- 3-7
Do.		60—2—80	72- 3-7
Workshop Instructor		200	200
Foreman Fitter		50—5—75	66-10-8
Foreman Carpenter		45—3—60	55
Gymnastic Instructor		20—2—40	32- 3-7
	Total ..		5,596-15-2

2. In their report, placed below, the Committee deal with the College staff and administration and consider that the following is the minimum staff which will meet requirements :—

One Principal.
One Professor of Mathematics.
One Assistant to Professor of Mathematics.
One Mechanical Engineer.
Five Assistants to Mechanical Engineer.
One Professor of Civil Engineering.
Seven Assistants to do.
One Gymnastic and Drill Sergeant
and to cover leave vacancies, one Professor and three more Assistants.

But as the pay of these officers have not been definitely stated, it is submitted that it is not quite possible to compare the present cost with that involved in the proposed scheme.

T. KANAKASUNDARAM PILLAI—4-7-05.

		Present. Rs.	Proposed. Rs.
Principal		1,000—1,250	1,250–1,600
Professors	Two—Indian Educational Service	500—1,500*	3 or 4 750–1,500
	One—Provincial Educational Service	200— 700	
Technical Assistants (nine)			13 or 16 on higher pay.

* Includes senior and junior allowance, Indian Educational Service.

If the proposal about the Principal means that he is to be put on Rs. 1,250—50—1,600, it involves an increase of about Rs. 300 a month. Present average value of appointment is Rs. 1,166⅔. Average value of Rs. 1,250—50—1,600 = 1,250 + $(\frac{2}{3} - \frac{7}{90})$ 350 = 1,250 + $\frac{53}{90} \times 35$ = roughly Rs. 1,460. Colonel Love however draws Rs 1,602¼ *per mensem.*

If the proposal about the Professors means that there are to be four on Rs. 750—50—1,500 instead of two in the Indian Educational Service and one in the Provincial Educational Service, I should estimate the cost (very roughly) at Rs. 2,450 *per mensem.* The value of an appointment in the Indian Educational Service is more than Rs. 805 (at which office have taken it), because eligibility for senior and junior allowances has to be taken into account. It is impossible to estimate accurately the value of a chance of a discretionary allowance. But, very roughly, the average value of an appointment in the Indian Educational Service may be taken as Rs. 900. The average value of an appointment on Rs 750—50—1,500 is Rs. 750 + $(\frac{2}{3} - \frac{1}{9})$ 750 = $\frac{14}{9} \times 750$ = about Rs. 1,170. The cost of the four proposed appointments would be about Rs. 4,675 against cost of present appointments (2 × 900 + 1 × 416 =) Rs. 2,216. But then it must be remembered that the proposed appointments are to be non-pensionable.

2. The proposals about the Assistants to the Professors are even vaguer, and so I attempt no estimate.

3. Very roughly, indeed, it may be estimated that the proposals would raise the salary bill from (Rs. 5,600 *plus* whatever it may be correct to add for the value of Indian Educational Service special allowances) to not much under Rs. 10,000 *per mensem.*

Which cannot be expected to be granted.
J. T[HOMSON].

A. GALLETTI—5-7-05.

The proposals have not yet been seen by Public Works Department. The file will be sent to Chief Engineer u.o. for favour of early remarks.

H. D. TAYLOR—9-7-05.

To the Public Works Department.

PUBLIC WORKS DEPARTMENT.

I cannot reply in such an important subject until I receive further information as to conditions prevailing in other Indian Colleges of Engineering. I am now making the requisite references and will communicate the results as quickly as possible.

W. B. DEWINTON—21-7-05.

To the Educational Department.

EDUCATIONAL DEPARTMENT.

Can Chief Engineer give a definite date as to when his remarks may be expected. The consideration of this important subject has already been delayed more than is desirable and it is hoped that it may not be hung up much longer.

H. D. TAYLOR—22-7-05.

To the Public Works Department.

PUBLIC WORKS DEPARTMENT.

This is the first I have seen of a matter which affects the Public Works Department very closely. Wholesale and important changes are proposed which require most careful consideration, and some acquaintance, which I do not at present possess, of the methods and conditions prevailing in other Indian Colleges, on which the committee maintain a complete silence. In a matter of this kind I see neither the need for, nor the wisdom of, hurry, and I hope I can be given sufficient time to obtain the necessary information. Probably a month will suffice.

W. B. DEWINTON—24-7-05.

To the Educational Department.

EDUCATIONAL DEPARTMENT.

May this matter be allowed to lie over for one month? It seems to be useless to proceed in the matter or to make a précis of the criticisms already passed on the committee's proposals until the remarks of the Chief Engineer are received.

Please see Mr. deWinton's note on page 5 of notes in G.O., No. 723, dated 12th December 1904.

H. D. TAYLOR—25-7-05.

His Excellency should see as also the Honourable Member. Mr. deWinton's opinions are a necessity of the case.

J. T[HOMSON]—26-7-05.

I would deprecate hurry in this matter. Let us have Mr. deWinton's matured opinion. There is much to comment on in the papers, but this is not the time.

G. S[TOKES]—28-7-05.

I agree to wait for Mr. deWinton's opinion.

A[MPTHILL]—3-8-05.

File returned to the Hon'ble Mr. deWinton.

H. D. TAYLOR—4-8-05.

PUBLIC WORKS DEPARTMENT.

Note by the Chief Engineer, Public Works Department.

My views on this subject are as follow :—

(1) *Recruitment of the college classes.*—The committee propose that the recruitment should be as follows :—

(*a*) Engineer class from B.As.
(*b*) Upper Subordinate class from F.As.
(*c*) Other classes from Matriculates.

The Director of Public Instruction, the Principal, Civil Engineering College, and Mr. Chatterton all agree. *The Engineer class* was 56 strong at the end of 1904, being an average of 14 for each of the four years of the course.

This class provides annually one Assistant Engineer for the Public Works Department. Its remaining members are eligible for appointment to the temporary Upper Subordinate establishment of the Public Works Department, with the prospect of eventual transfer to the permanent establishment. They are also of course eligible for appointments outside the Public Works Department.

It will be seen from passages marked and flagged A and B in the confidential file herewith submitted that I have proposed, with His Excellency's concurrence, another mode of recruitment to the Engineer grades of the Public Works Department.

If this proposal is ever adopted, and I think it will be greatly to the advantage of the Public Works Department if it is, the need for an *Engineer class* at the Civil Engineering College will cease as far as the Public Works Department is concerned.

With regard to the raising of the standard of general education as proposed by the committee, it will be seen from page 229 of the College Calendar for 1905 that of the numbers offering for admission to the college at the entrance examination, only 30 per cent. passed, and only 18 per cent. were admitted. It is therefore quite possible to raise the standard under ordinary circumstances, but I am very doubtful whether it is advisable to do so just at the moment when the Public Works Department requires a largely increased number of recruits to supply the Upper and Lower Subordinate staff required for the major and minor irrigation projects, some of which have been sanctioned, and others will, I hope, be sanctioned shortly.

The present subordinate staff of the Public Works Department is as follows :—

Upper Subordinates—	
Permanent	179
Temporary	130
Lower Subordinates (including the lately reorganised Irrigation Conservancy establishment)	190

and I roughly calculate that our additional requirements in the near future will be as follows :—

Nature of employment.	Upper Subordinates.	Lower Subordinates.
Tungabhadra project	30	30
Cauvery „	16	16
Minor „	10	10
Gódávari River conservancy division	4	4
Seven new sub-divisions	14	14
Four Tank Restoration Scheme divisions	14	4
Irrigation Conservancy establishment		35
Total ...	88	113

In 1904 the following students passed out of the college :—

Engineer students	12
Engineer Subordinate students	33
Sub-Overseers and Surveyors	34
Total ...	79

and they were distributed as follows :—

Class.	Public Works Department.				Elsewhere.	Nowhere.	Total.
	Permanent Upper Subordinates.	Temporary Upper Subordinates.	Lower Subordinates.	Total.			
Engineer	1	2	..	3	7	2	12
Engineer subordinate	2	20	1	23	2	8	33
Sub-Overseers, etc., ...	..	..	7	7	12	15	34
Total ..	3	22	8	33	21	25	79

The Public Works Department has the first call on college students, and we might, if vacancies had existed in 1904, have taken the whole of the 46 students who went elsewhere. But it is not advisable to deprive other bodies of their recruits, and even if we take every man in the future, the above figures of our probable requirements show that we shall still be shorthanded for some years to come. Therefore, I think it will be necessary to increase the numbers admitted to the college at the next

and future entrance examinations, and that the time is not altogether favourable for
A | raising the standard for admission. But the Educational Department are better able to advise on this subject than I am, and I am content to abide by their decision. The only other remark I wish to make about the entrance standard is that it would be a great help to the college if other schools and colleges made training for it a speciality not only for the entrance examination, but for the course of study at the college. Why should not the higher class schools and colleges at the Presidency town and in the mufassal have classes for teaching, drawing, surveying, engineering mathematics, geology, science, etc., for boys who wish to make engineering their profession?

