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Maritime education and training in Bangladesh

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MARITIME EDUCATION AND TRAINING IN BANGLADESH

by

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The contents of this Paper reflect my own personal views and are not necessarily endorsed by the UNIVERSITY.

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I express my sincere thanks to IMO & W.M.U. Administration for giving me an opportunity to study in this university.My two years stay in this university have been full of experience & knowledge. The field trips undertaken by me were eye opening.I had the opportunity to see for myself the facilities in different established teaching institutions & discuss the problems with the learned faculty members & members of administration these institutions.The notable ones are:

The U.S.merchant Marine Academy,King's point,
The state university of New York, Fort schuler.
The U.S. Naval Acdemy, Anapolis, New York, Maryland.
The Ship Research Institute, Flensburg, F.R.G.
The Maritime Academy,Warnemunde, G.D.R.
The Maritime Training Institutes, Newyork
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The Maritime Academy. Rjeka, Yugoslavia.
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I express my sincere thanks to the authorities of these institution for their active support and co operation.

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The project is not an exhaustive piece of article.The ideas and knowledge I carry from this university are to big to put in pen, but will definitely guide my future career & ultimately my country.

I finally express my sincere thanks to my organisation the Bangladesh Shipping Corporation & my government for deputing me for this course.

ABSTRACT

The project "Maritime Education & Training in Bangladesh" deals with the existing system in my country, the development project under execution and the future course of action to be taken. While dealing with the subject I have tried to be straightforward as far as possible. I have tried to explain the essential elements which need to be developed if our education and training is to be effective in a changed technological environment in the field of shipping. I have tried to highlight the importance of practical training backed by sound & broad theoretical studies required of an officer serving on board a ship to run a modern vessel safely & efficiently. This stems from my personal belief that the ultimate safety of a vessel lies with the person who operates it . Training is a definite insurance against accidents & inefficiency.

Our system is still new and in a development stage. I have put forward some suggestion which I consider will help our country.

I have tried to explain the problems our country is facing in developing its education & training facilities. I have pin pointed the problem of lack of experienced teaching staff as our number one problem.

I have put forward some suggestions to solve the problems.

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CHAPTER I

INTRODUCTION

Bangladesh appeared on the world map as an independent state on the 16th December 1971.

The country lies in the northeastern part of the South Asia between $20^{o}41'$ and $26^{o}38'$, north latitude $88^{o}01'$ and $92^{o}41'$ east longituude.The country borders with India on her west & north & Burma & India on her east.The entire southern border embraces the Bay of Bengal

The total area of the country is 143778 sq Km.The territorial water of Bangladesh extends 12 nautical miles and the economic zone 200 nautical miles measured from the base line.The total coast line is about 580 km.

The country is highly riverine.The river networks and their distributaries numbering 230 with a total length of 15000 miles covering the country flow down to the Bay of Bengal.The total navigable riverine water way is about 5240 miles.

Because of the presence of such a dense network of rivers, the water borne tranport has become predominant compared to other mode of transport.In fact rivers are the life line of our national economy.There are 3174 registerd steamers,motor launches,ferry boats oil tankers , barges & almost 2.8 million country boats in commercial use in the country.The number of launch landing stations in the country is 1400.

Fish is the main item in a average Bengali daily diet & is an important source of protein.The Bay of Bengal and the numerous rivers are the potential source of fish.A considerable portion of

our people make their living on fishing.Bangladesh entered into deep sea fishing in the year 1972 with the establishment of Bangladesh Fisheries Development Corporation,The number of Deep sea Trawlers engaged in Deep sea fishing in the year 1984 was over 90.There are a few thousand small craft fishing in the shallow water of the Bay of Bengal.Fish today is one of the most important items in our export list and earns considerable amount of foreign exchange for our country.

To support our growing maritime industries quite a large number of ship repair and construction indutries have grown up in the country.

The country has two deep sea ports, The port of Chittagong & the Port of Chalna. In short the maritime and ancillary activities represent a sizeable percentage of our national economy.

It is with such a maritime background and heritage that Bangladesh ventured into international merchant Shipping through the establishment of Bangladesh Shipping Corporation.Since then our shipping has recorded a steady rise & has been playing an increasingly important role in our national economy.

The country was determined from the begining of the inception of shipping to maintain an international standard as regard manning & certification . The safety standard maintained in our ships is of international level. To achieve self sufficiency in the field of trained and competent manpower in the field of shipping the country is trying to reorganize and develop its maritime administration and maritime education and training facilities. Despite pressing demand from other sectors of the national economy our Govt. is trying its best to develop maritime education and training facilities keeping in view the requirements of STCW convention and also our national

requirements.In fact the requrements ofthe STCW conventions are incorporated in our national legislation.

In this paper titled "MARITIME EDUCATION AND TRAINING IN BANGLA-DESH", I have tried to give an account of our present system,our development programme & the compliance of the requirements ofthe STCW Convention as regard certification and manning.I have tried to discuss the education and training system of some selected countries.I have tried to extract the following facts from the education and training system of the developed countries.

1. The level of theoretical education given.
2. The practical training ,method and the equipments used.
3. How the system fits into the general education system of the country.
4. Composition and strength of teaching staff.
5. The course curriculumn.
6. Compliance with the STCW convention.

The whole project is based upon my practical observation of the facilities in different developed countries,discussion with faculty members,discussion with the members of administration during field trips,and information gathered from periodicals,literature,hand outs and lectures given by the distinguished visiting and resident professors of the World Maritime University. Finally I have put forward some recommendations which I consider are necessary for my country.

CHAPTER II

BANGLADESH MERCHANT NAVY

2.1 IMPORTANCE OF A MERCHANT FLEET

Bangladesh is a coastal state with Bay of Bengal embracing her entire southern border.Over 95% of our external trade is routed through the sea.The total volume of our external trade in the year 1983-1984 was 7.74 million tons.It is expected that at the end of the 3rd five year plan (1985-1990) the total volume will rise to 10 5 million tons.The main socio economic considerations which prompted Bangladesh to have a merchant fleet in commensurate with the growth of our external trade are:-

1. To prevent drainage of foreign exchange in the form of freight charges which constitute almost 10% of the total cost of cargo.
2. To earn foreign exchange.
3. To help promote our external trade by opening new route and providing concessional freight specially for non traditional items.
4. To ensure timely despatch of parcels to meet our export targets and international obligations and import targets for the sake of stable market and smooth developmental activities.
5. To help the country to bargain at level terms the freight rate with foreign shipping to keep the freight under control.
6. Shipping being a stategic industry, dependence on foreign shipping entirely could be catastropic in times of national emergencies.
7. To generate jobs for our people in shipping and ancillary industries.We are a nation having a long tradition of unique seamanship,and marine related vocations.

8. Finally shipping is in corformity with our greater national objective of self reliance in all activities of national economy.

2.2 GROWTH OF SHIPPING SINCE INDEPENDENCE.

Bangladesh entered into international Shipping in the year 1972.The total number of vessels the nation owned as of 31-10-1984 was 28 with a total capacity of .314 million tons of which .264 million tons numbering 21 Ships in public sector and .05 million tons in the private sector.The acquisitionof such a number of ships within such a short period of time is a clear demonstration of national determination to achieve self sufficiency in this vital sector of economy.The performance of our shipping in these years has been highly encouraging, particularly in a period when the whole world has undergone recession.

2.3 PROJECTED GROWTH BY 1990 During the fiscal year 1983-84 our shipping carried almost 20% of our total external volume, leaving 80% to be handled by foreign flag carriers.The freight charge which constitutes almost 10% of the total cost of cargo is a spectacular loss in the form of foreign exchange and has an adverse affect on our balance of payment.Our national shipping policy aims at acquiring a merchant fleet within the shortest possible time to achieve the capability to lift 40% of our external sea borne trade.It is projected that by 1990 our total ships will be 56 of which 36 in the public sector and 20 in the private sector.The total dead weight capacity will be .627 million.This will enable us to carry about 25% of our external trade.This is a clear demonstration that our merchant fleet has clear room to expand.

CHAPTER III

MANNING AND CERTIFICATION

3.1. LEGAL REQUIREMENT:- As regard manning and certification our national policy has always been to maintain an international standard.In the absence of our own merchant navy act, our govt adopted the British merchant navy act for governing our merchant navy.Our manning scale and certificate requirements were aligned with that of the united Kingdom.

Bangladesh promulgated its own Merchant navy Act in 1983.Under the same Act new rules and regulations regarding certification and manning have been framed.The new national requirements have incorporated the requirements of the STCW convention and recommendations.The provisions are under the process of implementation.

3.2.STRUCTURE OF CERTIFICATE FOR DECK OFFICER:-

The proposed structure and grade of certificates are as follows:-

GRADE OF CERTIFIFATE	FUNCTION QUALIFIED TO DISCHARGE.
Deck officer class 1	Master unrestricted
Deck officer class 2	Chief mate
Deck officer class 3	2nd mate
Deck officer class 4	3rd mate

3.3.MINIMUM SCALE OF OFFICER.

