

GOVERNMENT OF INDIA
DEPARTMENT OF COMMERCE

Report on the scheme for the
establishment of a training-ship
in India

BY

Captain M. B. SAYER, R. N. R.



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Report by Captain M. B. Sayer, R. N. R., on the scheme for the establishment of a training ship in India.

RESOLUTION BY THE GOVERNMENT OF INDIA, DEPARTMENT OF COMMERCE,
No. 238-S. (9) (a), DATED DELHI, THE 25TH NOVEMBER 1925.

Chapter 2 of the Report of the Indian Mercantile Marine Committee contains the Committee's recommendations for the training of Indian Executive officers and Engineers for the Indian Mercantile Marine. The Committee suggest, *inter alia*, that the Royal Indian Marine S. S. "Dufferin" should be converted into a training ship to be stationed at Bombay for training Indian boys as deck officers. Their proposals in this respect do not furnish sufficient details to enable the Government of India to form definite conclusions. The Committee have not, for instance, given any details regarding the course of instruction to be followed and the staff which should be maintained, or a detailed estimate of the cost of maintaining the proposed training ship. In the absence of information on these points it is not possible for the Government of India to decide either the extent or the financial effects of the proposal.

2. The Government of India have therefore decided to obtain the services of an expert from England to prepare a detailed scheme for the establishment of a training ship in Indian waters and for this purpose have been able to secure the assistance of Captain M. Sayer, C.B.E., R.D., R.N.R., Captain Superintendent of the training ship "Worcester." In this he will be assisted by Mr. J. A. Richey, C.I.E., M.A., Educational Adviser to the Government of India and Captain E. J. Headlam, C.S.I., C.M.G., D.S.O., Director of the Royal Indian Marine.

3. In paragraph 11 of their Report the Indian Mercantile Marine Committee contemplate that it will be best in the beginning to provide for the training of not more than 50 boys. It is difficult to estimate the number of boys for whom training and accommodation will be required. The accommodation needed also depends on the length of the course prescribed. As the Committee state in paragraph 11 of their Report, the prospects of trained mercantile marine deck officers obtaining employment in this country will be somewhat limited until Indian shipping has been fully developed. This last will take time and for many of the earlier years it may be assumed that the majority of those who obtain employment will be employed in ships engaged in Home-trade vessels. The number of such vessels is probably about 60 to 70 requiring in all some 240 to 300 deck officers. If employment at sea be taken at 24 years, this would mean some 10 new entrants every year.

4. In paragraph 14 of their Report the Committee recommend that the period of training in the training ship should be for two years, and in paragraph 16 they suggest that the age for joining should be not younger than 15 and not older than 17 years. The Government of India are somewhat doubtful as to the soundness of these proposals. Though every effort will,

no doubt, be made to obtain suitable cadets from the seafaring classes of India, it is probable that at first, at any rate, the majority of the cadets will be landsmen. If so, in the opinion of the Government of India as at present advised, it may be necessary to take boys of a younger age and to give them a longer course of instruction than that suggested by the Committee. Subject to the advice of the officers referred to above, the Government of India incline to the opinion that the course should not be one of less than four years' duration.

5. Assuming that the course finally accepted will be one of four years, and allowing an ample margin for wastage, the total number of boys in training at one time is not likely to exceed 70 or 80. It should be borne in mind that the object of the training ship is to train boys for a sea career and not to add one more to the educational institutions of the country designed to train boys for ordinary avocations.

6. In this connection there should also be considered the question raised in paragraph 24 of the Report of the Committee, namely, formation of classes for coaching officers for certificates of competency as Mates and Masters. In the first place it has to be considered whether it is suitable to attach such work to the training ship, and if so, whether those undergoing such courses should be accommodated on the training ship. Candidates qualifying for the Mates and Masters certificates of competency would be considerably older than the ordinary cadets, and the question whether it would be advisable to accommodate them on the training ship with boys will need careful consideration, particularly with reference to the question as to how the presence of these older men will affect the general discipline on board the ship. The Government of India are provisionally of opinion that, on the whole, it would perhaps be better to provide the necessary coaching facilities for men of this class on the shore, the Instructional staff of the training ship being allowed to give courses of lectures for this purpose if necessary. If, however, it is eventually decided that the men in question ought to be accommodated on the training ship, the total number of students on board the ship is not likely to exceed 110 to 140 for several years.

7. In paragraph 12 of their Report the Committee recommend that the proposed training ship should be located at Bombay. Doubts have, however, been expressed whether Karachi would not be more suitable than Bombay for the location of the ship. The arguments which have been advanced in favour of Karachi are:—

- (i) that it is possibly more healthy than Bombay;
- (ii) that the harbour being less exposed to the monsoon more constant practice in sailing and boating may be obtained.

8. Captain Sayer will be requested to report on the points specified below, bearing in mind the above considerations:—

- (a) whether the training ship should be stationed at Bombay or Karachi;
- (b) whether the S. S. "Dufferin" is suitable as a training ship for the numbers indicated, or whether it is too large and too expensive;
- (c) the age at which the boys are to be admitted to the training ship;

- (d) educational qualifications required, and other conditions to be fulfilled by candidates for admission to the training ship ;
- (e) the curriculum and the course of training to be followed on the training ship and the period of training ;
- (f) to what extent sea cruises for the boys would be desirable, and how they should be arranged and conducted ; if the Committee's recommendation that a tender should be attached to the training ship is supported, details of the tender required and an approximate detailed estimate of the initial and recurring cost involved should be given ;
- (g) whether the courses referred to in paragraph 24 of the Report of the Indian Mercantile Marine Committee should be given on the ship and those attending such courses be accommodated therein ;
- (h) the staff of Instructors, their emoluments and method of recruitment and also equipment, etc., required ;
- (i) what fees or other charges should be levied from (a) the boys and (b) those attending the Mates and Masters courses : also whether board should be provided free as recommended by the Committee ;
- (j) to prepare detailed estimates of costs (1) capital, (2) recurring of any scheme put forward and in particular of adapting and using the S. S. " Dufferin " for this purpose.

9. The Government of India would also be glad to get the advice of Captain Sayer on the following points :--

- (1) Proposals for preliminary training in paragraph 19 of the Report to inculcate sea sense in Indian boys ;
- (2) Proposals in paragraphs 26 to 29 of the Report for the training of Engineer officers ; and
- (3) Question of providing facilities for the training of lascars in modern methods of navigation.

10. Mr. J. A. Richey will meet Captain Sayer at Bombay where most of the work will doubtless be done. They will make their own arrangements for meeting Captain Headlam. Captain Sayer should also visit Karachi and after his inspection is completed and he has formulated his schemes he should come to Delhi for writing the Report.

Ordered that a copy of the Resolution be forwarded to Captain M. Sayer, C.B.E., R.D., R. N. R., Mr. J. A. Richey, C.I.E., M.A., Educational Commissioner with the Government of India, Captain E. J. Headlam, C.S.I., C.M.G., D.S.O., Director, Royal Indian Marine, Department of Education, Health and Lands, Army (Marine) Department, Finance Department, and Accountant General, Central Revenues.

FROM CAPTAIN M. B. SAYER, R. N. R., TO THE SECRETARY TO THE GOVERNMENT OF INDIA, DEPARTMENT OF COMMERCE, DATEL DELHI, THE 28TH DECEMBER 1925.

I have the honour to report that I arrived in Bombay on the 18th instant and reported as instructed by the High Commissioner for India (London) to the Director, Royal Indian Marine, accompanied by Mr. J. A. Richey, Educational Commissioner, who kindly met me on arrival.

The general scheme for the establishing of the proposed Training Ship was discussed by us in meeting, as I had already received a copy of the Resolution No. 238-S. (9), Department of Commerce, dated at Delhi, the 25th November 1925, with printed report of the Indian Mercantile Marine Committee at Aden. I had been enabled to study same, and become conversant with the ideas of the Government of India on the subject, before arrival.

After a full discussion, we proceeded to inspect the steam ship "Dufferin" and I beg to append below, my opinion as to her general suitability for conversion to a Training Ship.

Royal Indian Marine S. S. "Dufferin."

After a careful and detailed inspection of this vessel. I came to the conclusion that she was decidedly suitable for the proposed plan, on the following counts—

(1) Cost of conversion should be moderate, as practically no alterations are required, beyond the removal of a few wooden Bulkheads, as agreed upon with the Director, Royal Indian Marine.

(2) Owing to her having fairly large Square-port-holes, and also Side-Doors, she is well ventilated, which is essential, more especially in the Indian climate.

At the same time, it will be necessary to fit fans in sleeping and living quarters, for use in hot season, these with uptake Shaft-Ventilators should keep ship cool and healthy.

(3) Present accommodation is most suitable and adequate to house the suggested staff, with but little alteration.

(Note.—These necessary alterations were discussed between us, and agreed upon. The Director, Royal Indian Marine, will obtain estimates from his Constructor and Engineer of the probable and approximate cost of conversion (which is attached hereto Appendix A.)

(4) It is quite unnecessary to remove Engines and Boilers at the moment. If this were done, it would entail a large expenditure and no good be served thereby, whereas, should the proposed scheme prove a failure, the ship is still intact, and would accordingly fetch a higher price if sold in the open market for breaking up purposes, with Engines and Boilers still in her, all that is necessary is for them to be laid up in the usual manner. They should then require small attention.