B | (2) *Fees.*—This is a question for the Educational Department.

(3) *The College year.*—The proposals of the Committee are agreed to by both Colonel Love and Mr. Chatterton, but the former remarks: "The two terms proposed by the committee are very unequal in length. They should be equalised if term fees are to be retained." I do not suppose that the question of fees is an important one, but if there are to be terminal examinations, I think the course of study for them should be as nearly as possible of equal length, as in other institutions of the kind. The committee propose—

	Length.	
	Months.	Days.
First term, July 15th to October 1st	2	15
Second term, October 10th to April 30th	6	20

so that, even deducting the Christmas holidays (one week) and one month spent in surveying, the second term is nearly three months longer than the first.

I would suggest the following as a more suitable arrangement:—

	Length.
First term, June 15th to October 15th	4 months.
Inspection tour, October 16th to October 31st.	
Second term, November 1st to March 31st	5 ,,

(In the latter the official Christmas holidays and one month for surveying are included.)

Vacation—April 1st to June 15th.

This would give four months in each term for study in college, and 9½ months' work out of the 12.

(4) *Rules incidental to College Reorganisation.*—Rules (1) and (2) are for Educational. With regard to rules (3), (4) and (5) the Public Works Department has small use for a Mechanical Engineer, trained as such only, and I do not think the Chief Engineer would be justified in recommending to Government for the guaranteed appointment a man so trained, when a student trained as a Civil Engineer was obtainable. Unless, therefore, Mechanical Engineers are required outside the department, I would have no separate course of study for them, but
D | give, as heretofore, the Civil Engineer some mechanical training. If, however, it is decided to retain the Mechanical Engineers' course, its usefulness to the Public Works Department would be increased if instruction in Electrical Engineering was combined with it, and the instructor styled "Professor of Electrical and Mechanical Engineering". I see that a course of elementary Electrical Engineering *is* included in the syllabus for Mechanical Engineers. I would make it a more extended course for them, so as to enable them to take charge of important electrical installations, and I would include the elementary course in the syllabus for Civil Engineers. The practical difficulties of the separation of the courses of the Civil and Mechanical Engineers, after the first year, are well explained by Colonel Love, and I agree with all he says, and am equally in the dark as to what the Committee mean by their remark about the practical course.

C | (5) *School and College.*—This is a matter for Educational. I never understood the distinctions.

(6) *Syllabuses.*—I agree to the abolition of the language course except to military students. I think Mr. Chatterton's proposal to have a 12-hour lecture week as compared with 25-hour recommended by the committee is sound. I also agree with him that Civil Engineering students should be taught at least as much Mechanical Engineering as the Upper Subordinate class. Geology is a very useful subject for Engineers. It might be taught by obtaining an outside lecturer for one hour a week.

My chief concern with the syllabus is that surveying and levelling should be efficiently taught. I also agree with Colonel Love that the principles of architecture should find a place in the syllabus.

Upper Subordinate Class.—The alteration in designation and the increase of the length of the course from 2½ to 3 years are both sound proposals.

Military Subordinates.—I do not agree with the committee on this subject. Their proposals will practically abolish the military element in the Public Works Department altogether, and I value my military leaven too much to consent to
E | this, especially at a time when we shall want every available man we can lay hands on. No doubt we have had, of late years, a proportion of soldiers born and bred in the country, but some of them have turned out very useful men, and we can always reject undesirables if we choose, and if the Principal of the college will help us. I have ascertained from the Assistant Adjutant-General, 9th division, that men of the army are not likely, in his opinion, to pass the F.A. examination, and I certainly would not enforce it in their case. I do not think we can do better than adopt, as they stand, the Roorkee College regulations for admission of military subordinates, of which I attach a copy, and invite special attention to rule 399 (*f*), concerning skilled artizans. I would send a copy of these regulations to the Commanding Officer of every British regiment and battery on arrival in the Presidency and ask that they may be posted up in a conspicuous place in barracks, with a synopsis of the career open to soldiers in the Public Works Department. I would also ask the Commanding officer to give any soldier expressing a wish to qualify himself for the course, special facilities for improving his knowledge, and for learning either Tamil or Telugu, which would take the place of Hindustani in this Presidency. This would give a man two or three years in which to qualify himself for the entrance examination and subsequent college course, and would obviate, in my opinion, the need for a probationary course. I think there is little doubt that the department would be able to take at least five military men annually for the next fifteen years, on the permanent or temporary Upper Subordinate establishment, and be all the better for them.

They should, as Colonel Love says, be eligible for employment in the Military Works Department as well as in the Public Works Department.

Lower Subordinate Class.—The change of designation from "Sub-overseer and Surveyor class" is sound, and corresponds with the term in use in the Public Works Department. I do not, however, understand the committee's recommendation to include draftsmen in this class—the work of the latter being, for the most part, distinct from that of Lower Subordinates, and the Public Works Department being in great need of good draftsmen, specially trained as such, and not as inferior sub-overseers. The committee's chief reason for their proposal is that the draftsman class has always been hard to fill; but the figures given on page 229 of the College Calendar for 1905 do not quite bear this out, for the year 1904 at any rate, the examinees numbering 161, of whom 25 passed and 33 were admitted. It is true that the standard was low, as stated by the committee, but this will be remedied by the raising thereof now proposed, and I do not understand why qualified candidates should not come forward in plenty for posts whose pay ranges from Rs. 30 to Rs. 130. I should like to see the Roorkee system of recruitment for this class adopted at Madras —*vide* page 64 of Roorkee Calendar for 1904.

(7) *Board of Examiners.*—At the Engineering Colleges of Poona, Roorkee and Sibpur, the college staff conducts all examinations except for the University degree, aided in the case of Roorkee by occasional outsiders. I see no reason why the same

system should not be adopted at Madras, but I have no objection to the recommendation of the committee, and agree with Colonel Love's remarks on the subject. I do not share Mr. Chatterton's apprehensions.

(8) *College Staff.*—I am entirely opposed to the committee's proposal to recruit the college staff entirely from the Public Works Department, and to place its administration in the hands of the Chief Engineer, for the following reasons:—

(*a*) The Public Works Department is an executive and not an Educational Department.

(*b*) The Government of India have already negatived the proposal to place the Sanitary Engineer and his Assistant, so long as they are subordinate to the Local and Municipal Department, on the cadre of the Public Works Department. Substituting Educational for Local and Municipal, the present proposal is an analogous case.

(*c*) The Public Works Department will have a hard task during the next twenty years, to find men for its executive work, without having also to find men for educational work.

(*d*) All the other Engineering Colleges in India are under the Educational Department, and recruit their staff partly from England, and partly in this country either from the Public Works Department, or Educational Department, or by advertisement.

My own opinion is that the college should remain under the Educational Department, and the superior staff be recruited from England and from the Educational Department, the Public Works Department being indented upon to supply temporary vacancies only. In which latter case, the pay should be that which the incumbent would draw if serving in the Public Works Department at the Presidency town, *plus* a staff allowance of Rs. 100. I would have a Royal Engineer officer as Principal, whenever procurable.

F With regard to the subordinate staff, I should like to see Colonel Love's class (ii) recruited also from England, but such a course, no doubt, presents difficulties, and as, for many of the appointments, practical engineering knowledge is essential, I suppose the Public Works Department will have to provide men, if unobtainable elsewhere; but as stated above, it will be a very difficult task with so much executive work in hand. The pay for such men should be the pay they would draw if on ordinary duty in the Presidency town *plus* the following staff allowance:—

	Rs
Upper subordinates	50
Lower ,, ...	30

Colonel Love says the staff is the weakest feature of the college. I think this is partly due to the fact that when a recruit is obtained from England, Government utilise him for some other work, *e.g.*, Messrs. Chatterton and Griffith and even Mr. James has work outside the college I believe. Thus the college staff is constantly undermanned, a condition which must reflect on the quality of the outturn.