The minimum number of certificated deck officer to be carried in a vessel is as below:-

Type of voyage:-Foreign.

Tonnage:- unlimitted

POSITION OF OFFICER	NUMBER	GRADE OF CERTIFICATE.
Master	1	Class 1
Chief mate	1	Class 2
2nd mate	1	Class 3
3rd mate	1	class 4
radio officer	1	MRCG.

Type of voyage :-Near coastal

Tonnage:- 1600-3000.

POSITION OF OFFICER	NUMBER	GRADE OF CERTIFICATE
Master	1	Class 2
2nd mate	1	Class 3
3rd mate	1	class 4
Radio officer	1	MRCG

TYPE OF VOYAGE :- Near coastal

Tonnage:- 200-1600.

POSITION OF OFFICER	NUMBER	GRADE OF CERTIFICATE.
Master	1	Class 3(E)
2nd mate	1	class 3 or clss 4(E)
3rd mate	1	CLass 4
Radio officer	1	Radio telephone.

Type of voyage:- Home water.

Tonnage 200-1600

POSITION OF OFFICER	NUMBER	GRADE OF CERTIFICATE
Master	1	Class 3(E)
3rd mate	1	CLass 4
Radio officer	1	Radio telephone

Type of voyage:- Home water

tonnage 200-1600

POSITION OF OFFICER	NUMBER	GRADE OF CERTIFICATE
Master	1	Class 4(E)
3rd mate	1	Class 4
Radio officer	1	Radio telephone

Note:-(E) denotes endorsement by administration

Home water voyage:- Means voyage between ports and places in Bangladesh.

Near coastal:-Means voyages between ports and places between Singapore on the south east and Colombo on the south west and includes all ports and places in the bay of Bengal.

Foreign going:-Means a voyage of any distance out side the areas defined above.

3.4 CERTIFICATION OF DECK OFFICER:- A deck officer is issued a certificate of competency after fullfilment of the following conditions:-

1. Initial qualification.
2. practical experience (sea service).

3. Succesful completion of mandatory courses.

4 Passing of examinations(Written and oral).

3.5. MANDATORY COURSES:-The following mandatory courses are required to be taken before class 4 certificate of competency.

1. Proficiency in survival craft.
2. Fire fighting.
3. First aid at sea.
4. Efficient Deck hand.
5. Radio telephone.

The following courses are to be taken before class 2 certificate of competency.

1. Navigation control course:-This includes ARPA,Radar simulator.
2. Ship captain medical course:-The course is much deeper and broader than the first aid course.

3.6. SPECIAL REQUIREMENT FOR TANKERS:-Officers serving in a tanker shall have to take an approved tanker familiarization course.-

SPECIAL REQUIREMENT FOR GAS CARRIER:- Officer serving in a gas carrier shall have to take an approved gas carrier familiarization courses.

3.8. EXAMINATION BY THE ADMINISTRATION The candidates for different grades of certificates are examined in the following subjects.

Deck officer class 4

Subject	hour
General ship knowledge	3
Chartwork	2
Practical navigation.	2
Meteorology	2
Signal & oral examination.	

Deck officer class 3

Genaral ship knowledge	3
Chart work	2
Practical navigation	2
Meteorology	3
Applied science	3
Principle of navigation	2
Mathematics	2.5
Oral	
Practical signal.	

DECK OFFICER CLASS 2

Coastal navigation.	2.5
Ocean & offshore navigation.	2.5
Meteorology	2.5
Shipboard operations	2.5
Ship construction $ stability.	3
Business & law	2
Oral	

Signal

Deck officer class 1

Business & law.	3
Navigation.	2.5
Ship construction & stability	3
Engineering & control system	2.5
Navigation aids & instruments.	3

Oral

CHAPTER IV

MANNING AND CERTIFICATION OF ENGINEERING DEPARTMENT

4.1. LEGAL REQUIREMENT:-The minimum qualification,practical training and sea experience for certificate of competency are determined by the safety administration.The provisions are made taking into consideration the requirement ofthe STCW convention and also specific requirements of the country.

4.2. GRADE OF CERTIFICATE:-There are four grades of certificate of competency.They are :-

Marine engineering officer class 1

Marine engineering officer class 2

Marine Engineering officer class 3

Marine Engineering officer class 4.

4.3. Minimum number of Engineer in a ship:-The manning scale of Engineering officers is based upon

1. Registered propulsion power.

2. Operational range of the ship.

The minimum scale of engineering officer to be carried in a vessel are as follows:-

Foreign going and near coastal voyage.

Registered power	Chief Engineer	2nd engineer
3000 and over	class 1	class 2
750 or more but under 3000	class 2(E)	Class 3

The minimum manning scale for home water voyage are as follows.

Registered power(kw)	Chief Engineer	2nd Engineer-
6000 and over	class 1	class 2
3000 & more but under 6000	Class 2(E)	Class 3
750 &more but under 3000 or Class 4	Class 3(E)	Class 3

(E) denotes endorsement by the administration.

Note:-A Vessel with 750 Kw propulsion power or more is also required to carry two more certificated Engineers of any class mentioned who will be incharge of a watch.

4.4. MINIMUM QUALIFICATION AND SEA TIME

To take a class 4 certificate of competency one has to fulfill the following conditions:-

Must have passed the higher secondary school certificate examination in the science group with mathematics and physics.

Must have successfully completed a four year approved apprenticeship scheme in a recognized marine workshop.

Must have completed 6 months of sea service in the engineering department of a ship having propulsion power no less than 350 kw.

Or

Must have completed successfully an approved training scheme in the Marine Academy Bangladesh as an engineering cadet .The Engineering cadet scheme is of four years duration consisting of three stages.They are:-

2 years in the Marine Academy

1 year at sea as a cadet(with training log)

1 year in the Marine Academy.

For a Class 3 certificate of competency a minimum of 15 months of sea service is required in a vessel with propulsion power not less than 350 kw.

For a Class 2 Certificate of Competency a minimum of 21 months of sea service is required in a vessel having propulsion power no less than 750 kw.Of the 21 month of sea service required at least 9 month must have been spent in watch keeping.

For a Class 1 certificate of competency a minimum of 21 months sea service is required while holding class 2 engineer certificate.

4.5.COMPETENCY EXAMINATIONS BY ADMINISTRATION

Class 4 Examination

The class 4 examination is oral only.

Class 3 Examination

The class 3 Examination consists of the following subjects:-

PART A

General Engineering science 1(one paper)

General Engineering Science 2(one paper)

PART B

Engineering Knowledge(two papers)

Oral Examination.

Class 2 Examination The class 2 examination consists of two parts ,part A & part B.

PART A

Applied mechanics (one paper)

Applied heat (one paper)

Applied mathematics(one paper)

Engineering drawing(one paper)

PART B

Electro technology (one paper)

Naval architecture(One paper)

Engineering knowledge (two papers)

Oral examination.

Class 1 examination

Part A

Applied mechanics (one paper)

Applied heat(one paper)

Part B

Electro technology(one paper)

Naval arcitecture (one paper)

Engineering knowledge (two papers)

Oral Examination

4.6 MANDATORY COURSES FOR ENGINEERS

Prior to taking the class 4 certificate of competency each candidate must complete the following approved courses.

1. Fire fighting.
2. First aid at sea.
3. Prificiency in survival craft.

4.7. SPECIAL_REQUIREMENTS_FOR_TANKERS An approved tanker familiarization course is mandatory for engineers serving in a tanker.

4.8. _SPECIAL_REQUIREMENT_FOR_GAS_CARRIERS An approved gas carrier familiarization course is mandatory for engineers serving in a gas carrier.

CHAPTER V

MARINE ACADEMY

5.1. INTRODUCTION

To ensure a steady supply of well trained and qualified manpower for our growing merchant fleet,allied industries and related Adminstration, Bangladesh recommissioned its Marine Academy in the year 1973.The Academy was established in the year 1962 and since then has been giving pre-sea training to both deck and engineering cadets.The institute is residential and run along the same line as former Conway in U.K. and King's Point in U.S.A.

LOCATION:-The Academy is situated on the eastern bank of river Karnaphuli about 12 miles to the south of the Main city Chittagong.Facing the Bay of Bengal the Academy is located in a beautiful and picturesque place.

5.2.MISSION OF THE ACADEMY:-The mission of the Academy can be briefly summarised as follows:-

1. To explore and recognise the potential sea faring talents of cadets, suitably train and adequately equipe them with officer like qualities , to groom them as future leaders in all fields,especially in the field of shipping and to prepare them to guide men under their command with ability and confidence.

2. To give such a co-curricular and extra curricular and disciplinary training which will enable a cadet to take his place as an officer of the Bangladesh merchant fleet and face with courage,endurance and fortitude the rigours of life at sea.

3. To develop in a cadet through constant guidance and supervision,a sense of purpose,loyalty,devotion to duty,uprightness,adaptability under all trying circumstances,pride of profession and

sprit of service which make them valuable and distinguished members of their profession and proud citizen of Bangladesh, SAUDI ARABIA

4. To achieve a sound academic and professional standard which will enable them to sit for certificate of competeny examinations.