(5) It will be necessary to instal a Lighting and Pumping Plant and the present Dynamos and Boilers are too large for practical and economical use for the purpose required.

I beg to suggest that a Vertical Boiler be installed for the supply of steam, for Pump, Hot water, etc., and that an Oil Engine Plant be installed to run a smaller Dynamo for lighting purposes, another Dynamo being installed for stand by purposes. Possibly the present Installation might be disposed of to go against the costing of the proposed New Set. This plan, if carried out, would be much more economical.

(6) The Main Hold could be fitted and used as a Gymnasium in bad weather.

(7) As the ship has been laid up for a considerable time, she will require a certain amount of repairs done, during conversion, if it is decided to adopt her for the suggested purpose.

(8) Suggested that the "Foremast" be fitted with Fore-Yard, Fore-topsail Yard and Top Gallant Yard, so that the cadets may be taught Sail drill, method of sending down yards, the going of Aloft, which would instil many qualities in the boys, giving them confidence, courage and agility, which is essential in their training as future officers.

Sails should be fitted to Topsail and Top Gallant Yards only, with also a Jib, or other fore and aft Sail.

General Remarks.

Of course the ship is a little on the large size for the suggested number of Cadets to commence with, *i.e.*, (30) and will therefore require a larger staff for upkeep and maintenance, but it must be borne in mind that should the proposed Scheme, prove a success, in time the numbers will increase, so that this disadvantage will become non-existent.

In my opinion, it will be impossible to find a more suitable ship than the "Dufferin" for the purpose required and I should not suggest your looking elsewhere; as she has all the qualities necessary to make a successful Training ship, summed up briefly as follows:—

1. Is roomy, with large Deck spaces,
2. Has good ventilation (most essential),
3. Present accommodation suitable for staff, with but little alteration required,
4. Is in good condition, and can be maintained with a moderate staff.

Furthermore—

If the scheme does not materialize, the sum expended on conversion will not be very large and, as I have pointed out before, the ship will be intact and in good order for sale.

Visit to Karachi.

In accordance with instructions received, I proceeded to Karachi, arriving there by the S. S. "Vta" on the 23rd, being received on arrival by the Port Officials, who kindly afforded me every facility for viewing and inspection of Harbour. I visited the Telegraph ship "Patrick Stewart" and inspected her, but came to the conclusion she was too small for the requirements. Furthermore, she would require a large sum expended on her to fit her as a Training ship.

Manora was next visited with its Harbour Trust Establishment.

In reviewing the respective merits of Bombay and Karachi, I have no hesitation in affirming that, in my opinion, the climate of Karachi was much better than that of Bombay. Furthermore, it is more sheltered in the South-west monsoon, with but little interruption in Boat communication with the shore at this period which you are bound to have in Bombay. It has also good facilities for Boat-sailing and pulling in safety, which could not be carried out with safety in Bombay during the South-west monsoon. There is an excellent berth for mooring a Training ship off the Telegraph Wharf, Manora, the only drawback being that all Fresh Water and Stores must come by Boat from Karachi side. But this is a detail of no account.

Repairs could be effected by Port Trust Dockyard as required.

It is possible that a play-ground might be obtained on Manora—or anyway the share of one—good and safe bathing can be also obtained.

In regard to your detailed questions, as specified in Resolution No. 238-S. (9), I have the honour to append my opinion in regard to same :—

- (a) *Station of Training Ship.*—There is no doubt Karachi would be more suitable than Bombay, as being more healthy and more sheltered during the South-west monsoon. Boat communication should not be interferred with if ship be moored off the selected site at Telegraph Buoy, Manora.
- (b) *Suitability of S. S. "Dufferin."*—Is a suitable vessel, somewhat on the large size, but should numbers increase after inception period, this fact will be no drawback. Steamship "Patrick Stewart" is too small, and would require a lot of expenditure to make her suitable. Even then she would not be the ship required.
- (c) *Age of boys—Admittance.*—Suggested 13 years.
- (d) *Qualifications for admission.*—Essential boy should speak English and have received a fair standard of education as regards elementary subjects.
- (e) *Curriculum.*—As supplied from the "Worcester" (*vide* Appendices E. and F.) but the teaching of Navigation and Nautical Astronomy could not be commenced until Cadets had been thoroughly grounded first in English subjects of Arithmetic and Algebra.

Period of training could not be less than four years to commence with.

- (f) *Necessity for Sea Cruise.*—I do not think it necessary for Sea-Going-Tender to be arranged for in the initial stage, besides which it would incur heavy expense. Training Establishments in England have tried this but have shut down same on this account.

If a small Brig were available and attached to the Training ship stationed at Karachi, day trips might be made outside Harbour to advantage during fine weather.

- (g) *Coaching classes for Board of Trade examinations.*—Presumably these Nautical Schools will not be required for sometime. When necessary there is no reason why one should not be run in connection with the Training ship; but it would be advisable for those attending to be accommodated ashore and not on board the Training Ship as they would be of an older age than the Cadets, and it might be prejudicial to good discipline.
- (h) *Staff of Instructors, etc.*—The staff, as suggested, is dealt with under separate cover with their emoluments.
- (i) *Fees.*—The fees of the Training Ship “Worcester” are £140 per annum inclusive of one suit of uniform yearly, washing and medical attendance. The “Conway” charges £120 without uniform. Pangbourne Nautical College £160, without uniform. The matter of what fees should be charged against the parents of the proposed Native Training Establishment is one to be decided by the Government who are in a position to know the sum likely to be obtained from the class of parent it is desired to draw the boy from. But it is suggested that, as a commencement, the fees chargeable should be small, say 50 per cent. only, the Government paying the other 50 per cent to enable them to see how the Scheme generally is received by the public and if the right sort of boy is forthcoming.

The usual fee charged in England at the Nautical Schools for “cramming” for the B. O. T. Examinations is approximately as follows:—

	£	s.	d.
Second Mates	3	17	6
First Mates	5	5	0
Masters	10	10	0

(j) Attached—*Vide* Appendix C.

Preliminary Training in Schools.

(1) The suggested scheme for the establishing of primary Nautical Schools in my opinion is not necessary; provided scholars at Government schools were taught English and the history of Sea Power and all it means with a thorough grounding in Arithmetic and Algebra.

Training of Engineer Officers.

(2) As regards the training of Engineer officers, provided adequate training in Workshops and Shipbuilding yards for large vessels were obtainable in India, there is no reason why the scheme could not be carried through. It is usual in England for a boy training as an Engineer to serve 5 years in the shops to be followed by 3 years Sea training as a junior Engineer before being eligible to sit for his 2nd Engineer's Certificate.

Training of Lascars.

(3) In regard to this question, I do not consider the ordinary Lascar would be educated sufficiently to be able to grasp and learn modern methods of navigation.

In regard to supplying estimates of costs, Capital and recurring, I beg to inform you the annual cost of upkeep for the Training ship "Worcester" including all charges is approximately £17,000 per annum.

You will appreciate the fact that I personally am not in a position to give estimates for a ship in this country where conditions are totally different and which can only be defined by the local experts.

The Director of the Royal Indian Marine has kindly had estimates prepared by his Staff Engineer and Constructor in regard to cost of conversion. Also the Director, Royal Indian Marine, has compiled his estimate of recurring costs after consultation with me in regard to the required staff and all other details for upkeep when running.

The question of the educational side has been discussed fully between Mr. J. A. Richey, Educational Adviser to the Government of India, Captain E. J. Headlam, Director, Royal Indian Marine and myself. I have supplied Mr. Richey with the syllabus of the "Worcester" both School and Seamanship side with all particulars as regards suggested staff.

I therefore beg to attach reports from both the Director, Royal Indian Marine, and Mr. Richey concerning the above mentioned subjects for your information giving figures for the inception of the scheme and its maintenance when a going concern.

General Summary.

After affording the Government of India answers to their questions as put to me in their Resolution No. 238-S-9 (a), Department of Commerce, dated at Delhi, the 25th November 1925, and after carrying out their instructions contained therein, I beg, in view of my engagement from England, to give my opinion on the proposed scheme of establishing a Training Ship in Indian waters for the training of Indian Cadets and to place before the Government of India an alternative scheme which would, in my opinion, as an independent witness possessed of some practical experience, be of a greater advantage and likely to carry a far greater chance of success than the general scheme which was put to me. It is as follows :—

That a limited number of carefully selected candidates—say 6 a year should be sent to England for training in the existing Training Ships H. M. S. "Conway" and "Worcester"—three to each establishment; selected candidates to be of approximately 14 years of age when joining and with good knowledge of English; term of training to be of three years. After passing out from the Training Ship, a cadet would be apprenticed for a further 3 years to a Line of British Steamers in India, who, I understand, have already agreed to accept these boys, after which period the boy would be eligible to sit for his Board of Trade Examination as Second Mate. He then could return to India qualified to take up an appointment. Meanwhile, he will have acquired the following advantages :—

1. Will have been taught by English Masters with other English boys in same class—nothing but English being spoken and will derive benefit for same.