With regard to the members of the staff, I am not qualified to judge, as I know so little about the arrangement of the classes. I think the Principal might take greater part in the teaching, and be the Senior Professor of Civil Engineering, with an Assistant Professor whose principal duty should be the teaching of surveying and levelling, which, from a departmental point of view, is the most important subject taught at the college.

With regard to pay, I think Rs. 1,000—50—1,500 for the Principal, if a Civilian, and Rs. 500—50—1,000 for the Professors are suitable amounts, with personal allowances if they serve longer than ten years. If the Principal is a Royal Engineer officer, he would get his military pay proper *plus* a staff allowance, to be decided in each case.

On this subject of the college staff, I think Mr. Chatterton's remarks are very much to the point.

(9) *Board of Visitors.*—This body of 14, designed chiefly "to check any tendency under a Department of Public Works régime to subordinate the college to the mere needs of the department," and well described by Mr. Chatterton as "a cumbrous expedient" for that purpose, is doubtless taken from the Sibpur College, where they have a Board of sixteen visitors and a Secretary.

At Poona they have none, and at Roorkee they have a committee of management, numbering six, and composed as follows:—

Chief Engineer, Public Works Department	President.
Manager, Cawnpore Woollen Mills. Director of Public Instruction, United Provinces. Manager, Oudh and Rohilkund Railway. Locomotive Superintendent, Oudh and Rohilkund Railway.	.. Members.
Principal of college	Member and Secretary.

This committee met once in the year 1904. I can find no record of the Sibpur Board having met at all in that year.

I have great doubts whether any such body is required at all, but if Government decide to appoint one, I would prefer to call it, as at Roorkee, a committee of management. It might be constituted as follows:—

Chief Engineer, Public Works Department	President.
Director of Public Instruction. Chief Engineer, Madras Railway. President, Faculty of Engineering, Madras University. A member nominated by the Chamber of Commerce.	.. Members.
Principal of the Civil Engineering College	Secretary.

(10) *The removal of the College.*—I agree that the college should be made residential as soon as possible. All other Engineering Colleges in India are so, or are about to become so, and the advantage is undoubtedly great. This alteration may necessitate the removal of the college to some more roomy site than Chepâk, but the Committee's arguments do not convince me of this necessity. Colonel Love's remarks on this subject are very much to the point, and I think consideration of it should await the return of Government to Madras, when the matter can be thoroughly threshed out on the spot. No special officer is needed if no removal is decreed.

W. B. DEWINTON—26-8-05.

To the Educational Department.

EDUCATIONAL DEPARTMENT.

As regards **A** on page 11 of these notes there is no dearth of passed candidates in these days and the qualifications proposed by the committee and accepted by the Director of Public Instruction, Colonel Love and Mr. Chatterton may be approved. There should however be a provision for exceptions being made whenever necessary in favour of Europeans and Eurasians, Native Christians and Muhammadans and perhaps non-Brahman caste Hindus also.

2. **B** *on page* 11.—The present rates of fees are (page 70 of the Calendar for 1905)—

	Rs.	
(1) Engineer class	360	For the full theoretical course if paid in advance.
(2) Engineer Subordinate class	150	
(3) Sub-overseer and Surveyor class ..	100	
(4) Draftsman class	80	

It is proposed to retain (1) at the present figure, to raise (2) to Rs. 180, retain (3) and raise (4) to Rs. 100. The proposal may perhaps be accepted, the fee for the full B.L. course is Rs. 350 (two years) (page 40 of the Law College Calendar) and that for the full M.B. & C.M. course is Rs. 500 (five years) and for the L.M. & S. course Rs. 400 (four years) if paid in one sum on joining college. (Pages 33 and 37 of the Medical College Calendar.) As a matter of fact, no such lump payment

is made and the fee thus comes to Rs. 610 and Rs. 470, respectively, for the M.B. & C.M. and L.M. & S. courses. Similarly the fee for the Engineer class now comes to Rs. 432 for three years if paid monthly and Rs. 408 if paid by the term and that for the Engineer subordinate class to Rs. 180 and Rs. 170, respectively, for 2½ years. That for the sub-overseer and surveyor class is Rs. 120 and Rs. 112, respectively, for two years and that for the draftsman class Rs. 96 and Rs. 88, respectively, for two years.

3. C *on page* 11.—The present distinction between college and school does not seem to serve any useful purpose. On the other hand, it creates unnecessary trouble in the debit of charges. In future, the distinction may be abolished and the whole of the charges shown under college. The Agricultural College takes in non-matriculates and yet it is treated as a college. In the Medical College the students—male and female—in the apothecary class are mostly non-matriculates.

4. A complete précis of the opinions recorded is attached :—

P. T. THARYAN—30-8-05.

A. GALLETTI—30-8-05.

Precis of the opinions of the Director of Public Instruction and others on the recommendations of the Committee appointed to consider the reorganization of the College of Engineering.

REVISION OF THE SYLLABUS.

I.—RECRUITMENT OF THE COLLEGE CLASSES.

Committee—

Engineer Class.—From B.As. who have taken either Mathematics or Physics as optional subjects.

The Upper Subordinate Class.—From F.As.

All other classes.—From Matriculates.

Director of Public Instruction.—If the University establishes a Science Degree one course for that Degree might include Mathematics (Pure and Applied), Chemistry, Physics, Geology, and Mineralogy, and such a course might be insisted upon from candidates for the Engineer class and the teaching of these subjects omitted from the Engineering curriculum. The qualifications proposed for entry to the Upper Subordinate class and other classes may need revision in consequence of University changes.

Colonel Love and Mr. Chatterton.—Agree with the committee.

The Hon'ble Mr. deWinton.—A certain mode of recruitment to the Engineer grades of the Public Works Department has been proposed. If this is adopted the need for an Engineer class at the College of Engineering will cease as far as the Public Works Department is concerned. Apart from this it will be necessary to increase the numbers admitted to the College at the next and future entrance examinations. The time is not therefore altogether favourable for raising the standard of admission but the Educational Department is better able to advise on the point and its decision will be accepted.

I cannot follow. Whether you make the products of the College Assistant Engineers or Upper Subordinates, what limit should thereby be put on either the literary qualifications or the technical training of the Collegians ?

J. T[HOMSON].

It would be a great help to the College if other schools and colleges made training for it a speciality, not only for the entrance examination but for the course of study.

The committee's proposals which are generally accepted may be approved, provision being made for special exceptions in the case of special classes such as Europeans and Eurasians and Muhammadans.

H. D. TAYLOR—4-9-05.

24

I agree with the Committee.

J. T[HOMSON]—12-9-05.

So do I.

G. S[TOKES]—12-9-05.

A[MPTHILL]—22-9-05.

II.—FEES.

Committee—

	Rs.
Engineer class	360
Upper Subordinate class	150
Lower ,,	100

for the full theoretical course, if paid in advance.

The Director of Public Instruction and Mr. Chatterton.—No remarks on this point.

Colonel Love.—The rates are suitable, but students should have the option of paying slightly enhanced rates by the year or term.

Yes.

J. T[HOMSON].

The Hon'ble Mr. deWinton.—This is a question for the Educational Department.

For present rates of fees, please see page 70 of Calendar for 1905. The present rates are as follows : —

	Rs.
(1) Engineer class	360
(2) ,, Subordinate class	150
(3) Sub-Overseer or Surveyor class	100
(4) Draftsman class	80

If paid by the month or term the present fees are as follows :—.

—	Period.	Monthly.	Term.
	YRS.	RS.	RS.
(1) Engineer class	3	432	408
(2) ,, Subordinate class	2½	180	170
(3) Sub-Overseer and Surveyor class	2	120	112
(4) Draftsman class	2	96	88

The proposals may be accepted.

H. D. TAYLOR—4-9-05.

Yes.

J. T[HOMSON].

G. S[TOKES]—12-9-05.

A[MPTHILL]—22-9-05.

III.—COLLEGE YEAR.

Committee—

First Term.—From about 15th July to about 1st October. Then an interval for inspection tours.

Second Term.—From about 10th October until the beginning of the official Christmas holidays.

Then survey camp for about a month from the termination of the Christmas holidays.

Then until the end of April, the last fortnight of which being devoted to the annual examinations.