5.3. ORGANIZATIONAL SRUCTURE OF THE ACADEMY:-The Academy is run by the Ministry of Shipping.The institution is headed by a commandant who is responsible to the Director General of shipping.The organizational set up is as follows:-

COMMANDANT

DUPUTY COMMANDANT

ENINEERING DEPARTMENT

NAUTICAL DEPARTMENT

ADMINISTRATION

EDUCATION DEPARTMENT

ADJUTANT

DEVELOPMENT SECTION

Under the above stucture the total number of employees is 190.The total number of officer is 38 and the supporting staff is 152. Details of offocer and supporting staff are as follows:-

NAUTICAL DEPARTMENT

1xChief of nautical studies

2xSenior nautical instructor

3xNautical instructor

1xRadio officer

1xElectronic instructor

1xMedical instructor

1xFire instructor

1xChief petty officer (Seamanship)

1xChief petty officer (signal)

Total Officers=13

total Supporting staff=36

ENGINEERING DEPARTMENT

1xChief Engineer

1x Sr Mechanical Engr.instructor.

2x Sr Engineering instructor

1xSr.Electrical instructor.

1xEletrical instructor

1xSr.Naval Architect

1xNaval Architect

2x Engineering instructor.

1X Electo-Mechanical Engineer.

1xChief Petty officer(ship wright)

Total offcers:-12

Supporting staff:-26

EDUCATION DEPARTMENT

1xChief Education officer

5X Education officer

Total Officers:-6

Supporting staff:-6

ADMINISTRATION

1xDevelopment officer

1xSupporting staff.

ADJUTANT

1x Adjutant.

!xChief petty officer (physical Training)

Supporting staff:-17

The commandant and the Deputy commandant have their own supporting staff of 2 each.

The chief of nautical studies is the head of the Nautical Department, while chief engineer is the head of the Engineering Department.The chief education officer is the head of the Academic Department.

5.4:- ENTRY IN MARINE ACADEMY

Keeping in mind the high standard to be maintained in training,the selection is made through four stages.The selection is purely through competitive examination.The four stages of selection are:- written,interviews,medical and special eye test.

5.5. MINIMUM EDUCATION:-A candidate seeking admission in the Academy must have passed higher secondary certificate examination in science group with mathematics and physics.

5.6. WRITTEN EXAMINATIONThe written examination is held in four papers,each carrying 100 mark and of 3 hours duration.The paper examined are Physics,Mathematics,English,and general Knowledge.40% is the minimum qualifying mark.

5.7. INTERVIEW &VIVA VOCE.Candidates declared successful in the written examination appear before a Board of interview constituted by the Ministry of Shipping.The interview carries 200 marks and 50% is the minimum qualifying mark.The candidates are judged from the following points of view:-

1. Personality:-This includes bearing,general appearance and overall confidence of a candidate.

2. Speech and expression:-This includes whether a candidate can express himself effectively, clearly and logically and also his pronounciation, internation and accent.

3. Intelligence:-This includes whether a candidate's presence of mind, quickness in uptake, wit, humour and commonsense.

4. Knowledge:-This includes a candidate's general knowledge, knowledge of current national and international affairs and of general science as applicable to daily life and of maritime affairs.A candidate is expected to have a good background knowledge of maritime affairs.

5.8. PHYSICAL REQUIREMENTS:- The candidates qualified in written examination and interview are required to undergo a medical examination.A candidate must also conform to the following physical standards:-

(1) Minimum height:-5 feet 2 inches.

(2) Minimum weight:-100 lbs.

(3) Minimum chest:-30 inches with a normal expansion of 2 inches.

The following points are particularly observed.

1. That a candidate's hearing is good and there is no sign of disease of the ear.

2. That a candidate's speech is without impediment.

3. That the candidate's teeth are in good order. 4.That the candidate's chest is well formed and lungs are found clear by x-ray examination and that his heart is sound.

5. That there is no sign of abdominal disease.

6. That the candidate is not ruptured.

7. That the candidate's limbs, hands and feet are well formed and developed and that there is free and perfect motion of all joints.

8. That the candidate does not suffer from any such disease which may relapse due to tough and laborious training in the Academy and tough nature of job on board ship afterwards.

Eye test:-The candidates are tested for perfection of eye sight and colour vision. Nautical cadets are not allowed any spectacles or glasses.

5.9: -FINAL SELECTION:- Final selection is made purely on the basis of merit.Assignment to the nautical or engineering branch is made on the basis of "first preference" given by the candidate,subject to medical limitation especially eye sight.

5.10.: THEORETICAL STUDIES -In order to understand and comprehend professional subjects a sound foundation on academic subject is a pre-requisite.The following academic subjects are taught in the academy.:-

(1) Physics

(2) Mathematics

(3) English

(4) Humanities

(5) General Knowledge and current affairs.

5.11. PROFESSIONAL STUDIES(Nautical)

The following professional subjects are taught to nautical cadets.

(1) Principal of navigation.

(2) Practical navigation.

(3) Chart work.

(4) General Ship Knowledge.

(5) Electronic aids to navigation.

(6) Ship construction and stability.

(7) Meteorology.

(8) Signalling.

(9) Seamanship.

(10) Engineering Knowledge.

(11) Ships business and Commercial Knowledge.

5.12. PROFESSIONAL STUDIES(Engineering)

The engineering cadets under take the following professional subjects:-

(1) General engineering knowledge.

(2) Motor engineering knowledge.

(3) Steam engineering knowledge.

(4) Automation,instrumentation and control.

(5) Engineering drawing.

(6) Workshop practice.

(7) Electro technology.

(8) Naval architecture.

(9) Ship construction.

(10) Heat and heat engines.

(11) Applied mechanics.

6.13. PRACTICAL TRAINING:-

The navigating cadets undertake practical training in the following.:-

Signalling.

Seamanship.

Radio electronics.

Sailing.

Rowing.

Power boat handling.

Physics laboratory.

The engineering cadets undertake practical training in the academy workshop,

Electric and electronic laboratory.

The marine workshop belonging to Bangladesh Shipping Corporation which is one of the most modern workshops in Chittagong.Adequate stress is given on experimenting with the foundamental aspects of engineering science, understanding of constructional details and functional aspects of various machinery found on board ship and attainment of reasonable skills in lathe work, welding, metal cutting fabrication, brazing, gas cutting considered essential for a practical engineer at sea.

5.14REGIMENTAL TRAINING:-Discipline is of paramount importance to be a successful officer in the merchant navy.The Academy maintains a high standard of discipline comparable to any defense academy.The daily life of the cadet is strictly routined and wearing of prescribed uniform is a must.

5.15. SPORTS AND PHYSICAL TRAINING: To keep one physically fit and to instil important human qualities such as alertness, coolness, courage, teamsprit and comradeship, sports and games plays an important role.Organised games in the Academy comprises of soccer, cricket, volleyball, basketball, hockey, tennis,-badminton, swiming and atheletics.

Passing out:- The deck cadet, on passing out, join Bangladesh flag ship as a cadet.They get 9 month remission of sea time required for their first competency certificate.

The engineering cadet completes his training in three phases.

2 years in acadey 1st phase

1 year at sea 2nd phase(With sea log)

1 year in academy 3rd phase.

on succesfull completion of training he is entitled to appear for class 4 certificate of examination.

5.16. SHORT COURSES OFFERED BY THE ACADEMY

Academy conduct the following short courses.

Name of course	Duration.
Engineering class 2 part A	18 weeks.
Engineering class 2 Part B	18 weeks
Deck officer class 2	26 weeks
Deck officer class 3	18 weeks.
Deck officer class 4	12 weeks.
Efficient deck hand	2 eeks.
Course on life boat.	1 week.
Fire fighting	1 week.
Restricted telephone	1 week.
Electro navigation aids	2 week.
Electro navigation system.	5 weeks.
Ship captain medical guide	2 weeks.
First aid at sea	2 weeks.
Proficiency in survival craft	(Facilities being developed)
Crew training	
Basic first aid for crews	1 week
Fire fighting	1 week

5.17. DEVELOPMENT PROJECT (Undergoing).

In order to achieve self sufficiency in the field of trained man power in the maritime sector our government with the assistance of UNDP, undertook a development programme, envisaging a maritime training complex based upon the Marine Academy.

The project is expected to be completed by 1988. The immediate objectives are to achieve the following.

1. To provide preparatory courses in all grade of certificate of competency examinations.(including Master & chief engr)
2. Conduction of advance courses such as Radar simulator,personnel-survival
3. Modernisation of training equipments and teaching aids.
4. Modernisation of phase III workshops for engineering cadets.
5. Introduction of radio officer course.
6. Updating of the library.
7. Development of teaching staff providing training abroad with the ultimate objective of replacing the expatriates.At the moment there are five personnel undergoing studies in the World Maritime University. Two have already completed their two years of studies and have joined the Academy.The five undergoing studies are likely to join either the safety administration or the Academy.
8. Development and updating the course curriculumn of pre sea courses taking into consideration modern requirements.