2. Will be living the ordinary life of an English boy intended for the Sea profession on a Training Ship in England, where the climate is more temperate, therefore the boy should improve in physique. Furthermore will all the time be unconsciously acquiring that sense of the Sea so important which is fairly manifest in English boys, who have chosen it as a profession and in close association daily with English boys of his own age and rank, will quickly learn their language and habits, which will prove invaluable when he goes to sea as an apprentice and later becomes an officer associating with possibly European officers over him.

I beg to inform you that for the last three years, I have had on board my ship the " Worcester " 19 Egyptian Cadets who were sent by their Government for education and training, with a view to entering their own intended Sea Services, which is now under consideration beyond their existing Establishments. These Egyptian Cadets were recruited from the high official class and joined the " Worcester " between 13 and 14 years of age.

The Egyptian Government paid all fees, holidays, clothing, travelling expenses, etc., the parent bearing no cost.

These boys have done exceedingly well and have improved in physique, general knowledge and can all speak the English language well : in competition with English boys both in school and out, have more than held their own.

The seven senior are now about to undergo six months training in a Naval Establishment in England, having finished their course in the " Worcester ".

I am prepared to state that I think my Committee would consider favourably any request the Indian Government might put up of a like nature.

The Egyptian Government have an educational organisation in London who is responsible for the welfare, arrangement for holidays, etc., of all Egyptian students undergoing education in England. This the Indian Government would also require, and would no doubt have.

This same alternative scheme should also embrace the Engineer student. I suggest to make a thoroughly practical and efficient Engineer, he must be trained in a Shipyard, where large Ocean Going Ships are built, where he can go through all the various processes of both Ship and Engine Construction, Fitting Shops, Moulding Lofts and Drawing Office which is the usual method undergone by the British Engineer during his 4 or 5 years' apprenticeship. He goes in and works as a workman and is treated as such during this period, certainly rough but necessary for future efficiency when he becomes an officer. I am referring of course to Marine Engineers. The Egyptian Government have their students in England in this branch.

This alternative scheme would prove less costly than establishing your own ship, with all its ramifications, obtaining Board of Trade sanction for training ship time to count, and you would have the benefit of nearly 70 years experience given to the boys to be trained, besides which their vision would be so much more broadened in living in Europe, seeing the world outside their own Dominion and the way other nations live and behave, I say this, because-

India is not, broadly speaking, excepting in certain small areas on its sea-coasts, a sea-faring nation. It therefore should subject this alternative scheme for consideration, as taking them and rearing and training them amongst a nation who have been sea-farers from the earliest times. For your information, the following is an approximate scale of salaries now being paid in the British Mercantile Marine :—

Liners, 1st Class.

Commanders	£C00—1,200 per annum.
Chief Officers	£30—35 per month.
2nd officers	£24—26 „
3rd officers	£16—18 „
4th officers	£11 „

Cargo Boats.

Masters	£40—60 a month.
Chief Officers	£26—30 „
2nd officers	£20—26 „
3rd officers	£11—14 „

Apprentice, if having paid a premium, say, of £50 for three years, is returnable in wages plus 5 per cent. interest, otherwise he draws no pay.

All staff is victualled by shipowner and they pay no messing, but excepting in the larger and old established Lines, no guarantee is given that employment will continue after the voyage has been completed, the practice being to sign Articles for the one voyage.

In conclusion, I should like to express my appreciation of the help I have received from both Captain Headlam and Mr. Richey in drawing up my report. It will always be a pleasure to me to do anything I can to forward the scheme as decided upon by the Government of India if assistance is required by a Nautical Adviser in England,—in any way required of me.

NOTE BY CAPTAIN E. J. HEADLAM, C.S.I., C.M.G., D.S.O., DIRECTOR OF THE ROYAL INDIAN MARINE, AND MR. J. A. RICHEY, C.I.E., I.E.S., EDUCATIONAL COMMISSIONER WITH THE GOVERNMENT OF INDIA, FOR THE USE OF CAPTAIN M. SAYER.

(N. B.—*This note follows only approximately the order of the questions put in paragraph 5 of Government of India, Commerce Department, resolution No. 238-S (9) (a), dated Delhi, the 25th November 1925.*)

We offer no opinion on the choice between Karachi and Bombay as the site for the training ship since Captain Sayer is inspecting both places with a view to determining this question.

2. We consider that the “Dufferin” can be converted into a suitable training ship. It is admitted that she has many features, *e.g.*, ample deck space, which make her eminently suitable for such a purpose, but it has been

suggested that she is unnecessarily large. This criticism was made on the assumption that the number of students in residence would not exceed 50. On the suitability of the "Dufferin", however, Captain Sayer is the best authority.

3. The Indian Mercantile Marine Committee in paragraphs 14 and 16 of their report recommend that boys should be recruited between 15 and 17 years of age and the course of training should be of two years' duration. The Government of India in their resolution recommend an earlier age for recruitment and a course of four years.

We are of opinion that the course should be one of three years and the maximum age for recruitment should be 15. We do so for the following reasons :—

- (a) A cadet on an English training ship is 17 years old when he completes his course and he has then to serve three years apprenticeship before qualifying for a certificate. We think that as far as possible Indian boys should be placed on an equal footing and be qualified to obtain a certificate at the age of 20.
 - (b) We do not consider the standard of English knowledge reached by an Indian boy at the age of 15 sufficiently high for him to complete in two years a course, which is largely technical, conducted entirely through the medium of English. The use of English as the medium of instruction is only begun in the 8th class in Bombay and with the introduction of vernacular into high schools it may still further be postponed. We therefore consider it essential that intensive instruction in English be included in the course of training and we do not consider that there will be time for this unless the total period of training is extended to three years. (We base our recommendation on the Bombay curriculum since it is probable that a majority of the recruits will in the first instance come from Bombay, but we believe these arguments hold equally good for recruits from other parts of India).
 - (c) We do not recommend a four year course because it will be necessary to recruit boys at 13 if they are to complete their training by the age of 18. It is improbable that parents will be willing to let their boys join the training ship at this early age. Indeed we are assured that we should get a larger number of candidates if we could raise the minimum age of recruitment to 16. Against this we believe that the cadets will gain far more by a year's intensive training on the ship than if left to continue their general courses in a high school for another year.
 - (d) The cost of fees to parents for an additional year of training might act as a deterrent from recruitment.
 - (e) The staff which we suggest will be adequate for a two or three year course of training whereas it will need enlargement if a fourth year is to be added.
4. The candidates for admission should have completed the 8th standard in an anglo-vernacular school and should pass a qualifying test in English,

Arithmetic and General knowledge, *i.e.*, History and Geography. They should also be interviewed by a board of selection before final admission. We consider this interview essential in order to make sure that the boys have a genuine intention of joining the mercantile marine and are not merely taking advantage of an excellent course of instruction at Government expense.

5. Each year should be divided into two terms as follows :—

(a) from January the 15th to June the 15th with a break of ten days at Easter ;

(b) from September the 15th to December the 15th.

We suggest this arrangement because it will be necessary during the monsoon to move the "Dufferin" far up the harbour for security. The provision of a long mid-summer holiday should also suit the convenience of boys coming from distant parts of India.

6. The Indian Mercantile Marine Committee proposed an annual output of 25 cadets. It seems unlikely that steamship companies will be able to take more than fifteen apprentices a year ; it is possible that even this number may not be able to find employment after their term of apprenticeship. To obtain this output it would not be necessary to admit more than 20 cadets each year but the "Dufferin" has capacity for the full 100 cadets and the running charges on lighting, etc., will be the same whether the enrolment is 50 or 100. Moreover, since the staff cannot be reduced but is ample for a school of 100, while the fees proposed more than cover the keep of each cadet, every additional cadet in residence up to the capacity of the staff means a *pro tanto* reduction in the cost per head. To raise the number of cadets from 50 to 100 would mean an additional *net* income to Government of some Rs. 12,000 annually against a small initial outlay on beds, desks, etc. There are also educational advantages *e.g.*, in organising games, in fixing the larger number. It is therefore suggested that 30 candidates be admitted annually. Admission may be made at the beginning of the September terms as the school examinations are usually held at the beginning of the hot weather.

We do not anticipate that every vacancy will be filled and there will undoubtedly be some wastage during the course, so that the number in residence at any time will not probably exceed 80 of whom 25 will complete the course each year. Only fifteen passed cadets will qualify for apprenticeships. There will be a distinct advantage in introducing this element of competition since it is easier to select the more suitable officers at the final stage than at first admission. Those cadets who do not qualify for the mercantile marine will have received an excellent education and should have no difficulty in obtaining admission to a higher course of study or in obtaining employment.

7. During the first year instruction will be confined to English, Mathematics, *i.e.*, Arithmetic, Algebra and Geometry, the History of India and Geography. The Cadets will also receive instruction in the elements of seamanship, rowing and physical training. During the second year Trigonometry, Navigation and Meteorology will be added for a few hours each week, the course in general Mathematics and General Knowledge being correspondingly reduced. During the third year the course should follow as closely as possible that taught in the first and second nautical classes in the "Worcester" training ship.