Long Vacation.—From about 1st May till about 15th July.

Director of Public Instruction.—No objection. Nothing is said about the dates of University examinations: they may be held in May. Some arrangement should, however, be made to combine the University with the College examinations.

Colonel Love.—The proposals are advantageous on the whole. The University examinations need not necessarily be altered. The two terms should be equalized in length if term fees are to be retained. The College should grant its own diplomas and certificates on the results of the final examinations conducted by the board supplemented by marks awarded by the College staff for practical work. The University examinations confer honourable distinction, but they cannot replace college tests for certificates of qualification for employment.

Mr. Chatterton.—The proposed rearrangement will be a great improvement. It will be necessary for the University to accept the courses of study prescribed for the Engineer class and to alter the date of the University examinations to the beginning of July, but should there be a College and a University examination? One or the other might be abolished. University may conduct the examinations and appoint a strong Faculty of Engineering or a joint Board of six or eight members may be appointed and the degree of Bachelor of Engineering conferred on all those who are declared successful by the Board.

The Hon'ble Mr. deWinton.—The following is suggested as a more suitable arrangement:—

First term.—15th June to 15th October—4 months.
Inspection tour.—16th to 31st October.
Second term—1st November to 31st March—5 months including Christmas holidays, one week, and survey camp one month.
Vacation.—1st April to 14th June.

H. D. Taylor—4-9-05.

The teaching fraternity ought to know its own business best. Mr. deWinton's seems the best division of a school year.

J. T[homson]—12-9-05.

I agree.

G. S[tokes]—12-9-05.
A[mpthill]—22-9-05.

IV.—Rules incidental to College Reorganization.

Committee—

Rule 1.—A student who fails to obtain qualifying marks in the examination held at the end of the year's course shall not be promoted and must either leave the college or join the class below. No student will be permitted to remain more than four years in the college.

Is it meant that he is to remain in his past year's class or go down one class?
J. T[homson].

Director of Public Instruction.—Accepted.

Colonel Love.—Accepted.

Mr. Chatterton.—No remarks.

The Hon'ble Mr. deWinton.—This is a matter for the Educational department.

H. D. Taylor—4-9-05.

Shall not be promoted: certainly. So he adds the 4th year to his college course and if he does that twice he goes out.

J. T[homson]—12-9-05.

The Committee's recommendation may be accepted.

G. S[tokes]—12-9-05.
A[mpthill]—22-9-05.

Committee—

Rule 2.—No student will be allowed to appear for any degree examination until he has completed his practical course satisfactorily.

Director of Public Instruction.—Will require some modification with reference to the suggestion regarding a combined college and University examination.

Colonel Love.—Is a matter for the University.

Mr. Chatterton.—No remarks.

The Hon'ble Mr. deWinton.—This is a matter for the Educational Department.

I agree with Colonel Love. If the University agrees to a combined examination the proposal may be modified accordingly.

H. D. Taylor—4-9-05.

I suppose the student might go up and pass his degree. But, if a practical course is to have value, that practical course should be completed before the degree should be conferred.

J. T[homson]—12-9-05.

I agree with the Committee.

G. S[tokes]—12-9-05.
A[mpthill]—22-9-05.

Committee—

Rule 3.—The theoretical course of the Civil and Mechanical Engineer will be one and the same during the first year, but from the end of this period the further instruction of the two classes of students will be on different lines; in other words, the bifurcation of the civil and mechanical course will take place at the end of the first year.

Director of Public Instruction.—Will require modification if the non-professional science subjects are studied before entry into the college.

Colonel Love.—May be accepted.

Mr. Chatterton.—Agreed.

The Hon'ble Mr. deWinton.—The Public Works Department has small use for a Mechanical Engineer trained as such only. Unless therefore Mechanical Engineers are required outside the Department no separate course of study for them is needed, all that is necessary being to give the Civil Engineers some mechanical training.

H. D. Taylor—4-9-05.

The Committee's proposal seems correct.

J. T[homson]—12-9-05.

I agree.

G. S[tokes]—12-9-05.
A[mpthill]—22-9-05.

Committee—

Rule 4.—The duration of the practical course shall be in the case of Civil Engineer students one year, and in the case of Mechanical Engineer students two full years, one of which must be passed in outside workshops, that is, in shops other than those under the direct control of the Public Works Department.

(Government should bear for a period of five years the whole of the extra cost involved in the extension of the practical course of Mechanical Engineer students to two years.)

Director of Public Instruction.—May be approved, if feasible. More and more students are appearing for the degree in Mechanical Engineering. If there is no demand for them the course may well be left a little more expensive.

If there is no demand for them why do they increase for the course ?

J. T[HOMSON].

Colonel Love.—The effect of the rule will be to deplete the Mechanical Engineer class. The additional year may be voluntary and inducements to go through it held out.

Mr. Chatterton.—The Civil Engineering class will be more popular than the Mechanical Engineering class. If possible therefore the senior Mechanical Engineer student should be offered one of the Technical scholarships if he does not obtain the apprentice Engineer appointment.

The Hon'ble Mr. deWinton.—The practical difficulties of the separation of the courses of the Civil and Mechanical Engineers are explained by Colonel Love Mr. deWinton agrees with all he says.

H. D. TAYLOR—4-9-05.

Colonel Love seems correct.

J. T[HOMSON]—12-9-05.

I agree.

G. S[TOKES]—12-9-05.

I concur.

A[MPTHILL]—22-9-05.

Committee—

Rule 5.—The apprentice Engineership will be awarded by the Chief Engineer, Public Works Department, to the student whether he be a Civil or Mechanical Engineer who may have been selected conjointly by the Board of Examiners and the full Professorial staff of the College.

Director of Public Instruction.—May be approved.

Colonel Love.—With different courses for Civil and Mechanical Engineer students there will be difficulty in awarding the single guaranteed appointment.

Mr. Chatterton.—*Vide* remarks under rule 4.

The Hon'ble Mr. deWinton.—The Chief Engineer will not be justified in recommending to Government for the guaranteed appointment a man trained as a Mechanical Engineer when a student trained as a Civil Engineer was available. See also remarks under rule 4.

H. D. TAYLOR—4-9-05.

There is no reason why the Chief Engineer should have the role of only registering the examiners' selection. The examiners should send up one name in each branch for the Chief Engineer to make his selection.

J. T[HOMSON]—12-9-05.

I agree.

G. S[TOKES]—12-9-05.

A[MPTHILL]—22-9-05.

V.—SCHOOL AND COLLEGE.

Committee—

The distinction between School and College should disappear and the whole institution regarded as a College.

Director of Public Instruction.—No objection to the removal of the distinction.

Colonel Love.—The change proposed is highly desirable.

Mr. Chatterton.—The proposal automatically comes into effect if the Matriculation examination is adopted as the minimum qualification for admission.

The Hon'ble Mr. deWinton.—This is a matter for the Educational Department. The existing distinction has never been understood.

The present distinction between College and School serves no useful purpose and tends to create extra work in the debit of charges. The distinction may be abolished and the whole of the charges shown under "College."

Both the Agricultural and Medical Colleges take in non-matriculates and are treated as colleges generally.

H. D. TAYLOR—4-9-05.

Yes.

J. T[HOMSON].

G. S[TOKES]—12-9-05.

A[MPTHILL]—22-9-05.

VI.—SYLLABUSES.

1. General.

Committee—

The syllabuses as revised for the three classes are given in appendices I, II and III. The only alteration common to all classes is the excision of the language course.

All the syllabuses are based upon an assumption of a 25-hour lecture week exclusive of out-door, workshop and other morning attendances and upon an assumed duration of three years for the theoretical course.

Director of Public Instruction.—No remarks.

Colonel Love.—Agrees to the abolition of the Language course.

Mr. Chatterton.—Agrees to the abolition of the Language course but opposes the proposal to have lectures for 25 hours a week. Instruction should be mainly imparted in the workshop, drawing office and laboratory. The routine of work should be as follows :—

Lectures	12	hours a week	
Drawing office	8	do.	
Workshop	6	do.	
Laboratories	9	do.	
Total ...	35		

Two hours of lectures a day seem a bit trivial.

J. T[HOMSON].

Six hours a day.

J. T[HOMSON].

The Hon'ble Mr. deWinton.—Agrees to the abolition of the Language course except in the case of the military students. Mr. Chatterton's proposal to have a 12-hour lecture week is sound.