5.17.1. TEACHING EQUIPMENT PROCURED SO FAR. Under UNDP assistance the Academy procured training equipment to the tune of u$ 850,000. In addition NORAD provided training equipment of 1 million USD, which includes a radar simulator.

Almost all the equipment has arrived and undergoing installation.

SHIPHANDLING SIMULATOR The Academy is trying to procure a shiphandling simulator.It is expected that the same will be avilabe very soon.

On completion of the project it is expected that the Academy will be well equiped and will match any standard marine academy.

5.18. PROBLEMS OF MARINE ACADEMY

The Marine Academy is only 23 years old. The Academy is playing a vital role in the maritime sector, where the necessity of adequately trained and competent manpower is essential for the sake of our national economy.Over 70% of the trained officer serving in our merchant fleet are from this Academy.The Acdemy has been facing some problems since inception.The main problems are :-

1. Shortage of qualified teaching and technical staff.
2. Resource constrain.

5.18.1. SHORTAGE OF TEACHING AND TECHNICAL STAFF The shortage of qualified staff is one of the main functional problems of the Aca demy. The Academy from the very begining has failed to attract and retain our own nationals to serve in the Academy .Since re opening of the academy after independence Academy has had to depend on expatriate teaching staff.At the time of writting this project there are 6 expartriates helping the Marine Academy in its day- to-day programme.From time to time attempt has been nmade to get staff from the Bangladesh shipping corporation on deputation.But in most of the cases they could not be retained for more than one academic year. The result was disruption of training programme and slow progress of developmental activities.The shortage of qualified staff could be attributed to the following factors:-

(a) Isolation of the academy from city life. The Academy because of its location on the other side of the river from the city, is somewhat like a ship at anchorage. The means of transportation to

the city is far from satisfactory and the means of communication is also poor. The staff, for their daily neceesities are dependant on the main city, as there is no shopping facility in the vicinity.

(b) The institute is residential. The teaching staff besides their teaching jobs, are suppssed to look after general welfare of cadets and take part in day- to- day activities. The residence within the campus for teacher is compulssory.

(c). Children education. This is one of the most important factor which is yet to be solved. In the absence of any facility within the campus, the staff has to send their children by boat across the river for schooling. This gives them considerable mental tension for reason of safety. During moonson the weather remains mostly rough and the boat services are frequently disrupted.

(d) The salary stucture in the academy is tied to that of civil servant.The earning of teacher is low compared to other maritime personal serving shore based organizations, particularly in terms of fringe benifit,promotional prospect and also social glamour.

(d) Social outlook

Unfortunately the teaching profession fails to get due consideration from the society as whole.

(e) The Maritime Academy is a vocational institute.The social standing and freedom enjoyed by a teacher in other institution of learning are limitted in the Marine Academy. Research and the pursuit of knowledge for personal development are highly encouraged in other institution of learning and facilities are also there. But the Maritime Academy is still in a state of development and such

facilities are almost non existing.

(f) UNDER FUNDING The operation and development of a Maritime institute involves huge expenditure. The development of its infrastructure requires sound financial support. The cost of equipment is extremely high. For a country like Bangladesh with a poor capital base it is difficult to have sufficient fund made available. The maritime education is yet to be known to the greater section of the society. The actual requirement of such an institution is not very often realised by the persons dealing with the funds.

Though in many countries the education and training cost of such institutions are funded jointly by the government and the shipping industries, such scope is limitted in Bangladesh, since our shipping industry is very small.

CHAPTER VI

MARITIME EDUCATION AND TRAINING IN SOME SELECTED COUNTRIES

This chapter deals with the maritime education and training system prevailing in some selected countries.The objectve is to highlight how these countries have adapted maritime education and training to the changing circumstances neceessiated by technological innovations, social outlook, economic necessities and most importantly safety requirements.

UNITED KINGDOM

The maritime education and training in the U.K. is strictly seperated between deck and engine and needs to be discussed under two headings:.

6.1. EDUCATION OF ENGINEERS The education and training of engineers in U.K. can broadly be divided in two categories.These are:-

1. Traditional training.
2. Cadet training.

TRADITIONAL TRAINING

In the traditional method the Engineer officers are selected from shipyards or marine workshop through apprenticeship programme for a period of four years.On completion of 18 months of sea service as anuncertificated officer they qualify to appear in the class 2 engineer certificate of competency examination.A further qualifying sea service of 18 months, while holding a class 2 certificate,

entitle them to appear in class 1 exmination.This form of training is now being supersided by front ended education generally termed as "cadet training scheme" because of the following reasons:-

(a) The candidates coming up through this programme are not given any broader studies of foundamental aspects of science and engineering.

(b) The increased diversity and sophistication of ships and machineries calls for a more comprehensive,systematically planned and carefully controlled training programme based upon a broader theoretical basis which not only will take care of safety but also of versatile leadership in a day to day ship operation.

(C) It was also necessary that education of engineering officer should be so organized that they get a nationally recognized qualification which will give them a social standing and ample opportunity to get a job after a certain period at sea.

CADET TRAINING SCHEME

The cadet training scheme is provided at three level depending upon the qualifations of the new entry.They are :-

(a) OND SCHEME. (Ordinary national diploma).

(b) HND SCHEME. (Higher national diploma).

(c) DEGREE SCHEME.

All the schemes involve almost the same degree of practical training but they differ from each other very much in theoretical content and standard. The schemes are flexible enough so that candidates with diplomas after study of certain period can take a degree. All the courses are for a period of four years.In general

the ordinary national diploma covers the theoretical requirement of U.K. administration competency examination.

The higher national diploma covers a syllabus which is more than the requirements ofthe U.K.safety administration.

The theoretical content of the degree scheme is the same in standard and breadth as that of any engineering degree in U.K.

The entry requirements varies according to the scheme followed by the students.

ENTRY REQUIREMENTS

OND sceme:-At least must have passed 4 sujects at 'O level' which includes mathematics and a Scientific subject or with a general engineering certificate including mathematics,erecting machinery and technical drawing.

HND scheme:-Must have passed 5 subjects of which mathematics and physics must have been studied at A level.

DEGREE scheme:-A level with mathematics and physics.Candidates with HND can follow a further one year academic curriculumn to get a degree.

Each of the courses includes monitoring of cadet progress, continual assesment of achievement and formal examinations which have been aprroved by U.K. safety Administration but examinations are conducted by the colleges.

EXEMPTIONS Although these cadets are required to sit for their certificate of competency examinations,they are exempted from the theoretical subjects of the class 2 and class 1 engineer examinations depending upon the scheme followed.

The candidate with OND scheme are exempted from the theoretical subjects of class 2 examinations.That is they appear only in practical subjects namely engineering knowledge general and engineering knowledge motor.

The candidate with HND & DEGREE scheme are exempted from class 2 and class 1 engineer examinations theoretical subjects.

MANDATORY COURSES:- The following courses are mandatory and need to be taken by an engineering officer .

(a) Approved fire fighting course.

(b) First aid at sea.

(c) Personnel survival at sea.

(d) Special course for tanker.

(e) Special course for chemical tankers and liquified gas carriers.

The last two courses are meant for officer serving in tankers, chemical, or liquified gas carriers.

FURTHER TRAINING OF ENGINEERING OFFICER

The certificate of competency examinations are oriented towards ships in general rather than to any particular ships.The examinations are basically safety oriented. For these reasons it is desireable that engineering officers shuld get specialized training. Colleges offer many such courses such as:-

Management.

Electronics.

Automation etc.

6.2 NAUTICAL EDUCATION AND TRAINING IN U.K.

In the U.K. for obtaining the first and 2nd mate certificates there are four different Schemes:-

The schemes are built up according to the "SandWich" types and succesful candidates may receive either an official certificate of education or a certificate of competency from the Ministry of Trade and Industries.

The structure of several training scheme is identical except the theoretical content.The schemes are:

(a) ONC Scheme: Examination for ONC takes place at the college under the"Joint commttee" in order to safeguard the required national level. The examinations for 2nd mate certificate are held by D.T.I.When the examinations have been passed the 2nd mate certificate is issued after the required sea time (24months) has been completed and the certificates for mandatory courses are obtained.

The mandatory courses are:-

1. Efficient deck hand.
2. Radio telephone.
3. First aid at sea.
4. Radar observer.
5. Fire fighting.

Entry requirement:- 4 subjects at "O" level which must include mathematics, physics ,and english. OND SCHEME:(Ordinary national deploma). Diploma ranks higher than the ordinary national certificate.

In general outline and content the diploma scheme is similar to that of certificate.But some subjects are taught at deeper level.-

The candidate following the scheme is exempted from the examination of 2nd mate and also for the subjects electricity, radio and electronics from the examination of first mate.

HND SCHEME (Higher national diploma) The course lay out is the same as OND,but theoretical contents are deep.The practical training requirements are the same as for other courses.
Entry requirement:-At least 5 subjects at "O" level which must include mathmatics, physics, and English,
MNTB-SCHEME (Merchant navy training board scheme).The scheme to some extent is similar to the HND scheme and entry qualification is also the same.But mathematics and physics must have been taken at A level.