8. We understand that the fees paid by a resident student in a good hostel attached to a high school in the Bombay Presidency range between Rs. 40 and Rs. 50 per student per mensem including board and lodging, tuition, medical fees, games fees, etc. We recommend that the fee at the training ship should be Rs. 50 per student per mensem which will cover all dues to the ship and from which the boys should be provided with a simple working uniform similar to that worn by boy scouts and a white uniform with buttons, etc., for shore leave and ceremonial occasions. There should be a limited number of scholarships, *e.g.*, three in each term of the value of Rs. 25 each per mensem which will take the form of remission of half the training fees.

9. We have fixed the fees with a view to the class of boys whom we expect to recruit. It has been suggested that the training ship may draw on sons of serangs, lascars, etc., who already follow the sea. It seems extremely improbable that men of this class will be willing to allow their boys to undergo a course of six years, *i.e.*, three years in the training ship and three years apprenticeship before they become wage-earners. It is understood that their boys at present start wage-earning at about the age when we should expect them to join the training ship. Moreover English apprentices in the mercantile service are not sons of common seamen. Evidence as to the likelihood of recruits for training being forthcoming is contradictory but we believe that if sufficient publicity is given to the scheme there is a fair possibility that boys of the middle classes may be attracted to this career. The prospects before a lad on the completion of his training should be, however, clearly set forth.

10. Before the scheme is inaugurated it will be necessary to lay an outline of it before the Board of Trade and obtain from them an assurance that they would be prepared to consider favourably an application, when the training scheme is complete, for recognition of its courses as equivalent to one year of sea faring.

11. We attach to this note :—

- (a) an estimate of the cost of preparing the "Dufferin" for use as training ship (Appendix "A");
- (b) a list of the staff which we consider necessary (Appendix "B");
and
- (c) a summary of the capital and recurring cost of the scheme (Appendix "C").

APPENDIX "A"

Estimate of non-recurring cost of fitting out the R. I. M. S. "Dufferin" as Training Ship.

Alterations and repairs as per estimate attached:—

	<i>Labour.</i>	<i>Material.</i>	<i>Total.</i>
	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Alterations	30,150	43,400	73,550
Reconditioning work	26,552	20,292	46,844
Overhead charges	25,516	12,738	38,254
Total .	82,218	76,430	158,648

	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Electric fittings, etc., as per estimate attached:	11,000	23,000	34,000
	2,250	3,150	5,400
Total .	13,250	26,150	39,400

Awnings, running gear, fitting sails, yards, etc.			<i>Rs.</i> 25,000
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Grand total of non-recurring charges.			<i>Rs.</i> <u>2,23,048</u>
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N.B.—There will be some returns on stores, etc., and arisings but no allowance for this has been made in the estimate.

The estimate includes the provision of additional furniture for cabins.

APPENDIX " B ".

ESTIMATE OF RECURRING CHARGES.

<i>Officers and Instructional Staff.</i>		<i>Rs. per annum.</i>
Captain (a) . . .	Salary	20,400
	Servants' allowance	1,200
Chief Officer (b) . . .	Salary	8,400
	Messing	730
Second Officer (b) . . .	Salary	6,000
	Messing	730
Headmaster (Euro- pean) (c)	Salary	18,000
	Messing	730
Second Master (d) . . .	Salary	3,000
Third Master (d) . . .	Salary	3,000
Fourth Master (e) . . .	Salary	3,000
	One Assistant Sur- geon, I.S.M.D.	3,000
One European Boat- swain Instructor.	Messing	730
	Salary at Rs 250 p. m.	3,000
One Clerk at Rs. 150 per mensem	Messing	730
	Salary	1,800
One Indian Boatswain Instructor at Rs. 150 p. m.	Messing	365
	Salary	1,800
Two Engine Drivers, 1st class	Messing	730
	Salary	3,600
Total		81,675

(a) The Captain may be of the standing of a Captain in the Indian Marine, specially selected.

(b) On the ship one officer must always be on duty. Allowance must be made for sickness and leave, therefore two officers are the minimum complement. These officers will instruct in Seamanship. They may be drawn from the Mercantile Marine.

(c) The headmaster of other training ships is usually instructor in navigation and nautical astronomy. In view of the peculiar conditions in India the headmaster on the "Dufferin" will be fully occupied in supervising his staff and teaching English, a thorough grounding in which during the first year is essential if the cadets are to understand the higher technical instruction. For this instruction it will be necessary to rely on the professional staff, who must be specifically recruited for this purpose, if necessary, at higher rates of pay than those proposed by us.

(d) The second and third masters will be teachers of Mathematics and General Knowledge. They will live on shore and come out to work daily on a launch, hence no allowance has been made for their messing. The pay of their posts has been fixed with reference to the pay of superior posts in the Bombay S. E. S. from which service they might be drawn.

(e) The fourth master will be an additional English master to be recruited in the second year on the same pay as the second and third master, if it is found that a fourth master is necessary.

Crew.

	Rs.	A.	P.	Per annua.
1 Serang	960		0	„
1 Tindal	480	0	0	„
10 Lascars, 1st class	3,720	0	0	„
For Auxiliary Machinery, Electric Light, etc.—				
10 stokers, 1st class	3,720	0	0	„
1 Wireman for electric light	1,200	0	0	„
1 Carpenter's mate	840	0	0	„
1 Ship's Steward	720	0	0	„
1 Store keeper (Cassaub)	420	0	0	„
4 Topasses at Rs. 25 per mensem each	1,200	0	0	„
2 Bhandaries at Rs. 25 per mensem each	600	0	0	„
<i>Ward Mess Servants.</i>				
1 Butler	600	0	0	„
1 Servant	420	0	0	„
1 Cook	480	0	0	„
1 Masalchi	360	0	0	„
<i>Educational Staff Mess.</i>				
1 Servant	420	0	0	„
<i>Warrant Officers Mess.</i>				
1 Servant	420	0	0	„
Clothing for all the above at Rs. 15 per annum	570	0	0	„
Messing for the above at 10 annas per diem each	8,068	12	0	„
Total	25,798	12	0	„
<i>Cadets' Boarding.</i>				
120 cadets food at Re. 1 per diem for eight months	28,800	0	0	„
3 cooks at Rs. 35 per mensem each	1,260	0	0	„
3 Masalchis at Rs. 30 per mensem each	1,080	0	0	„
Total	31,140	0	0	„
<i>Stores and upkeep.</i>				
Prizes, educational instruments and books	3,000	0	0	„
Recreation and sports	1,000	0	0	„
*Stores, Oil fuel for lighting fans, sanitary, etc.	45,000	0	0	„
Water	2,000	0	0	„
†Annual repairs and docking	25,000	0	0	„
Total	76,000	0	0	„

* Including petrol for motor launch.

† Annual and emergency repairs will be carried out at the Royal Indian Marine Dock Yard on payment.

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APPENDIX " C ".

Estimate of expenditure involved in converting and using R. I. M. S. " Dufferin " as a training Ship.

	<i>Labour.</i>	<i>Material.</i>	<i>Total.</i>
	Rs.	Rs.	Rs.
<i>Capital Expenditure</i> as per Appendix " A "	95,468	1,02,580	1,98,048
Awnings, etc., as per Appendix " A " . . . . .	..	..	25,000
			<hr/>
	Grand Total Rs.		2,23,048
	Say Rs.		2,50,000
 <i>Recurring expenditure</i> (Appendix " B ")	Rs.	A. P.	
Officers and Instructional charges	81,675	0 0	
Crew	13,860	0 0	
Ward Mess Servants	1,860	0 0	
Educational Staff Mess, Warrant Officers Mess, Clothing, Messing, etc.	10,078	12 0	
Cadets' Boarding	31,140	0 0	
Stores and Upkeep	76,000	0 0	
	<hr/>		
Total of recurring expenditure			2,14,613 12 0
 <i>Receipts—</i>			
<i>Fees—</i>			Rs.
32 cadets for 8 months @ Rs. 50			12,800
18 cadets for 8 months @ Rs. 25			3,600
			<hr/>
			16,400
			<hr/>

APPENDIX D.

H. M. S. WORCESTER, DAILY ROUTINE.

<i>Monday.</i>	<i>Tuesday.</i>
A. M.	A. M.
6-0 Night watchman calls Instructors and Galley Hands.	6-0 Night watchman calls Instructors and Galley Hands.
7-0 Cadets called. First part to wash.	7-0 Cadets called. First part to wash.
7-30 First part fall in for 10 mins. Physical Drill.	7-30 First part fall in for 10 minutes. Physical Drill.
7-40 Second part fall in for 10 mins. Physical Drill.	7-40 Second part fall in for 10 minutes. Physical Drill.
7-55 Divisions and Prayers.	7-55 Divisions & Prayers.
8-0 Hoist Colours. Band salute cadets facing aft.	8-0 Hoist Colours Band salute cadet facing aft.
8-1 Pipe Breakfast.	8-1 Pipe Breakfast.
8-30 Clear up Decks.	8-30 Clear up Decks.
8-50 Rig School. Main Deck.	8-50 Rig School. Main Deck.
9-0 School.	9-0 School.
11-0 Stand Easy 10 Minutes.	11-0 Stand Easy 10 minutes.
11-10 School.	11-10 School.
12-0 Dismiss School.	12-0 Dismiss School.
P. M.	P. M.
12-5 Hands to Sections.	12-5 Hands to Sections.
12-55 Dismiss Sections.	12-55 Dismiss Sections.
1-0 Pipe Dinner.	1-0 Pipe Dinner.
1-30 Clear up Lower Deck.	1-30 Clear up Lower Deck.
1-55 Rig School.	1-55 Rig School.
2-0 School.	2-0 School.
4-30 Dismiss School. Clear up Decks.	4-30 Dismiss School. Clear up Decks.
5-30 Pipe Tea.	5-30 Pipe Tea.
6-0 Stand Easy.	6-0 Stand Easy.
7-30 Clear up Main & Lower Decks.	6-30 First Section to Model Room for lecture. Electricity.
8-0 Pipe Supper.	7-30 Clear up Main & Lower Decks.
8-30 Prayers. Cadets turn in.	8-0 Pipe Supper.
9-0 Badge Cadets turn in.	8-30 Prayers. Cadets turn in.
9-30 Pipe down. Silence on the Lower Deck.	9-0 Badge Cadets turn in.
10-0 Cadet Captains turn in.	9-30 Pipe down. Silence on the Lower Deck.
	10-0 Cadet Captains turn in.