Surveying and levelling should be efficiently taught.

H. D. TAYLOR—4-9-05.

The Civil Engineering College is hardly the place to teach languages. Those ignorant of the vernaculars should go elsewhere for that education. I should not think that Mr. Chatterton's authority as to college hours should prevail over the views of the others.

I agree.

G. S[TOKES]—12-9-05.

A[MPTHILL]—22-9-05.

J. T[HOMSON]—12-9-05.

I cannot give an opinion on this question of hours.

G. S[TOKES]—12-9-05.

A compromise should be effected between the views of the Committee and Mr. Chatterton. At Roorkee the division between lectures and practical work is half and half.

A[MPTHILL]—22-9-05.

2. Engineer Class.

Committee—

The syllabus has been entirely recast. Geology has been included in the Civil Engineer's course and mechanism and steam-engine omitted. Elementary electrical engineering has been introduced in the course for Mechanical Engineers. Freehand and model drawing have been eliminated from the syllabus itself but the College staff should insist on a qualifying standard in the subject.

Director of Public Instruction.—No remarks on the professional subjects. Non-professional subjects have already been referred to.

Colonel Love.—Remarks of Committee generally agreed to. The principles of Architecture should find a place in the course for Civil Engineers. Some modification is called for in the distribution of marks for the Civil and Mechanical Engineer classes.

Mr. Chatterton.—Surveying has been omitted from the course for Mechanical Engineers. A short course of instruction therein should be prescribed. Civil Engineering students are to be taught Geology and Mineralogy and are left to pick up their knowledge of mechanism and steam engines during the workshop course. This cannot be approved. The Committee has provided instruction in the last-mentioned subjects for the Upper Subordinate class.

G. S[TOKES].

The Hon'ble Mr. deWinton.—If it is decided to retain the Mechanical Engineer course, there should be a more extended course in Electrical Engineering for the Mechanical Engineer students so as to enable them to take charge of important electrical installations. The Civil Engineer students should have an elementary course in the subject.

The Civil Engineer students should be taught at least as much Mechanical Engineering as the Upper Subordinate students.

Geology might be taught by an outside lecturer for one hour a week.

The principles of Architecture should find a place in the syllabus.

H. D. TAYLOR—4-9-05.

Opinion seems to be in flux and not settled. I suppose it is a question of how many subjects *can* be brought in in the course. An Engineer cannot be of much use if he does not know drawing, and if he is not taught it at the Civil Engineering College he must get himself taught otherwise. And what would one say of an Engineer that didn't understand or couldn't explain the steam engine?

Electrical Engineering, Geology, Mineralogy are all excellent, if you can get them in.

J. T[HOMSON]—12-9-05.

The fact is that Civil Engineering, Mechanical Engineering and Electrical Engineering are three distinct branches which cannot be combined. Geology and Mineralogy are quite useless to the Mechanical or Electrical Engineer and Electrical Engineering is of as little use to the Civil Engineer. It should be combined with the Mechanical Engineering course.

G. S[TOKES]—12-9-05.

Mr. deWinton seems to be right. The syllabus should be referr[illegible] Committee for reconsideration in the light of the present criticisms.

A[MPTH[illegible]—22-9-05.

27

3. Upper Subordinate Class.

Committee—

The existing Engineer Subordinate class to be designated the Upper subordinate class. This will bring the College as regards the designation of the class into line with the Roorkee College and the Public Works Department.

The course should be extended from 2½ to 3 years.

The alterations in the syllabus are in the main only verbal except in Applied Mechanics, the instruction in which should, so far as it goes, be complete and in mechanism and the steam engine.

Director of Public Instruction.—No remarks.

Colonel Love.—Remarks of Committee generally agreed to.

Mr. Chatterton.—No remarks.

The Hon'ble Mr. deWinton.—The alteration in the designation and the increase in the length of the course are both sound proposals.

H. D. TAYLOR—4-9-05.

Yes.

J. T[HOMSON]—12-9-05.

G. S[TOKES]—12-9-05.

A[MPTHILL]—22-9-05.

4. Military Subordinates.

Committee—

No soldier student should be admitted unless he is a tradesman, British born and bred, and has a first-class Army school certificate. Such students should be admitted to a probationary class for a period of one year to prepare them for a qualifying College examination which should be passed prior to joining the Upper subordinate class.

Director of Public Instruction.—No remarks.

Colonel Love.—The qualification in regard to certificate of education may be accepted, but it will not be expedient to insist on the other conditions. Preference may however be given to non-commissioned officers and men who have a trade and who are British born. A probationary year of study will be necessary.

Mr. Chatterton.—Similar proposals were sent up to the Government of India about ten years ago and were negatived. Only soldiers who are non-domiciled Europeans should be admitted to the college—probationary class should be abolished—higher general educational qualifications should be insisted on at the outset. No importance can be attached to the statement that the soldier student should be a tradesman.

The Hon'ble Mr. deWinton.—The Committee's recommendations under this head cannot be accepted. The Roorkee College regulations for admision of military subordinates may be adopted. A copy of these regulations may be sent to the Commanding Officer of every British regiment and battery on arrival in the Presidency with the request that it may be posted up in a conspicuous place in the barracks with a synopsis of the career open to soldiers in the Public Works department.

H. D. TAYLOR—4-9-05.

Colonel Love seems correct, but the Roorkee regulations are not open to cavil if they can be carried out.

J. T[HOMSON]—12-9-05.

I agree.

G. S[TOKES]—12-9-05.

A[MPTHILL]—22-9-05.

5. Lower Subordinate Class.

Committee—

Under this title a new class should be formed to replace the present Sub-overseer and Surveyor and the Draftsman classes.

Director of Public Instruction.—No remarks.

Colonel Love.—Agreed. It is assumed that classes of double strength will be admitted and sub-divided.

Mr. Chatterton.—Agreed, but Elementary Applied Mechanics introduced into the curriculum of the class is unnecessary and should be omitted.

The Hon'ble Mr. deWinton.—The change of designation is sound, but draftsmen should not be included in the class. *Vide* Roorkee Calendar. Their work is distinct from that of Lower Subordinates and the Public Works Department is in need of good draftsmen.

The Roorkee system of recruitment may be adopted for the draftsman class.

———

H. D. Taylor—4-9-05.

Can a man be a proper draftsman if he has not some general knowledge of engineering matters? It would seem inadvisable to make a student a draftsman only.

J. T[homson]—12-9-05.

I can give no opinion. I do not know what end this class is designed to meet. I think a class for draftsmen should be continued.

G. S[tokes]—12-9-05.

The Committee's recommendations may be accepted. Mr. deWinton appears to have overlooked page 271 of the Roorkee Calendar for 1904.

A[mpthill]—22-9-05.

VII.—Board of Examiners.

Committee—

The Board as at present composed should be strengthened by the addition of two members of the college professorial staff. They would not be examining members but they will guide the examining members through the syllabus.

Director of Public Instruction.—There should be internal and external examiners—in other words some or all of the college staff should be combined in a Board with the examiners appointed by the University.

Colonel Love.—The recommendations of the Committee are assented to.

Mr. Chatterton.—It is not desirable to accept the recommendations of the Committee. College Professors put on the Board will acquire a knowledge of the questions and this will place them in a difficult position with regard to lectures which have to be subsequently given.

The Hon'ble Mr. de Winton.—No objection to the recommendation of the Committee, but there is no reason why the Poona, Roorkee and Sibpur system under which the College staff (aided by outsiders occasionally at Roorkee) conducts all examinations, except for the University degree, should not be adopted here.

———

H. D. Taylor—4-9-05.

The Professors are not to examine but to be sorts of guides, philosophers and friends to the Board. There is no reason for the Professors to feel ill at ease thereby.

J. T[homson]—12-9-05.

I think the Director of Public Instruction's view is right. There should be internal and external examiners.

G. S[tokes]—12-9-05.

The Committee's suggestion may be accepted provisionally until the University have decided when the examinations are to be held and whether they will combine them with the College examinations. (See Director of Public Instruction's remarks.)

A[mpthill]—22-9-05.

VIII.—College Staff and Administration.

1. Staff.

Committee—

The staff should consist of—

one Principal,
one Professor of Mathematics with one Assistant,
one Professor of Mechanical Engineering with five Assistants, one of whom should be a Science Assistant,
one Professor of Civil Engineering with seven Assistants, and
one Gymnastic and Drill Surgeant.