6.3.MARITIME EDUCATION IN U.S.A.

Prior to the 2nd world war the maritime education in the U.S.A. used to be on the basis of a licence programme.The objective was to meet safety requirements of the Administration that is of the U.S.A. Coast Guard. After 2nd world war the course curriculumn was expanded to match sophisticated technology,change in social outlook and also to maintain the comparative position of maritime profession with other disciplines-

There are seven maritime academies in the U.S.A. providing front ended maritime education and training for officers.They are:

1. The U.S. Merchant Marine Academy ,King's Point.
2. State University of New York Maritime College, Fort Schuyler.
3. California Marine Academy.
4. Maine Marine Academy.
5. Texas Maritime College,University of Galveston.
6. Masschsetts Marine Academy, Massachsetts.
7. Michigan Marine Academy.

The king's Point Marine Academy is run by the national government. The rest belong to the state governments.

The Michigan Marine Academy is specialy meant for Great Lake and river licences.

All the academies are residential and provides course curricula which enables a cadet to achieve a nationally recognised degree as well as 3rd mate and 3rd assistant engineer licence.

The state University of New York provides the following courses for engineers:-

Degree in marine engineering.

Degree in naval architecture.

Degree in electrical engineering.

Degree in nuclear science and engineering.

Degree in ocean engineering.

The course curriculumn is of four years duration.The programme is so arranged that cadet complete 12 months of sea service so that they can qualify for their 3rd assistant engineer licence.The first two years course curriculumn is common to all engineering (Licence) concentrations and from the 3rd year on they take specialised courses relevant to degree provided. The cadets with nautical option

while preparing for 3rd mate licence can concurrently study for a degree in any one of the subjects:-

Bachelor of engineering(electrical).

Bachelor of science (computer).

Bachelor of science (marine transportation economics)

Bachelor of science (transportation management)

All the courses are of four years duration. The bachelor of electrical engineering for navigating officer is specialy designed taking into view the sophisticated electronics equipment being used in a modern ship.

The training programme is the same as for engineers. That is the cadet complete one year of sea training during their four years of study in the academy.

The King's Point and other academies provide almost the same programmes.

In the U.S.A. there is another programme of training for deck and engineerin officer known as dual licence programme. The programme gives common core of studies and training to both deck and engineering upto 3rd.mate/3rd assistant engineer level.The block diagram of whole education and training scheme is on page:45 & 46.

6.4. MARITIME EDUCATION IN POLAND

The education and training of ships officer in Poland form an integral part of national education ststem.The training is provided in merchant marine academies.They are higher technological school and provide education at university level.

There are five possibilities for specialization, namely:-

. Navigation.

Ship construction.

Electronics.

Electrical engineering.

Radio telegraphy. (radio officer)

The study in the academy takes 4.5 years of which 12 months is spent at sea for practical training. The education is based on broader fundamental subjects.

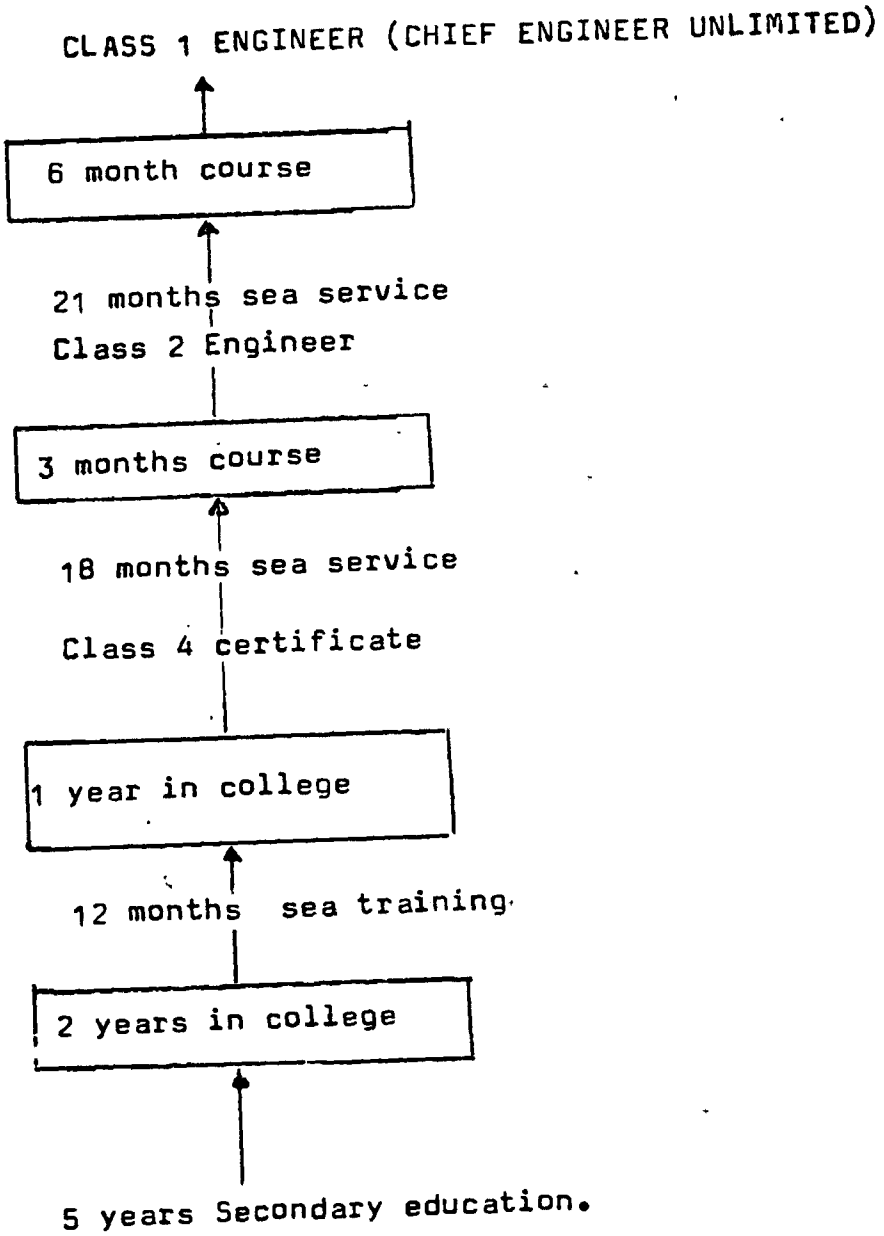
On completion of the education and training the cadets receive nationally recognised degree and certificate of competency as watch keeper.

The block diagram of education and training programme upto master level is shown on page 47

Note: The education and training of engineers is almost the same & hence not shown in block diagram.

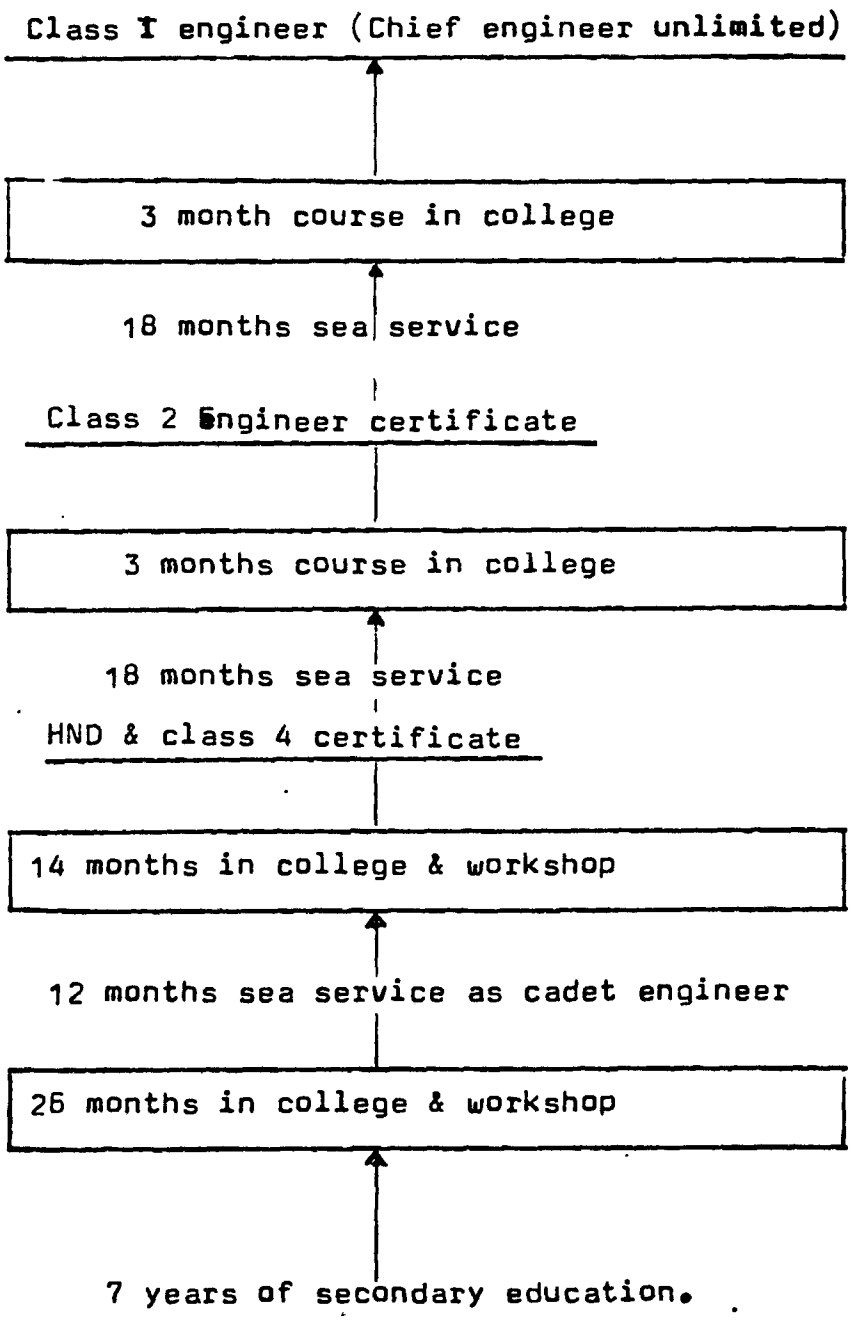
BLOCK DIAGRAM OF MARINE ENGINEERING EDUCATION IN U.K.