<i>Wednesday.</i>	<i>Thursday.</i>
A. M.	A. M.
6-0 Night watchman calls Instructors & Galley Hands.	6-0 Night watchman calls. Instructors. & Galley Hands.
7-0 Cadets called. First part to wash.	7-0 Cadets called. First part to wash.
7-30 First part fall in for 10 minutes. Physical Drill.	7-30 First part fall in for 10 minutes. Physical Drill.
7-40 Second part fall in for 10 minutes. Physical Drill.	7-40 Second part fall in for 10 minutes. Physical Drill.
7-55 Divisions & Prayers.	7-55 Divisions & Prayers.
8-0 Hoist Colours. Band salute cadets facing aft.	8-0 Hoist Colours. Band salute cadets facing aft.
8-1 Pipe Breakfast.	8-1 Pipe Breakfast.
8-30 Clear up Decks.	8-30 Clear up Decks.
8-50 Rig School. Main Deck.	8-50 Rig School.
9-0 School.	9-0 School.
11-0 Dismiss School.	11-0 Stand Easy 10 minutes.
11-10 Fire Stations. Abandon ship. Scrub Upper Deck.	11-10 School.
P. M. Clean down ladders Sand wash clothes, etc.	12-0 Dismiss School.
1-0 Pipe Dinner.	P. M.
1-30 Shore Party to clean.	12-5 Hands to Section.
2-0 Shore Party fall in.	12-55 Dismiss Sections.
5-0 Hoist recall.	1-0 Pipe Dinner.
5-30 Pipe Tea.	1-30 Clear up Lower Deck.
6-0 Free Game Room & Library.	1-55 Rig School.
7-30 Clear up Main & Lower Decks.	2-0 School.
8-0 Pipe Supper.	4-30 Dismiss School.
8-30 Prayers. Cadets turn in.	5-30 Pipe Tea.
9-0 Badge Cadets turn in.	6-0 Stand Easy.
9-30 Pipe down. Silence on the Lower Deck.	6-30 Stand Easy.
10-0 Cadet Captains turn in.	7-30 Clear up Main & Lower Decks.
	8-0 Pipe Supper.
	8-30 Prayers. Cadets turn in.
	9-0 Badge Cadets turn in.
	9-30 Pipe Down. Silence on the Lower Deck.
	10-0 Cadet Captains turn in.

<i>Friday.</i>	<i>Saturday.</i>
A. M.	
6-0 Night watchman calls Instructors & Galley Hands.	6-0 Night watchman calls Instructors and Galley Hands.
7-0 Cadets called. First part to wash.	7-0 Cadets called. First part to wash.
7-30 First part fall in for 10 minutes. Physical Drill.	7-30 First part fall in for 10 minutes Physical Drill.
7-40 Second Part fall in for 10 minutes. Physical Drill.	7-40 Divisions & Prayers.
7-55 Divisions & Prayers.	7-55 Second part fall in for 10 minutes Physical Drill.
8-0 Hoist Colours. Band Salute Cadets facing aft.	8-0 Breakfast.
8-1 Pipe Breakfast.	8-30 Place scrub deck gear. Get boats alongside.
8-30 Clear up Decks.	9-0 Hands scrub & wash decks. Clean ship.
8-50 Rig School.	11-30 If Decks are finished all sections 30 mins. Signals.
9-0 School.	1-0 Pipe Dinner.
11-0 Stand Easy 10 minutes.	2-0 Shore Party to clean.
11-10 School.	2-30 Shore Party fall in.
12-0 Dismiss School.	4-30 Recall Hoisted.
P. M.	5-0 Clear up Decks.
12-5 Hands to Sections.	5-30 Tea.
12-55 Dismiss Sections.	6-0 Free Library & Game Room.
1-0 Pipe Dinner.	7-30 Clear up Main & Lower Decks.
1-30 Clear up Lower Decks.	8-0 Pipe Supper.
1-55 Rig School.	8-30 Prayers. Cadets turn in.
2-0 School.	9-0 Badgc. Cadets turn in.
4-30 Dismiss School.	9-30 Pipe Down. Silence on Lower Deck.
5-30 Pipe Tea.	10-0 Cadet. Captains turn in.
6-0 Stand Easy.	
6-30 Stand Easy.	
7-30 Clear up Main & Lower Decks.	
8-0 Pipe Supper.	
8-30 Prayers. Cadets turn in.	
9-0 Badge Cadets turn in.	
9-30 Pipe Down. Silence on the Lower Decks.	
10-0 Cadet Captains turn in.	

<i>Sunday.</i>	<i>Summer Months.</i>
A. M.	P. M.
6-0 Hands called by Night watchman.	<i>Special Summer Routine.</i>
7-0 Cadets called. First Part to wash.	5-0 Pipe Tea.
7-30 Second Part to wash.	5-30 Non duty Forms or Sections clean for games.
7-55 Hoist Colours & Prayers.	6-0 Shore Party fall in & landed.
8-0 Pipe Breakfast.	Mondays. { English Classes. Ashore.
8-30 Clear up Decks for inspection. Cadets to Clean.	{ Nautical Classes. School.
9-45 Clear off Lower Deck. Divisions after rounds are made.	Thursdays { Nautical Classes. Ashore.
11-0 Rig Church.	{ English Classes. School.
1-0 Pipe Dinner.	Non school nights sections will land remainder will do "Seamanship."
2-0 Shore Party to clean.	6-30 School.
2-30 Cadet Captains going on shore fall in. Free Library.	7-45 Dismiss School.
4-30 Clear up Decks.	Shore party return on board.
5-0 Pipe Tea.	8-10 Clear up Decks.
6-45 Rig Church.	8-30 Pipe Supper.
7-0 Church.	9-30 Prayers. Cadets turn in.
8-0 Unrig Church. Pipe Supper.	10-0 Cadet Captains turn in.
8-30 Cadets turn in.	<i>Winter Months.</i>
9-0 Badge Cadets turn in.	Monday and Thursday only.
9-30 Pipe Down. Silence on the Lower Deck.	7-0 Evening School.
10-0 Cadet Captains turn in.	8-0 Dismiss School.

APPENDIX E.

H. M. S. "WORCESTER."

*School Syllabus.**Number of Periods (of about 50 minutes) devoted to each subject per week.*

	1st Naut.		2nd Naut.		3rd Naut.		Remove.		1st English.		2nd English.	
	T.	P.	T.	P.	T.	P.	T.	P.	T.	P.	T.	P.
Scripture	$\frac{1}{2}$	..	$\frac{1}{2}$	..	$\frac{1}{2}$	..	$\frac{1}{2}$	..	1	..	$\frac{1}{2}$	..
Dictation . . . . .	..	..	..	..	..	..	..	..	2 $\frac{1}{2}$	..	3	..
English	1 $\frac{1}{2}$	$\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{2}$	2 $\frac{1}{2}$	$\frac{1}{2}$	2 $\frac{1}{2}$	$\frac{1}{2}$	2 $\frac{1}{2}$	$\frac{1}{2}$
History	1 $\frac{1}{2}$	$\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{2}$	2 $\frac{1}{2}$	$\frac{1}{2}$	2 $\frac{1}{2}$	$\frac{1}{2}$	2 $\frac{1}{2}$	$\frac{1}{2}$
Geography	2	..	2	..	2	..	2	..	2	1	2	1
French . . . . .	..	..	..	..	3	1	3	1	3	1	3	1
Arithmetic . . . . .	..	..	..	..	2	..	2	..	4	1	4	1
Algebra	2	..	2	..	2	..	2	..	3	1	4	1
Geometry	2	..	2	..	2	..	2	..	2	1	3	1
Trigonometry	2	..	2	..	2	..	3	1	..	..	..	..
Navigation	2	1	3	1	3	2	3	2	..	..	..	..
Naut. Astronomy	4	2	3	2	..	..	..	..	..	..	..	..
Meteorology	1	..	2	..	2	..	2	..	2	..	..	..
Magnetism ¹	1	..	2	..	..	..	..	..	..	..	..	..
Mechanics	2 $\frac{1}{2}$	$\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{2}$	..	..	..	..	..	..
Science	2 $\frac{1}{2}$	$\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{2}$	..	..	..	..	..	..
General Maths . . . . .	..	1	..	1	..	1	..	1	..	..	..	..
Total	24 $\frac{1}{2}$	6	24 $\frac{1}{2}$	6	24 $\frac{1}{2}$	6	24 $\frac{1}{2}$	6	24 $\frac{1}{2}$	6	24 $\frac{1}{2}$	6

T—TEACHING PERIOD.