The strength is fixed on the basis of a 15-hour lecture a week; the Principal to assist the two Engineering Professors by lecturing 8 hours a week.

The Principal should be an Engineer by profession and the post should carry the minimum pay of a third-grade Superintending Engineer (Rs. 1,250) rising to the pay of a first-grade Superintending Engineer (Rs. 1,600) with free-quarters.

The Professor of Mathematics should be an Engineer if possible.

The staff should be recruited from the Public Works Department and the administration of the College should be in the hands of the Chief Engineer who would be subordinate to the Director of Public Instruction as regards general policy.

The staff thus recruited should receive staff allowances of Rs. 200 (for Professors), Rs. 100 (for senior assistants) and Rs. 30 (for junior assistants) in addition to the pay and allowances which they would draw if employed on departmental duty in Madras.

In certain cases recruitment from home must be resorted to, under covenants lasting for five years but renewable at the end of the period. No pension should be payable but a Provident fund should be established for the recruits. Their pay should be Rs. 750 rising to Rs. 1,500.

Neither the Principalship nor a Professorship should be held by an officer for a period exceeding ten years without the officer doing at least one year's practical work for every five years of educational work.

If the staff is not recruited from Public Works Department there should be one more Professor and three more Assistants to cover leave vacancies.

Director of Public Instruction.—No remarks.

Colonel Love.—The strength of the staff proposed is suitable assuming that the Lower Subordinate class will be of double strength. The Principal should have the standing of a Superintending Engineer and it would be an advantage if the Professor of Mathematics is an Engineer.

The proposal of the Committee to transfer the College staff to the Public Works Department will obviate most of the difficulties now felt and would tend to improvement in the qualifications and efficiency of the staff. A reasonable flow of promotion would be ensured, vacancies could be filled without difficulty or delay, there would be no troubles similar to those now experienced when Public Works Department officers on higher pay have to be appointed to act in the College and provision would be made for refreshing the practical experience of the staff.

The Members of the existing staff are divided into four classes—

1. Principal and Professors.
2. Senior Assistants.
3. Junior Assistants.
4. Workshop staff.

If the Committee's proposals are not accepted, classes 1 and 2 should be recruited from home and an additional Professor appointed to fill leave vacancies. The salary of class 3 should be materially augmented. The salary of the Workshop Superintendent should be raised and the workshop staff increased.

Mr. Chatterton.—In addition to the proposed staff there should be a Professor of Electrical Engineering. The Public Works Department may be able to supply one officer for the post of Professor and some subordinates as assistants, but all the other Professors will have to be obtained from England. These recruits from England should not be placed on a non-pensionable basis. The difficulties pointed out by the Committee regarding recruitment of the staff are real, but it is questionable whether the measures proposed are calculated to remedy matters satisfactorily.

Even if Public Works Department does not supply all the staff required, there should be no difficulty in arranging for leave vacancies and the extra staff proposed for this purpose is unnecessary.

The subordinate staff should be supplied by the Public Works Department and the proposal to give staff allowance is the only effective way of securing the services of competent men. The practice of getting out subordinates from England on covenants should be avoided.

The Hon'ble Mr. deWinton—is entirely opposed to the Committee's proposal to recruit the College staff entirely from the Public Works Department and to place the administration in the hands of the Chief Engineer. The College should remain under the Educational Department and the superior staff recruited from England and from the Educational Department, the Public Works Department being indented upon to supply temporary vacancies only. In the latter case the pay should be what the incumbents would draw in the Public Works Department at the Presidency town with a staff allowance of Rs. 100.

The Principal should be a Royal Engineer officer if possible.

It is desirable that the Senior Assistants also should be recruited from England, but there may be difficulties in doing this and the Public Works Department may have to provide the men. In that case they should be given Presidency pay and allowance *plus* a staff allowance of Rs. 50 for upper subordinates and Rs. 30 for lower subordinates.

As regards pay the Principal should get Rs. 1,000—50—1,500 if a civilian and military pay proper *plus* a staff allowance to be decided in each case, if a Royal Engineer officer.

For the Professors Rs. 500—50—1,000 is suitable with personal allowances after ten years.

Mr. Chatterton's remarks on the subject of the College staff are to the point.

H. D. TAYLOR—4-9-05.

The Chief Engineer's remarks are to be concurred in. The Public Works Department haven't the men for Professors and are not likely to have them in the future, and I have not heard that the present staffing methods are productive of harm in any way save that being a small staff it cannot be provided with a reserve for leave, etc.

J. T[HOMSON]—12-9-05.

I very much doubt the soundness of Mr. deWinton's arguments. With the abolition of Cooper hill the recruitment of the Public Works Department is much simplified, but it is not enough to say that the staff should be drawn from the Public Works Department. Their position as to discipline, promotion, pension, change of employment and so on needs definition before a decided opinion can be formed. But *primâ facie*, it would be better that this small staff should be part of the large department than an isolated unit such as it is now.

G. S[TOKES]—12-9-05

I concur with Mr. deWinton and the Hon'ble Sir James Thomson. The Committee should reconsider this question in the light of these criticisms.

A[MPTHILL]—22-9-05.

2. Board of Visitors.

Committee—

A Board of Visitors composed as follows with a quorum of 5 should be appointed :—

The Director of Public Instruction.
The two Chief Engineers.
The Consulting Engineer for Railways.
The Chief Engineer, Madras Railway.
The Chief Engineer, South Indian Railway.
The President, Faculty of Engineering, Madras University.
The Chairman of the Board of Examiners.
The Surgeon-General.
The Secretary to Government, Educational Department.

Any available past Principals, Professors or officers of the Public Works Department up to four in number with the Principal of the college, *Ex-officio* Member and Secretary.

Director of Public Instruction.—No remarks.

Colonel Love.—If the staff is transferred to the Public Works Department as proposed, it will be desirable to create a Board of Visitors.

Mr. Chatterton.—The proposed Board is likely to hamper subsequent developments, but if Government think otherwise it is desirable to add representatives of two of the large firms who have to do with Engineering work and who give employment to a considerable number of Mechanical Engineers and to reduce the total number to not more than ten.

The Hon'ble Mr. deWinton.—It is doubtful whether a Board of Visitors is required at all but it is decided to have one ; it should be called "Committee of Management" and constituted as follows :—

Chief Engineer, Public Works Department	*President.*
Director of Public Instruction	
Chief Engineer, Madras Railway	*Members.*
President, Faculty of Engineering, Madras University	
A member nominated by the Chamber of Commerce	
Principal, Civil Engineering College	*Secretary.*

H. D. TAYLOR—4-9-05.

Mr. deWinton's seems the more suitable proposal.

J. T[HOMSON]—12-9-05.

I do not understand what function this Board is to discharge. It seems to me unnecessary.

G. S[TOKES]—12-9-05.

The proposed Board will not be wanted if the college remains under the Director of Public Instruction as I think it should do.

A[MPTHILL]—22-9-05.

IX.—REMOVAL OF THE COLLEGE.

1. Site and Buildings.

Committee.—

Neither the accommodation nor the equipment in the existing college gives the minimum that is absolutely necessary and it is not possible to erect suitable buildings on the existing site nor to extend the existing buildings. Arrangements

should be made to construct new buildings in a suitable site. The site of the Agricultural College, if available, will be suitable. The college should be residential. Suitable Hydraulic, Mechanical, Electrical, Chemical and Physical Laboratories should also be built and the workshop extended. The total cost is roughly estimated at 12 lakhs.

Director of Public Instruction.—When the Agricultural College is abolished or moved elsewhere, some of the lecture rooms wanted will be available as also the quarters now occupied by the Principal and the Vice-Principal of that college. The hostel accommodation may be something much more simple than that provided at Chepak.

Colonel Love.—The existing accommodation in regard to lecture room and drawing office is adequate, but insufficient in regard to Laboratories and Workshops. If the college continues to be non-residential, there is room at Chepak for the additional buildings required for many years to come. The present site has many advantages. If the college is to be residential a site for a hostel could be found south of the Presidency College.

The Saidapet site is not an ideal site; it is inconveniently far from the industrial centre of Madras containing the Government brick-fields, the lime-kilns, cement works, Buckingham mills, Harbour works, Gun Carriage Factory, Massey & Co.'s works, etc. The area occupied by the Agricultural College proper is too restricted.