OND SCHEME



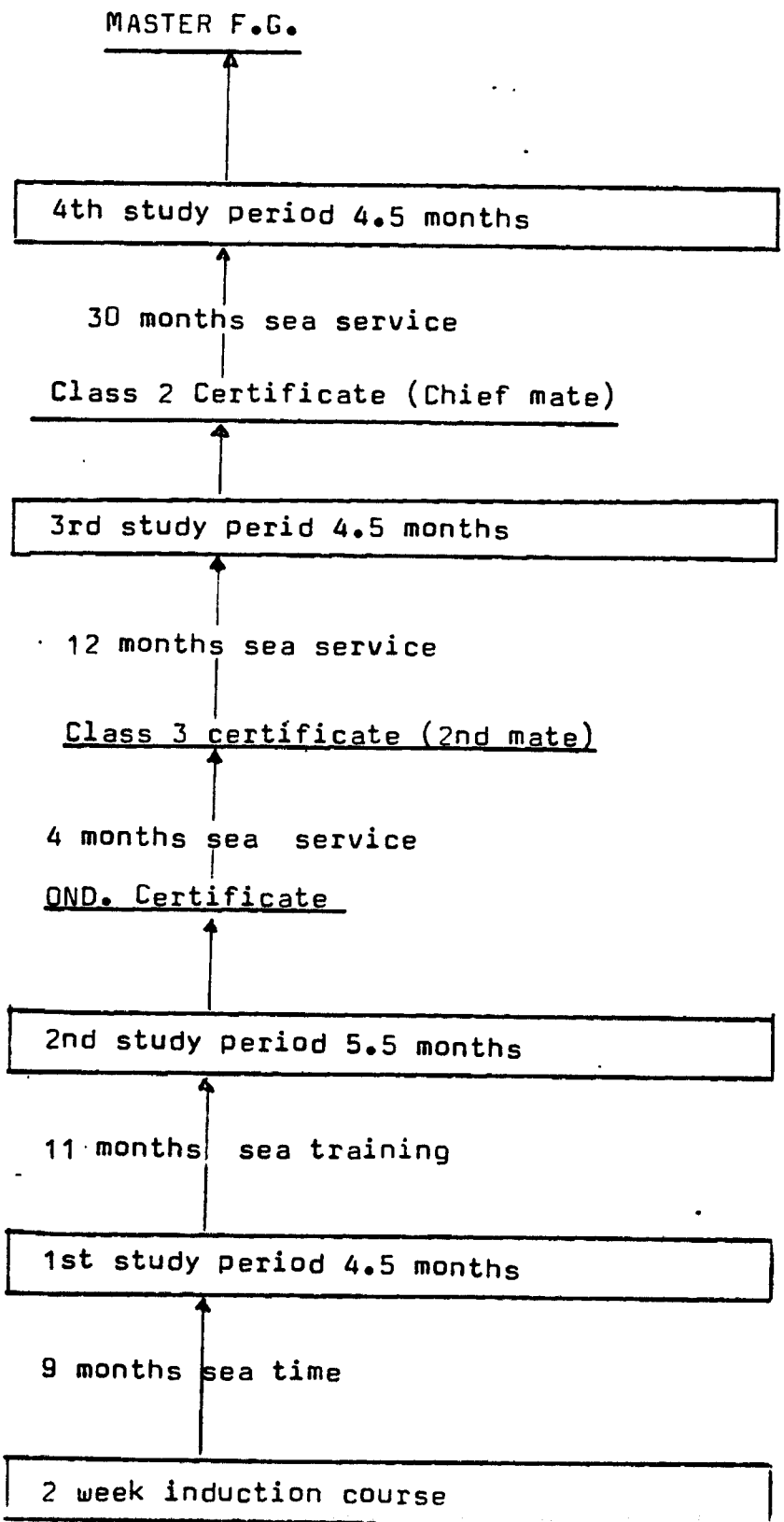
EDUCATION AND TRAINING OF ENGINEER IN U.K.

HND SCHEME

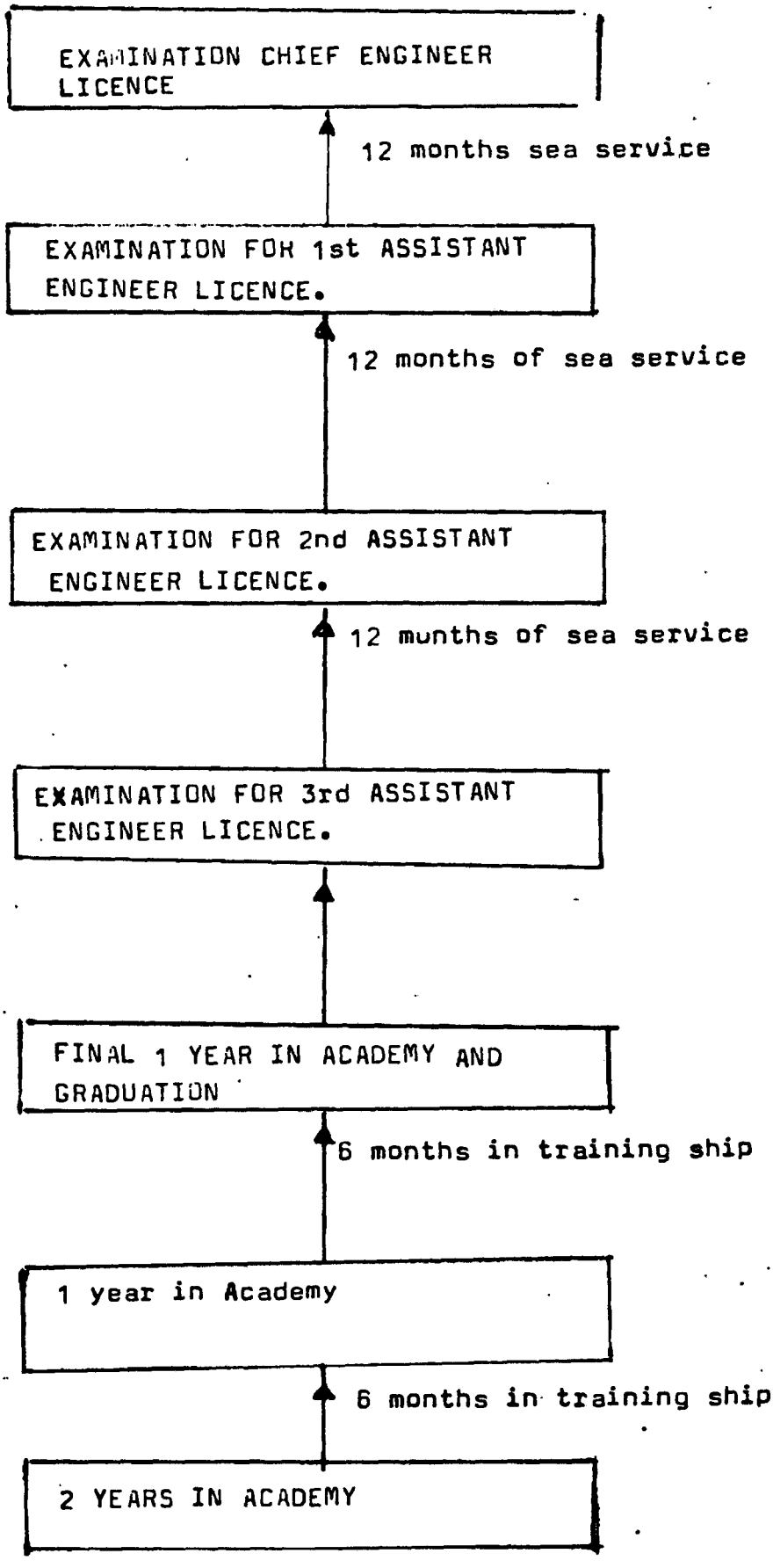


BLOCK DIAGRAM OF EDUCATION & TRAINING OF DECK OFFICER IN U.K.