P—PREPARATION.

English Syllabus.

- II. English . . . (a) Set-book. Scotts' "Old Mortality."
- I. English . . . (b) Reproduction of a simple story and easy compositions.
(c) Meanings of various phrases, abbreviations, etc.
- Remove . . . (a) Set-book. Scotts' "Old Mortality."
(b) Composition.
(c) Meanings of various phrases. abbreviations, etc.
- III. Nautical . . . (a) Set-book. Callender's "Sea-Kings of Britain." Vol. 3.
- II. Nautical . . . (b) Composition.
- Nautical . . . (a) Set-book. Sheridan "The Rivals."
(b) Composition—a weekly essay—subject announced on Monday—written in school on Friday.
(c) Reproduction and Precs.

Geography Syllabus.

The subject set for annual examination by the Royal Geographical Society is one of the Oceans. Consequently, during the first two terms of the School year attention is devoted (in the middle and Upper forms) to consideration of the countries bordering that ocean. The third term is devoted to revision and to the consideration of ocean currents, winds, depths, cables and smaller islands.

- II. English . . . (a) Elementary ideas of latitude and longitude, simple definitions of physical features, etc.
(b) Outlines of geography of British Isles; chief ports: manufacturing districts: (no detailed knowledge of Countries) climate.
(c) Position of chief countries, their capitals and ports.
- I. English . . . (a) as in (a) in II. English and in addition.
(b) Outlines of countries bordering Ocean under consideration for Royal Geographical Society Examination.
- Remove . . . (a) Regional geography of Countries bordering Oceans.
(b) Physical geography Solar System; Motions of Earth, Seasons. latitude and longitude Eclipses. Action of rivers; deltas; Snow and Ice: Coral reefs; volcanoes.
- III. Nautical . . . (a) Regional geography of Countries bordering Ocean.
(b) Physical geography. Oceans, depths, currents, tides, atmosphere: temperature; winds; trade winds, etc.
- II. Nautical . . . (a) as for III. Nautical.
(b) Physical geography revision of above.
(c) Map projections.
- I. Nautical . . . All above. In addition economic development of British Empire; chief Trade-Routes; Imperial Communications.

History Syllabus.

No attempt is made to teach English History prior to 1485. The subsequent period (1485 to the present day) is subdivided as follows :

I. 1485-1689 II. 1689-1815 III. 1815-present day.

Each of the foregoing subdivisions occupies one year.

In addition a rough outline of the development of the Chief European nations and of the British Empire is taught in the Upper forms.

- II. English . . . The main facts of the period under consideration.
 I. English . . . Text book used : Ransome's "Elementary History of England"
 "Romove" . . . The same treated more fully.
 III. Nautical . . . Text book : Warner & Martens "Groundwork of English History."
 II. Nautical . . . (a) As for III. Nautical but in addition.

(b) Rough outline of contemporary European History—*e.g.*, map of Europe about 1500 A. D ; Empire, Spain & France ; Turks. Renaissance : Reformation ; Rise of United Provinces : Thirty years' war ; Richelieu ; Wars of Louis XIV ; Map of Europe 1713 ; Rise of Prussia : Maria Theresa and War of Austrian Succession ; Seven Years' War ; Partitions of Poland ; Russian advance to South : French Revolution Napoleon : Map of Europe 1815.

N. B.—(b) is given in the form of lectures with the help of prepared cyclostyled notes.

- I. Nautical *Growth of British Empire.* (a) Various types of colony : early voyages of discovery :
 (b) India—early history—invasions—Mughal Empire ; religions ; Early European settlements ; Duplex & Clive ; Warren Hastings ; India Bills :—Wellesley : Mahratta Wars : Sikh Wars ; Dalhousie ; Canning ; Mutiny ; Afghan Wars ; Recent legislation. Government of India.
 (c) American Colonies : European settlements in N. America. Anglo-French struggle—Conquest of Canada ; Effect of mercantile system on American Colonies : War of Independence : "Quebec Act," Ontario settled ; "Canada Act" of 1791 ; Expansion to West ; "Reunion Act ;" B. N. America Act ; Government of Canada ; Senate & Commons. Modern development, C. P. R.
 (d) Australasia. Early discoveries ; Tasman ; Dampier ; Cook ; Development of N. S. W. growth of other Colonies ; Australian Federation Act of 1900, Government of Australia ; New Zealand.
 (e) South Africa—Dutch settlements, British Occupation Crown Colony ; Boer Trek ; Transvaal Republic ; Kaffir Wars ; Natal ; Attempts at Federation ; Zulu War ; First Boer War ; B. S. A. Company ; Subjugation of Matabeleland ; Gold in Transvaal : Question of franchise, Great Boer War : Self-Government granted—Union Act of 1909. Rhodesia.
 (f) Remaining British possessions.
 (g) Effects of Peace Treaty 1919. Mandated Areas.

N. B.—The above is taught by lectures with the help of prepared cyclostyled notes.

Each course is timed to occupy two terms, the third term being used for revision.

Arithmetic Syllabus.

Text Book. Godfrey, & Price. Four-Figure Tables. Godfrey & Siddons.

- 2nd English** . . . 5 periods per week.
 Weights & Measures.
 The Four Simple Rules.
 Reduction, Compound Rules, Practice.
 Unitary Method without Fractions.
 Areas & Volumes without Fractions.
 Prime Numbers, H. C. F., L. C. M., Roots by Prime Factors.
- 1st English** . . . 5 periods per week.
 Fractions.
 Decimals. (Not recurring.)
 Square, Square root & Reciprocal Tables.
 Logarithms. (Taught from Godfrey & Siddons' Algebra Ch. XV.)
 Unitary Method with Fractions.
 Metric System.
 Ratio & proportion.
 Harder Areas & Volumes.
 Problems.
- Remove** . . . 2 periods per week.
 Revise former work especially logarithms.
 Percentage.
- 3rd Nautical** . . . 2 periods per week.
 Revise former work.
 Approximation.
 Interest.
 Stocks & Shares.
 Circle & Cylinder.

Algebra Syllabus.

Text Book. Durell & Palmer. Part 1.

- 2nd English** . . . 5 periods per week.
 The use of letters.
 Generalised Arithmetic (not Fractions).
 Addition, Subtraction, Multiplication, Division, Squares.
 Square Roots, H. C. F. L. C. M. Brackets, Unitary Method.
 Negative Numbers.
 Simple Equations & Problems thereon.
- 1st English** . . . 4 periods per week.
 Fractions.
 Graphical Work.
 Simultaneous & Problems thereon.
 Factors.
 Indices (Godfrey & Siddons' Algebra Chapter XV).

Algebra Syllabus—contd.

Remove	.	.	.	2 periods per week. Revise former work. Quadratics & Problems thereon.
3rd Nautical	.	.	.	2 periods per week. Revise former work. Simultaneous Quadratics. Literal Equations. Graphical solution of Quadratics
2nd Nautical	.	.	.	2 periods per week. Revise former work. Harder Multiplication & Division. Identities. Harder Fractions & Equations.
1st Nautical	.	.	.	2 periods per week. General Revision.

Geometry.

2nd English	.	.	.	Text Book. Durell's Elementary Geometry, 4 periods per week. Solid, surface, line, point. Measurement of straight lines. Direction. Angle Measurement of angles. Angles at a point. Parallel lines. Angles of a triangle and polygon Use of compasses. Tests for congruence. Ambiguous case. Similar triangles and drawing to scale. Isosceles triangle. Inequalities. Parallelograms and congruence.
1st English	.	.	.	3 periods. Fundamental constructions. Construction of triangles from given data. Intercept theorems and constructions. Pythagoras' theorem. The tangent of an acute angle. The sine and cosine of an acute angle.

Geometry—contd.

Remove . . . 2 periods.

Area of rectangle.
 Area of parallelogram and triangle.
 Area of trapezium.
 Area constructions.
 Symmetrical properties of circle.
 Angle properties of circle.
 Tests for conyclic points.
 Equality of area.
 Tangent properties.
 Construction of tangents
 Mensuration of circle.
 Construction of circles from various data
 Regular polygons.

3rd Nautical . . . 2 periods.

Geometrical representation of identities.
 Segments of a straight line.
 Extensions of Pythagoras' theorem.
 Apollonius' Theorem.
 The rectangle contained by segments of a chord of a circle
 Meaning of a locus.
 Use of loci in constructions.
 Theorems on loci.

2nd Nautical . . . 2 periods.

Meaning of ratio.
 Proportional division of lines.
 The bisector of an angle of a triangle.
 Tests for similarity.
 Mean proportional.
 Properties of the circle.
 Areas of similar figures.
 Constructions depending on similarity.

1st Nautical . . . 2 periods.