The existing Agricultural College buildings would be of little use.

Should removal from Chepak be decided upon, search should be made for some central position in Madras and failing that it should be considered whether the institution should not be transferred to Bangalore where there are facilities for the teaching of survey.

And for what beyond ?
J. T[HOMSON].

Mr. Chatterton.—Agrees with the Committee but, considers that its estimate of 12 lakhs is not sufficient.

The Hon'ble Mr. de Winton.—The college should be residential, but it does not necessarily follow that the college should therefore be removed. Colonel Love's remarks on the subject are very much to the point. Consideration of the subject should await the return of Government to Madras.

H. D. TAYLOR—4-9-05.

I am not acquainted with the inside of the Engineering College. But I have always doubted whether the proposal to move it to Saidapet or elsewhere had much sense at the back of it; and if it is possible to house and equip it properly inside Madras that should be done.

J. T[HOMSON]—12-9-05.

I agree with the Committee that the college should be removed as soon as convenient. There is no difficulty in getting from Saidapet to the industrial centre of Madras.

G. S[TOKES]—12-9-05.

We cannot possibly decide this on paper. Let us wait until we get to Madras and then discuss it personally with as many members of the Committee as we can collect. I think we can manage without removing the college.

A[MPTHILL]—22-9-05.

2. Deputation of Special Officer.

Committee—

An officer should be placed on special duty to draw up a complete scheme of buildings in consultation with the Principal and to prepare plans and estimates. He should pay a visit to Europe to study the best of the laboratories devoted to the teaching of Engineering. The special duty may last for eight months.

Who expected to have to go ?
J. T[HOMSON].

Director of Public Instruction.—The elaborate arrangements to be found in the best laboratories in Europe which are intended for research work are unnecessary for a college here.

Colonel Love—Agrees with the Committee.

Mr. Chatterton—Agreed but the officer should consult the professors also.

The Hon'ble Mr. de Winton.—No special officer will be required if removal is not decided upon.

H. D. TAYLOR—4-9-05.

The Director of Public Instruction seems to be more or less correct here. The proposal has little to recommend it in these days when men are going to and coming from home and the particular expert appointed to a post in the Civil Engineering College should know his profession if he is fit to teach it.

J. T[HOMSON]—12-9-05.

I think the Committee's suggestion much too large. Surely the Principal and the Consulting Architect could work out the buildings needed.

G. S[TOKES]—12-9-05.

I concur. This question will not arise if the college is not removed.

A[MPTHILL]—22-9-05.

The précis put up shows in one view against each proposal of the committee, the opinions of the Director of Public Instruction, Colonel Love, Mr. Chatterton and Mr. de Winton.

2. The chief points of divergence of opinion relate to—

(*a*) the separation of the civil and mechanical courses after the first year;
(*b*) the recruitment of military students;
(*c*) the recruitment and pay of the college staff;
(*d*) the site and buildings.

3. The question of establishments is dealt with in the note, pages 8 and 9 *supra*.

H. D. TAYLOR—4-9-05.
J. T[HOMSON]—12-9-05.
G. S[TOKES]—12-9-05.
A[MPTHILL]—22-9-05.

Please draft.

2. The question of hours for lectures and practical work, of revision of the syllabus, and the staffing of the college is for the reconsideration of the committee.

3. The question of change of site is for further consideration at Madras.

H. D. TAYLOR—23-9-05.

The draft placed below is submitted for approval. Should copy of extracts from the Chief Engineer's note go to the committee ?

This seems desirable.
H. D. TAYLOR.

P. T. THARYAN—26-9-05.

A. GALLETTI—28-9-05.

For approval.

Extracts from Chief Engineer's note should be communicated with the order.

H. D. TAYLOR—30-9-05.

G. S. F[ORBES]—2-10-05.

Issue with necessary extracts from Chief Engineer's note.

H. D. TAYLOR—2-10-05.

Extracts marked **D** on page 12, **E** on page 13 and **F** on page 14 of the notes may go.

P. T. THARYAN—2-10-05.

A. GALLETTI—2-10-05.

Approved, also Mr. Chatterton's remarks as to division of hours for lectures and practical work.

H. D. TAYLOR—3-10-05.

[G.O., No. 655, Educational, dated 3rd October 1905.]

[E. I.] 800—15-3-05.

Educl.

1

31

~~Public Works~~ (1905) Department.

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[*Designation*] *Chief Engineer on Special Duty.*

[*Station*] *Madras*

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put page 6 in file

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

(*Designation*) Director of Public Instruction,

To The Secretary to the Government of Madras,
Educational Department.

Sir,

note file

Papers please seek by - invite a comparative statement showing cost of staff as proposed by the Committee & compared with present cost.

25/6/05

Read

Department of Public Instruction.

R C. No. 7291 of 1904.

DIRECTOR OF PUBLIC INSTRUCTION
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MADRAS.

From

Name and Designation } Government

Station Educational

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Date 2 June 04.

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Instructions relating to References.	Date of Receipt Date of Registry Date of Receipt by Clerk in charge with Initials Date of Receipt by Record Superintendent Date of Receipt by Clerk in charge Date of Note for Orders References. When issued / Date of reminders / When received
Explanation for delay to be entered here if called for.	ORDER. G.O. Ref. No. 7291/04 dated 6 June 04 Forwarded to Mr A. Chatterton for favour of remarks. E. Middlemast Dy. Director of Public Instruction

DESPATCHED
7 JUN 1905

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Department of Public Instruction.

SCHOOL OF ARTS, MADRAS.

DIRECTOR OF PUBLIC INSTRUCTION
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MADRAS

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Subject.

Submitting his remarks upon the report of the committee on the reorganization of the College of Engineering, Madras.

that all the best students will select that branch of Engineering in which they have the best chance of getting this appointment. The Committee remark "The work of the Department offers but few openings for the Mechanical Engineering pure and simple". This is quite true, but men who have been trained as Mechanical Engineers are likely in the long run to prove just as good men in the Department as those who have received a Civil Engineering training. In any case the Civil Engineering side of the College is always likely to be more popular than the Mechanical Engineerin and I would suggest the desirability of considering whether it would not be possible to offer one of the Government of India Technical Scholarships to the Senior Mechanical Engineer student if he does not obtain the apprentice Engineer appointment and if in the opinion of the College authorities he is likely to be able to make good use of such a scholarship. The scholarships would be awarded not to enable him to continue his studies in mechanical engineering but to enable him to acquire a practical knowledge of some industry in which his previous engineering training would be of value.

The duplication of examinations is undoubtedly a great evil and either the College or the University examinations ought to be abolished. I believe it would be quite practicable to arrange that the University should conduct the examinations and that the necessary control would be secured by appointing a strong Faculty of Engineering. If this be objected to, then as an alternative a Joint Board consisting of 6 or 8 examiners might be annually appointed, half of the members to be nominated by the Syndicate of the University and half of them by Government. This Board would conduct all the examinations of the College and the B. E. Degree might be awarded to those who pass out at the end of the third year. Practically the F. E. examinations would disappear and there would be two annual examinations previous to the Degree examination. The College Diploma would be merged in the University Degree.

To carry this scheme through it will be necessary for the University to accept definitely the courses of study prescribed for the Engineering classes of the College of Engineering. I should imagine that the Senate of the University would welcome some such change as now proposed, since it would give the University through its Faculty of Engineering much more complete control over the Engineering Education than it now enjoys.

The recommendation of the Committee, that the distinction between the school and the college should disappear, automatically comes into effect if the proposal that the Matriculation Examination be adopted as the lowest qualifying examination for entrance to any class, as educational institutions dealing with Matriculates are recognised by the Educational Department as colleges.

I have gone carefully through the new syllabuses and I consider them a great improvement on those at present in force. The proposal to abolish instruction in vernacular languages is perfectly sound, but I am distinctly opposed to the idea of the Committee that in each week there should be 25 hour-lectures, exclusive of outdoor, workshop, and other morning attendances. Instruction should be mainly imparted in the workshop, drawing office and laboratory and I consider it perfectly practicable to so arrange the courses that each student is not required to attend more than 12 lectures per week, the rest of the time being spent at practical work. A student may well work under the supervision of the college authorities for 35 hours per week arranged as follows:-

Lectures	12 hours.
Drawing Office	8 hours.
Workshop	6 hours.
Laboratories	9 hours.

From the Mechanical Engineering course Surveying

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TELEPHONIC MESSAGE.