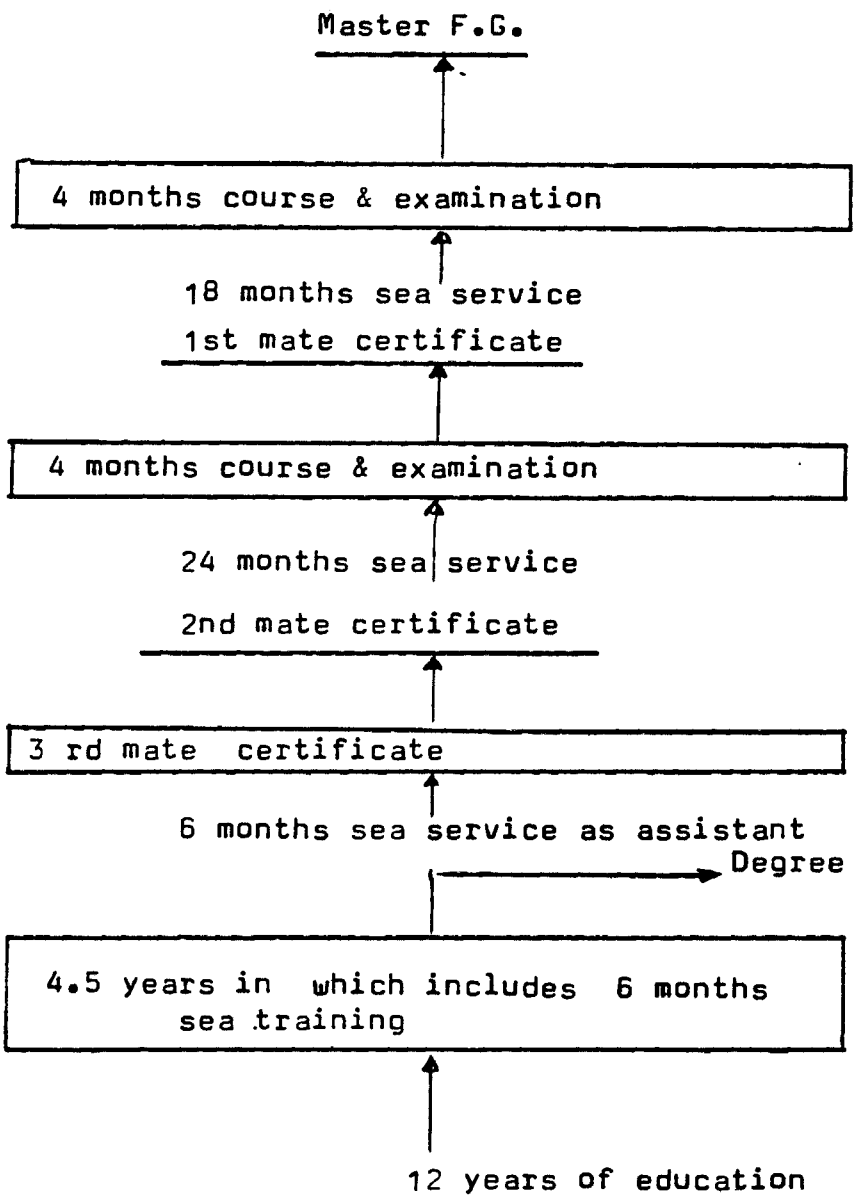
OND. SCHEME



BLOCK DIAGRAM OF EDUCATION AND TRAINING PROGRAMME OF ENGINEERS IN U.S.A.



BLOCK DIAGRAM OF EDUCATION AND TRAINING IN POLAND



Also page 71 & 72

CHAPTER VII

ESSENTIAL ELEMENT OF A MARITIME TRAINING INSTITUTE

An education and training centre should consist of a number of closely related elements, each of which has an important function in ensuring that the education and training objectives are realized. These important elements are:-

1. Experienced and competent teaching staff.
2. A well developed course curriculumn.
3. Laboratories and practical training facilities.
4. Training equipments.
5. Library.
6. Financial solvency.

7.1. Teaching staff

The teaching staff is the core element of any institution of learning.It will have the prime responsibility of formulating the education and training programmes and putting them into effect. It will be responsible for updating the course curriculumn.

It is essential that the teaching staff have the knowledge and experience of the responsibilities and function of an officer on board a ship.

It is also vital that the teaching staff is not only aware of national education and training requirements, but also those that have been agreed and accepted internationally.

It is important that the teaching staff are not only knowledgeable in their respective subjects but also in teaching methodology,-student psycology,monitoring student performance,progress and grad-

ing.

Of all most important is the fact that teaching is a dedicated and noble profession which calls for total involvement in teaching so that the objectives of education are attained.

7.1.1. STRENGTH AND COMPOSITION OF TEACHING STAFF

The strength and composition of a teaching staff is a vital factor for the effectiveness of education and training programme.The number of teachers and their specialization depend upon the teaching load, course curriculumn, and also the degree of specialization to be given to the student.It is most essential that while selecting teaching staff, specialization and experience are given due consideration.

7.1.2. DEVELOPMENT OF TEACHING STAFF:-

It is essential that the teaching staff is up- to- date about latest technology being used in the field of shipping.These call for updating of knowledge by continuation of studies,participation in symposium,seminars,membership of professional bodies and by maintaining a close relation with industries and research institutes.The teachers should be encouraged in this field.A maritime training centre should have a teacher and staff development programme.

7.2. LABORATORY AND PRACTICAL TRAINING FACILITIES:-

The education and training programmes require effective support from laboratories and practical training units. These facilities need to be compatible with the high and advanced technology used in ship and marine machinery operation.

The technical staff who maintains and operates these facilities

must be highly skilled in their field of activity and be able to provide effective support to the teaching staff.

It is essential that the practical training equipments must be relevant to the technology used in modern ships in order that the practical training can be co-related to the officers duties and functions aboard ships.

The laboratories must be furnished according to their specialist activity and be provided with services such as electrical power, water, compressed air, chemicals etc. so that they are ready for use.

7.3. COURSE CURRICULUMN:-The course curriculumn should be well balanced between theory and practical training to realise a specified training objective. The programme should be so designed and structured that the student understanding, skill and experience is progressively built up. While deveioping the course curriculumn, the following points should be given due consideration:-

1. That vessels have to operate with highest order of safety and efficiency. This calls for high degree of stress on practical and operation bias.
2. The legal requirement of national safety administration.
3. The internationally agreed minimum standard, particularly the provisions of the STCW Conventions and its associated resolutions and recommendations.
4. The level of education to be given. Particularly the requirements of the national education authority .
5. The latest innovations in the field of shipping.
6. Background of student.
7. The availability of qualified teaching staff and other physical

facilities.

Bearing in mind the fact that technology is continuosly changing and becoming complex, the course curriculumn needs to be periodically reviewed and upgraded.

The programme should be broad based at basic level to cover all the required knowledge, so that the more advanced specialised training can be given to senior personnel on top of it. If the basic scientific basis is not sound, the advanced training is going to be rendered ineffective.

At a more advanced level where the officer is transferring from junior to senior position, the subjects of study should be reduced and concentration should be given on to those specialist areas reflecting the higher technology and responsibilities that are associated with senior rank on board ship or shore establishment.

The monitoring and assessment procedures are an integral part of any education and training programmes.To ensure that the training and educational objectives are realised at each stage,effective means of monitoring and assessment should be established.The monitoring should be a combination of continuous and periodic method.

The sea_training is an essential element of seafarers training and education.Ideally it should be given in a purpose built training ship under the guidance of a competent teaching staff.The training should comprises of lectures, hands on training , discussion etc. etc.But since such an arrangement can not be made easily,the training should be given in a commercial vessel.In such a case an effective means of communication and understanding should be established between senior ship board personnel and the training insti-

tute. The cadet in this period of training should be given specific tasks known as sea log or sea project.

Finally the course curriculumn should be developed bearing in mind the fact that knowledge, understanding, skill and experience are the principal elements which together provide confidence and competence.

7.4.LIBRARY AND TEACHING AIDS:-

A library is an essential element of any institution of learning.It is a source of information and knowledge. Maritime institutes should emphasise on collection of wide variety of text books,reference books, scientific journals, publications of relevant professional bodies. The collection of the library should not only cater to professional needs but also cultural and individual hobbies. Modern teaching equipments are excellent tools to impart knowledge and instill understanding . The following teaching aids should be made avialable:-

Video filmn pertaining to maritime training.

Over- head projector.

Transferency.

Slides.

Photocopy machines.

Cyclostile machine.

Since the development of a library is a continuous process, it is desirable that budgetary provision should be adequate for its continued development.

7.5. FINANCIAL SOLVENCY

It is essential that an institution should have financial solvency

to coduct effectively its day to day programmes. Adequate budgetary provisions need to made so that training programmes are not disturbed.