General Revision.
Solid Geometry.—(Taught from Godfrey & Siddons *Geometry.*)
 Prism & Cylinder. Pyramid. Cone.
 Inclination of Line and plane and Plane to Plane.
 Sphere. Elementary Plan and Elevation.

Trigonometry.

		Text book Piggotts' Trigonometry.
1st English	.	Included in Geometry syllabus.
		The tangent of an acute angle.
		The sine and cosine of an acute angle.
Remove	. . .	4 periods per week.
		Explanation of Godfrey & Siddons' Tables.
		Examples on sine, cosine and tangent involving problems in two dimensions only.
		Use of Traverso Table.
		Cotangent, secant, and cosecant.
		Examples on the six ratios involving problems in two dimensions only.
		Solution of plane triangles.
		Use of haversines.
		Elementary consideration of the sphere.
3rd Nautical	. . .	2 periods.
		Areas of triangles.
		Circular measure of angles.
		Further consideration of the sphere.
		Proofs of the fundamental formulae for compound angles.
		Continue solutions of plane triangles introducing simple problems in three dimensions.
		Proofs of cosine, natural $\text{hav}\theta$ and natural $\text{hav}\phi$ formulae for spherical triangles.
		Explanation of Inman's Tables for following work.
		Solution of spherical triangles by Nat. $\text{hav}\theta$ and Nat. $\text{hav}\phi$ formulae.
2nd Nautical	. . .	2 periods.
		Revision of Third Nautical Work.
		Areas of triangles by Heron's Rule.
		Area of Sector of a circle.
		Circular measure and small angles.
		Angles greater than 180.
1st Nautical	. . .	2 periods. General Revision. Special stress on Problems in 3 dimensions.

SCIENCE.

3rd Nautical.

Syllabus of work for ten effective weeks at two periods per week.

1. Physical bodies. Differences between solids, liquids, and gasses. General properties of matter briefly in the light of molecular theory.

2. Heat a form of energy. Difference between quantity of heat and temperature. Expansion the general effect of rise of temperature.

SCIENCE—*contd.**3rd Nautical—contd.*

2. Construction of mercury thermometer. Conversion of one scale of temperature to the others.
4. Expansion of gasses under constant pressure. Absolute scale. Maximum and minimum thermometers.
5. Unit of heat. Specific heat.
6. Latent heat of fusion. Latent heat of evaporation.
7. Relation of pressure to volume of a gas under constant temperature.
8. Vapour pressure. Dew point. Hygrometry.
9. Conduction, convection, and radiation of heat.
10. General Revision.

2nd Nautical.

Syllabus of work for ten effective weeks at two periods per week.

1. Light the form of radiation that effects the sight. Brief account of its relation to radiant heat, electricity etc.
2. Rectilinear propagation of light. Laws of reflection of light from a plane mirror. Application to sextant.
3. Application of reflection to sextant continued Also to the artificial horizon.
4. Shadows. Eclipses of sun and moon.
5. Refraction of light. Prisms and lenses.
6. The telescope.
7. Nature of sound and its propagation.
8. Period of vibration, wave length.
9. Syren. Echo.
10. General Revision.

1st Nautical.

Syllabus of work for ten effective weeks at three periods per week.

1. Frictional electricity. Conductors and insulators. Positive and negative electricity.
2. Distribution of electrical charge. Power of points. Electrical induction.
3. Electric potential. Electrical discharge. Lightning and lightning conductors
4. The electric current. Electric cells.
5. Electric resistance. Ohm's law.
6. Electro-chemical action. Chemical work in batteries.
7. Accumulators.
8. Electro-magnetic induction.
9. Dynamo and motor. Radio-electrics.
10. General revision.

MECHANICS.

3rd Nautical.

Syllabus of work for ten effective weeks at two periods per week.

1. Measurement of length. British and Metric units—conversion from one system to the other. Use of micrometer screw.
2. Principle and use of vernier. Practical applications of the vernier to barometer and sextant.
3. Unit of time. Velocity. Uniform rectilinear velocity. Consideration of relative velocities of passing bodies.
4. Composition and resolution of velocities. Questions involving river and current sailing.
5. Acceleration and retardation. Acceleration due to gravity.
6. Mass. British and Metric units.—conversion from one system to the other. Use of chemical balance.
7. Momentum. General Revision to this point.
8. Force as the rate of change of momentum—also as product of mass and acceleration. Weight and its difference from mass. The spring balance.
9. The composition and resolution of forces. Parallelogram, triangle, and polygon of forces.
10. Practical application of parallelogram law in inclined plane, derrick, etc. General Revision.

2nd Nautical.

Syllabus of work for ten effective weeks at two periods per week.

1. Moments of forces. Composition and resolution of forces in parallel direction. The three classes of lever.
2. Practical applications of levers. The pulley considered as an infinite number of co-axial levers.
3. Pulley systems. Wheel and axle. Winch. Screw-jack.
4. Work-measurement. Its application to point out compensation for power obtained by elementary machines dealt with in previous lessons.
5. Energy measurement. Definition of the horse-power. Frictional forces and elementary considerations of mechanical efficiency.
6. General revision to this point.
7. Measurement of area. British and Metric systems. Conversion from one system to the other.
8. Simpson's rule.
9. Measurement of volume. Density measurement.
10. Specific gravity. General calculations of weights of solids and liquids of given dimensions.
 - Longitudinal Inclinations.
 - Trim and Change of Trim.
 - Moment to Change Trim 1 inch.

METEOROLOGY.

Text Book. Barometer Manual.

- 1st English and Remove.* 2 periods per week.
 Instruments. (Chapter I and Appendix I.)
 Corrections of Barometer Readings, both scales.
- 3rd Nautical* 2 periods.
 Revise former work.
 Atmospheric Pressure. (Chapter II.)
 Variations of Pressure. (Chapter III.)
 Beaufort Notation.
- 2nd Nautical* 2 periods.
 Revise former work.
 Winds, (Chapter IV.)
 Tropical Revolving Storms. (Chapter VI.)
 Clouds, 4 principal types. (Admiralty Manual of Navigation.)
 Gales in Temperate Zones. (Chapter V.)
- 1st Nautical* 1 period.
 General Revision.
 Weather Forecasting.

In addition to the above, a general knowledge of the Meteorology of the Ocean is included in the Geography syllabus of each form.

Navigation Syllabus.

- Books used* Iraman's Tables, and Examples in Navigation for the use of Cadets at the R. N. College, Dartmouth.
- Remove* 5 periods per week.
 The Sphere and the Earth.
 Parallel Sailing.
 Plane Sailing.
 Middle Latitude Sailing.
 Days work.
 Correction of Courses and Bearings.
 Explanation of Mercator's Chart.
 Construction of Plotting Chart.
- On Admiralty Charts* Fixing by Bearing and Distance.
 Fixing by Cross Bearings.
 Running Fixes No. tide.
- 3rd Nautical* 5 periods.
 Mercator Sailing.
 Great Circle Sailing (Distance and Initial and Final Courses only.)
 Construction of Mercator's Chart.
 Conversion of Longitude into Time.
 Zone Time.
 Notation of Admiralty Chart.
 Buoys, Lights and Light Vessels in U. K.
 Revision of former work.

- On Admiralty Charts* . . . 4 Point Bearings.
 Keeping reckoning in a Tideway.
 Running Fixes with Tide.
 Revision of former work.
- 2nd Nautical* . . . 4 periods per work.
 Great Circle Sailing. (Latitude and Longitude of Vertex.)
 Revision of former work.
- On Admiralty Chart.* . . . Laying off a course allowing for a current.
 Revision of former work.
- Sextant* . . . Principles.
 Reading on and off the arc.
 Perpendicularity, Side Error, Index Error.
- 1st Nautical* . . . 3 periods per week.
 Revision of Former work.
 Composite Sailing. Fixing by Station Pointer.
 Construction of mercator's Chart without protractor.
- Sextant* . . . Centring and Collimation Error.
 Measuring of Vertical and Horizontal Angles.
- Tides* . . . Short Explanation. Use of Tidal Diagrams.
- Nautical Astronomy Syllabus.*
- 2nd Nautical* . . . 5 periods per week.
 The Celestial Sphere. Geographical Position. Celestial Poles.
 Equator. Meridians. Ecliptic. First Point of Aries.
 Declination. Parallels of Declination. Polar Distance.
 Zenith. Celestial Horizon. Observer's Meridian N. E. S. W.
 Points of Horizon. Latitude P. N. Prime Vertical. Altitude
 Azimuth, Hour Angle. Circle of Position, Projection of Celestial
 Sphere on plane of Horizon. Examples of drawing the
 triangle PZX and solving for Zenith Distance and azimuth.
 Apparent Solar Day and Apparent Solar Time, Mean Sun, Mean
 Time, Equation of Time, H. A. T. S. H. A. M. S. G. M. T.
 G. H. A. M. S. G. H. A. T. S. Conversion of Longitude into
 Time, Zone Time. G. D. D. W. Error and Exact G. M. T.
 The Nautical Almanac. Finding Exact Declination and
 • Equation of Time. Calculation of H. A. T. S.
 Modification of haversine formula to hav $z = \text{hav } (l + d) - \text{cos}l \text{cos}d$ hav H. A. T. S.
 Calculation of Zenith distance and azimuth (arrangement as in
 Admiralty Manual p. 148).
 Corrections to be applied to and observed altitude of Sun's L. L.
 Theory of the Position Line.
 Complete working of a sun sight (As in Admiralty Manual p.
 157). Sun Meridian Altitude, regarded as a special case of
 the intercept method. D. W. T. and Zone Time of Noon.
 Fix by Sun Sight and shore bearing with or without rim
 by plotting on Admiralty Chart.
 Fix by 2 sun sights (one of which may be a meridian altitude),
 by plotting on Admiralty Chart.
- 1st Nautical* . . . 6 periods per week.
 General Revision of Sun Sights.
 Deviation by Sun Time Azimuths and Amplitudes

Position Lines by Star and Planet sights.
 Latitude by Polaris.
 Position Line by Moon Sight.
 Star and Planet Meridian Altitudes.
 Moon Meridian Altitude.
 Deviation by Star Planet and Moon.
 Deviation by Polaris.
 Ex-Meridian Altitudes.
 Fixing by any two sights by plotting either on an Admiralty
 or a Plotting Chart.
 Finding the time of Transit of Stars, Planets and Moon.
 Finding what bodies cross the meridian during a given inter
 val.