6 38

Date 190 .

Hours Minutes.

From: Mr S & G.P.

To: H C

Cecil.

Reply - Yes.

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Reply

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EDUCATIONAL DEPARTMENT.

39

Read again --

G.O. No. 723, dated 12th December 1904.

" " 754, " 21st December 1904.

Read also ---

C. No. 654 A., from the Pt., Coll. of Eng. Committee, No. 340, d/31-3-1905.
C. No. 699 " " " " " " " No. 360, d/10-4-1905.
C. No.1206 " " Prof.of Eng. on Spl. Duty , No. --- d/27-4-1905.
C. No.1210 " " D. P. I. No.7291, d/23-6-1905.

Type to duplicate 2/1/75

ORDER:-- no 655) 3-6-05
P.S.

The Government have considered the Report of the Committee appointed by their Order No.723 Edl., dated 12th December 1904, to advise on the proposed extension and reorganization of the College of Engineering, Madras. They have also considered the opinions of the Principal of the College and the Professor of Engineering on Special Duty, who were on leave when the Committee was appointed, and of the Director of Public Instruction and the Chief Engineer.

Pages 28, 29 & 29-a of the Proceedings

2. Removal of the College.

The Government will defer passing orders on this important matter till they have had an opportunity of discussing it further at Madras with the assistance of the members of the Committee and other authorities.

Pages 1 & 2 of the Proceedings

3. Recruitment of the College classes.

The Committee recommend that the ~~En~~ Engineer class should in future be recruited from those who have taken the Bachelor of Arts degree with Mathematics or Physical

Science

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Science as their optional subject, the upper subordinate class from those who have passed the First Examination in Arts and all other classes from those who have passed the Matriculation examination. These recommendations are accepted.

Page 3 of the Precis

4. Fees.

The Committee recommend that the fees for the several classes should be fixed as follows:--

	Rs.	
Engineer class	360	for the full
Upper Subordinate class	180	theoretical course if paid in advance.
Lower -do.-	100	

This recommendation is accepted, but the students will have the option of paying slightly enhanced rates by the year or term as at present.

Pages 4 & 5 of the Precis

5. The College Year.

The Committee are of opinion that the College year should consist of

(a) a first term from about the 15th of July to about the 10th of October, the last ten days of it being devoted to inspection tours,

(b) a second term from about the 10th of October to about the end of April with a break in the middle of about 9 days on account of the Christmas holidays and with survey camp for about a month after the termination of those holidays,

(c) the long vacation from about the 1st of May till about the 15th of July.

The Government consider that a more suitable arrangement will be to divide

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the College year as follows:--

(a) a first term from the 15th of J to the 31st of October, the last fortnigh of it being devoted to inspection tours;

(b) a second term from the 1st of November to the 31st of March including the Christmas holidays and the survey camp as proposed; and

(c) the long vacation from the 1st of April till the 15th of June.

6. Rules incidental to College re-organization.--

Pages 6, 7 & 8 of the Press

Pages 9 & 10 — do —

The Government accept the first three of these rules, but as regards the fourth which fixes the duration of the practical course in the case of Civil Engineer students at one year and in the case of Mechanical Engineer students at two years, they consider that its practical effect would be, if the additional year were made compulsory, to deplete the class of Mechanical Engineer students. The additional year for these students should therefore be entirely voluntary. Inducements to go through it may be held out but Government cannot undertake to bear the whole of the extra cost involved as suggested by the Committee. With regard to the fifth rule which relates to the selection of the apprentice Engineer, the examiners should send up the name of one Civil Engineer and one Mechanical Engineer student for the Chief Engineer to select from.

Page 11 of the Press

Page 12 — do —

The Committee also recommend the abolition of the distinction between the

School

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School and College departments. This recommendation is accepted. The whole institution will in future be a "College" for statistical and other purposes.

7. Revision of Syllabuses.

The Syllabuses drafted by the Committee will be remitted to it for further consideration. The Government approve of the excision of the language course and of other recommendations of the Committee. But the Committee should consider

(1) whether more time should not be spent in the workshop. At Roorkee working hours are divided equally between lectures and practical work,

(2) whether architecture should not be included in the Civil Engineering course,

(3) whether Civil Engineering students should not be taught as much mechanical engineering as upper subordinate students,

(4) whether a short surveying course should not be prescribed for mechanical engineering students,

(5) whether the electrical engineering course for mechanical engineering students should not be more thorough.

Some modification seems also to be called for in the distribution of marks between the Civil and Mechanical Engineering classes.

8. Reorganization of classes.

The Committee's recommendations that the course for the Engineer subordinate class be extended from 2½ years to 3 and its designation altered to "Upper Subordinate class" are accepted.

The

H.P.'s orders on page 15 of the Precis

Pages 13 & 14 of the Precis

Pages 13 & 14 of the Precis

Page 16 of the Precis

do

Page 15 of the Precis

Page 16 of the Precis

Page 15 of the Precis

Page 17 — do —

13 S/P 43

Page 20 of the Proceedings

The recommendation that the present Sub-overseer and Surveyor and Draftsman classes be thrown together into a new class to be called the "Lower Subordinate Class" is accepted.

Pages 18 & 19 — do —

9. Military Subordinates.

The Government consider that the Committee's recommendations go too far and that to accept them would be tantamount to abolishing recruitment from the army, a result by no means to be desired. Some change in the present regulations for the admission of soldiers to the College is, however, in the opinion of the Government, advisable and they propose to adopt in their entirety the rules of the Roorkee College relating to the matter. A copy of the new regulations should be furnished to the Commanding Officer of every British regiment or battery as soon as it arrives in the Presidency with the request that it may be posted up in a conspicuous place with a synopsis of the career open to soldiers in the P.W.D.

Page 21 of the Proceedings

10. Board of Examiners.

The Committee recommend that the Board of Examiners as at present composed should be strengthened by the addition of two members of the College Professorial staff.

Page 21-a-do —

This recommendation is accepted provisionally until the University have decided when the examinations are to be

held and whether they will combine them with the College examinations.

11. S t a f f.

Page 22 of the Precis

The Committee are of opinion that the College staff should be recruited from the P.W.D. and that the administration of the College should be in the hands of the Chief Engineer. The Chief Engineer is however entirely opposed to these proposals and considers that the College should remain under the Educational Department and the superior staff be recruited from home and from the Educational Department, the P.W.D. being indented upon to supply temporary vacancies only. He considers it desirable also that the senior assistants should be recruited from home but if there are difficulties in the way of doing this the P.W.D. should provide the men. In that case they should, in his opinion, be given Presidency pay and allowances plus a staff allowance of Rs.50 for upper subordinates and Rs.30 for lower subordinates. He would also fix the Principal's pay at Rs.1,000-50-1,500, if a Civilian and Military pay proper plus a staff allowance to be decided in each case, if a Royal Engineer Officer. For the Professors Rs.500-50-1,000 with a personal allowance after 10 years is considered suitable. The Government concur generally with the Chief Engineer. The P.W.D. have no men available to fill the posts of Professors and are not likely to have them in the future while the present method of recruiting the staff is not

Page 25 — do —

Page 25-a — do —

do

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known to be productive of harm in any way save that the staff being a small one cannot be provided with a reserve for leave vacancies. Before however a final decision is arrived at, the Committee will be requested to reconsider this question in the light of these remarks and favour Government with their further remarks thereon.

12. Board of Visitors.

Page 27 of the Precis

The Committee's proposal to appoint a Board of Visitors will now be unnecessary if the College remains under the D.P.I.

13. On receipt of the Committee's further remarks now called for the D.P.I. will be requested to submit proposals for the introduction of the scheme of reorganization and for the revision of the rules of the College.

14. The thanks of Government are due to the Members of the Committee for the labour they have already undertaken in connection with this question of reorganization and for the clear and concise report submitted by them. They are requested to submit their remarks on the points referred to them for further consideration, as early as may be practicable.

P.T.T.
26-9-05.

A.G.
28-9-05.

H.D.T.
29-9-05.

To

The D.P.I.
" P.W.D.
J.P. Davidson Esq.
F.J.E. Spring Esq. C.I.E.
R.Ll. Jones Esq.
M.R.Ry. A.V. Ramalinga Aiyar Avl
H.T. Keeling Esq.
Capt. W. Carew Smyth R.E.
W.H. James Esq.

with Extract from letter by the Chief Engineer.