Magnetism.

2nd Nautical 2 hours per week.
 Magnets. Hard Iron. Soft Iron Terrestrial Magnetism.
 Variation. Deviation. Dip.
 Permanent Magnetism of a Ship. Induced Magnetism.
 Hard Semi-circular Error, Soft Semi-Circular Error.
 Quadrantal Error. Heeling Error.
 Use of Fore and Aft. Athwartship and Vertical Magnets.
 Flinder's Bar and Spheres.
 Napier's Diagram.

1st Nautical 1 hour per week.
 Explanation and Calculation of the Co-efficients.
 Corrections illustrated by the Devioscope.

APPENDIX.

SEAMANSHIP INSTRUCTION.

The Cadets are divided into four sections: each of those sections, except the 1st or Senior section is divided into two groups. The Sections are accordingly 1, 2a, 2b, 3a, 3b, 4a, 4b. in order of seniority.

New Cadets are drafted into 4b, and if successful in their term examination, they pass into 4a. At this elementary stage failures to pass up after one term are very infrequent. Promotion then follows in normal conditions to higher groups and so on to the 1st Section.

The 1st Section is naturally the aim of all Cadets, and competition to fill vacancies in this Section is keen. In the first Section examination results have the following relation to the final certificate awarded:—

75 per cent. and over	.	.	First Class Extra.
50 per cent. to 74 per cent.	.	.	First Class.
Below 50 per cent.	.	.	Ordinary.

In the second Section certificates are awarded as follows:—

90 per cent. and over	.	.	First Class.
Below 90 per cent.	.	.	Ordinary.

No certificate is awarded to a Cadet who has not been promoted at least to the 2nd Section.

The following times are devoted to Seamanship.

12-5 P.M.—12-55 P.M. daily except Wednesdays and Saturdays.

On Wednesdays (Following Fire Stations and Abandon Ship) decks are usually cleaned down, but we manage also to send one section to Seamanship and one to Signals.

On Saturdays all sections go to Signals for 30 minutes after "Scrub Decks."

The Seamanship Manual is that written by Sir David Wilson Barker, and every encouragement is given to Cadets to use additional books by other standard writers.

The examinations are based on Sir David Wilson Barker's book and these examinations are held at mid-term and end of term.

An inspection of the Ship's Routine Table will show that a lecture in Elementary Electricity is given to the 1st Section every Tuesday from 6-30 to 7-30 P.M., and on Fridays a lecture on Steam is given from 12-5—12-55 P.M. Thus the Seamanship lectures are reduced to three per week for the 1st Section.

The Subjects are dealt with in broad outlines during the lecture periods, and Cadets are urged to work on the details during the evenings.

Seamanship Instruction Staff.

Chief Officer.

Second Officer.

Six Seamanship Instructors.

Daily at 11-45 A.M. the Chief Officer issues orders to the Instructors as to their Sections and subjects to be taken.

The Instructors take Sections 4b. to 2a. inclusive. The Chief and Second Officers share instruction of the 1st Section and from time to time, take, without warning, one of the other groups to inform themselves that the work of their subordinates is being carried on efficiently. Signals are commenced in group 3b. and are continued throughout the higher groups.

Movement upward may be accelerated in the case of a deservng Cadet, and disrating in the very rare cases of slacking, is also adopted.

Syllabus of Electrical Subjects as taken on H.M.S. "Worcester."

1. Introduction of Electrical apparatus as found in Marine practice with special reference to modern ships, etc.

2. *Lighting*.—Explanation of various types of Lamps—their use.

Methods of connecting with proper protective devices, etc.

3. *Elect. Power*.—Description of generators, motors, etc. Their design and construction, also application and proper maintenance.

4. *Auxiliary Units*.—Such as Hoists, Winches, electrically driven and controlled. Their use and proper maintenance.

5. *Elect. Bell and Telephones*.—Principles of action with a general arrangement of various circuits.

6. *Batteries and accumulators*.—Description of the construction and various uses of primary Cells. Also the proper use of Storage batteries.

ENGINEERING.

Course of Ten Lectures given to the Cadets of H.M.S. " Worcester " by Engr. Lt. Rickinson, R. N.

1. Boiler construction and sketches. Tank and water tube boilers.

2. Boiler mountings, water gauge, etc., with sketches.

3. Compound triple expansion engines, with sketches.

4. All pipe arrangements connected with boilers and engines.

5. Auxiliary machinery, pumps, etc.

6. Principles on which various types of marine engines work, including internal combustion engines.

7. Steering gear, windlass and winches.

8. Short description of the indicator card.

9. Description of dynamo engine.

10. Use of condensers, evaporators, etc.

The above lectures are given in detail with blackboard sketches. At the end of the course an examination paper is set requiring answers in all the above subjects, with sketches.

Fourth Section.

Note.—This Section is divided into two parts, comprising 1st and 2nd Term Cadets

Building of a ship (elementary).

Description of parts of Hull.

Names of spars and fittings aloft in a Four Masted Ship.

Names of Sails and Riggings in a four masted Ship.

Going aloft.

Compass and Helm.

Boats. Parts of Method of building.

Life Boats. Methods of Stowing Boats.

How to take a boat away at Sea.

Boat Pulling. (Teaching to Row.)

Watches and Time. (Method of.)

Belaying pins, Cleats, Coiling down Ropes.

International Code—Colours and principal meanings

Meaning of Dipping the Ensign.

Salutes.

Use of lifebuoys.

Glossary of Sea Terms.

Third Section.

Note.—This Section is in two parts, comprising 2nd and 3rd Term Cadets

In addition to 4th Section work :—

Lead and Line.

Common and Patent Logs.

Tackles and purchases (lightly touched on).

Signals. Semaphore.

Morse Code—learn alphabet.

Knowledge of ships' lights—their range of visibility, etc.

All about ropes and lines.

How to make Bends and Hitches (practical).

Use of Bends and Hitches.

Parts of all Fore and Aft Sails.

Parts of all Square Sails.

Making Sennit.

Worm, Parcel and Serve a Rope.

Fittings of Yards and Goffs.

Rigging of Bowsprit and Jibbon.

Whippings.

Scizings.

Running Gear for Square Sails.

Parts of Blocks. How to measure, etc.

Second Section.

Note.—This Section is in two parts, comprising 4th and 5th Term Cadets

In addition to 3rd and 4th Section Work :—

Rigging. Setting up Rigging.

Rattling down Rigging.

Anchors and Cables.

Anchoring a steamer.

Sending Yards up and down.

Sailmaking.

Bending and unbending sails.

Boat Drill. Getting life-boat in and out.

Boat sailing.

Sounding Machine.

Tackles and Purchases, Power gained, etc.

Rocket and Mortar Apparatus.

Schmerley Rocket Gear.

Signals. Flags. Morse Lamp. Morse flag, and semaphore.

Rule of Road Steering and Sailing rules in addition to all lights.

Deep Sea Lead and Line.

Making of Knots (practical).

Rope Splicing—Eye, short and long splices.

First Section.

Note.—This Section is the Senior Section, comprising top boys from 2nd Section—mostly 5th and 6th term Cadets.

In addition to all lower Sections :—

Lectures on Steam Engineering.

Lectures on Electrical Engineering.

Elementary Ship Construction.

Stability, etc.

Rigging of Sheers and Derricks.

Stowage of Cargoes.

Anchoring and Mooring Ship.

Laying out Anchors.

Sea Anchors.

Rule of Road (fully).

Method of beaching a Boat in a Surf.

Practical Boat Sailing.

Running a line of soundings.

Effect of a screw propellor going ahead, and astern.

Man overboard (Method of Rescue).

Signals, Reading Morse Lamp and Flag, Semaphore at B. O. T. rate.

Picking out signals from Signal Book.

Keeping and relieving Watch.

Glossary of Sea Terms.

Keeping of Log Book (Both Deck and Meteorological).

Load line marks.

Method of determining the strains in topping lofts and derricks.

Taking of Compass Error. Bearing and laying off of same.

Wire Splicing. Eye short and long splices.