CHAPTER VIII

CONCLUSION AND RECOMMENDATIONS

8.1. EDUCATION AND TRAINING OF ENGINEERS

Over the last few decades the design of merchant ships and machineries have undergone radical changes. Such changes are likely to continue as ship builders and ship owners attempt to produce ships which are able to operate for a long time at maximum efficiency with minimum crews.

To meet the demand of such technically advanced ships,crew members need to be highly skilled specialists who can work together as a team sharing many of the tasks and responsibilities.

The propulsion machinery installation and its associated systems on modern ships are highly sophisticated, with a high level of advanced technology incorporated into operation,maintenance and control.

A modern ship to-day is a sophisticated process plant which includes high degree of automation and control elements.

Because of less stay in ports and other economic factors the maintenance procedure on board has undergone considerable change.The periodic maintenance is giving way to conditioned based maintenance technique.

The equipments used to monitor engine performance and surveilance are increasingly becoming complex.

Many modern merchant vessels use micro computers to assist with maintenance control and operation, particularly in the area of data storage and retrieval, inspection interval, statistical analysis,store and spare parts control etc.

Many ships are now fully automated and very often operate with

unmanned machinery space.

The high degree of automation and control engineering used in a modern ship demands high level of training, not only to understand the theoretical aspects of such systems, but also to be able to locate fault and malfunctions and rectify them.

A modern marine engineer to day is a technologist, possessing wide range of knowledge, understanding and high skill necessary for the operation and maintenance of sophisticated equipments and the systems.

The global awareness for safer and cleaner ocean has led to the development of a number of international conventions and instrument.The most important international convention for the training of sea farers is the STCW convention.While developing education and training programme for our sea farers the requirements of the convention must be taken in to consideration. Bearing in mind the fact that almost all the developed and developing countries are giving front ended education and training to their engineering officers.

Taking into account the fact that cadet joining Marine Academy represent the cream of the nation and are academically sound enough to take advanced level of studies in the field of science and technology.

Bearing in mind the fact that the marine engineering is a versatile profession and a marine engineer can also be useful in shore based industries.

It is suggested that the education and training of engineers should be broad based at the basic level.

The objective of the basic level education should be to achieve:-

1. A right academic level like other engineering disciplines.
2. A right degree of operational and practical skill to ensure highest order of safety and efficiency in the operation of our vessel.

The basic level education and training should have the following components.

1. Theoretical studies.
2. Basic engineering craft skill.
3. Sea training.
4. Professional studies.
5. Specialized training.

8.1.1. THEORETICAL STUDIES

It is essential that to understand engineering problems knowledge about fundamental aspects of science is a must.The foundamental of science backed by sound mathematical treatment should be the core element of theoretical part of engineering education.The area to be covered is wide. The theoretical education must be supported by appropriate laboratory facilities so that the scientific and engineering principles are mastered. The following subjects should be involved.

Mathematics.

Physics.

Chemistry.

Naval architecture.

Engineering thermodynamics.

Engineering mechanics.

Theory of machines.

Fluid mechanics.

Material technology.

Strength of materials.

Engineering drawing.

Engineering design.

Marine heat engines.

Marine power plant.

Instrumentation.

Electro technology.

Control engineering.

Automation.

Personnel and industrial management.

8.1.2. ENGINEERING CRAFT SKILL Bearing in mind the fact that a ship is a self contained industrial unit run by a few personnel.Unlike shore based industries the ship do not have outside repair facilities easily. It is essential that a marine engineer will have a reasonable degree of craft skill to undertake repair and maintenance on board.

The aim of this portion of training will be to achieve a reasonable skill in the operation of the following machines and tools.

Twin grinding wheels.

Lathemachine.

Shaping machine.

Milling machine.

Fabrication & welding.

Metal cutting shears.

Metal bending shears.

Pipe bending.

Use of oxy-acetylene cutting equipments.

A marine engineer should be skilled in marine machinery maintenace and repair. He should be trained in the following aspects of maintenance.

Planned maintenance system.

Condition monitoring system.

Diagnostic testing.

Preventive maintenance.

The time allocated for this part of the training should be reasonable.

8.1.3. SEA TRAINING

The aim and objective of this part of trainin are:-

1. Familiarization with operational practices and procedure.
2. Understanding of watch keeping practices and procedure.
3. Understanding of ship board administration.

The training should ideally be given in a purpose built training ship under the guidance of a competent teacher.But since such a facility is costly to make it can be performed in merchant vessels.In such a case cadet should carry a sea project with specific assignments .An effective means of communication and understanding must be establised between ship board senior personnel and the training institute.The completion of sea training should be followed by an examination in order to ascertain as to how effective the training has been.

8.1.4. PROFESSIONAL STUDIES

This component of the programme is aimed at the development of professional competence.The subjects should be covered in this component of course curriculumn are:

Marine power plant which should include:

Diesel plant.

Steam plant.

Gas turbine.

Pumping systems-.

Ship electrical system.

Steering systems.

Refrigeration plant.

Fuel combustion system.

Lubrication system.

Control equipment.

Ship construction.

Safety equipments.

Heat transfer equipments.

Air compressor.

Deck machineries.

The subjects are very wide.Stress should be given on the understanding of :-

Design criteria.

Operational principle.

Operational problems and rectification.

Emergency operation.

Safe handling.

Maintenance and repair.

It is essential that the training should be given with equipments found on board ship. The workshop should be well equipped and the environment should be as close as possible to ship board machinery space.

The workshop should be designed like ship board machinery space as far as possible.

The following machinery shuold me installed:-

1. One medium speed diesel engine with water brake and with necessary monitoring instrument to study engine performance characteristics.
2. One live steam turbine.
3. one live gas turbine.
4. One packaged boiler with required control equipment.
5. Two small electri generator with complete panel boards for single & parallel operation.
6. One steering engine either ram or rotary vane type with complete control equipment.
7. Diesel purifiers with required piping lay out.
8. One refrigeration plant with complete lay out.
9. One oily bilge seperator with contril equipment.
10. Two air compressors.
11. One fresh water generator.
12. Two sets of pump representing centrifugal,gear, reciprocating type with equipment to study their characteristics and performance-
13. One engine simulator.
14. Sufficient number of electrical motors,transformer,circuit bra-

ker,etc. with test kits.

15. Equipment for fuel valve testing and pump calibration.

16. A control equipment laboratory.

17. Electronics laboratory.

18. Electric workshop.

Besides the above equipments there should be sufficient old engines and machineries being used on board for display and dismantling purposes for studying the constructional details.

It is essential that this portion of training is given higest priority. The hour allocated should be sufficient.The teaching staff should be experienced sea farers. The study should comprise of lecture, hands on training, analytical study and discussion.

8.1.5. SPECIALIZED TRAINING

The objectve of this portion of training programme is to cover some hazard unique to ship board profession.This include:

1. Fire fighting.
2. First aid at sea.
3. Survival at sea.
4. Damage control.
5. Tanker safety.

The course should be in modular form.The training should be given in special training units specialy designed for the purpose.The method should consists of class lecture,practical exercise ,video-filmn and discussion.

In fact the basic level education is the core of the whole training programme. On completion of the whole basic level programme a cadet should get:

1. A nationaly recognized educational award.

2. A certificate of competency as a watch keeping engineer.

8.2.ADVANCED LEVEL EDUCATION

The advanced level of education to 2nd and chief engineer level is to be provided in specialized subjects closely related to the job of senior engineering officer on board. In fact this portion of training is meant for updating the knowledge and at the same time qualifying for 2nd or chief engineer certificate of competency examination.While developing the course curriculumn of such courses emphasis should be given on the following.

1. Marine machinery maintenance technology which includes:

Technoques and practices for condition monitoring.

Diagnostic techniques.

Preventive maintenance.

2. Theoretical studies:- It should be concentrated on a few subjects. In fact since the cadets have received enough theoretical studies at their basic level it should be taught as a review of original learning.They should include only:

Naval architecture and ship buildibg.

Electricity.

Marine heat engines.

3. Professional studies:- This should include the following:-

Latest development in marine machinery design factors.

Latest development in machinery operational practices.

4. Specialized training:- This should include

Management.

Ship board safety.

Damage control.

The course curriculumn of chief engineer should be more elaborate then that of 2nd engineer. The specialized training for chief engineer should also include the following.

Technical & engineering management.

Financial management.

Personnel management.

National /international maritime requirements.

8.3. EDUCATION AND TRAINING OF DECK OFFICER

Over the last few years the merchant vessels have undergone radical changes.

The size of the vessels have increased.

The propulsion power has increased.

The traffic density has increased.

The cargo carried by sea to day are increasingly becoming dangerous as the world is becoming industrialised.

The specialized ships are being built to carry special cargo.

The international concern for safety of life,property and environment is increasing.

The rules and regulations pertaining to carries of cargo, their stowage and handling are becoming more stringent day by day.

The navigational and ship handling equipments are becoming complex.

The handling of a modern ship,& its cargo requires high degree of skill and knowlede.

It has been found that majority of accidents taking place out at sea in the form of collission or grounding are directly related to human error.

It has become essential that to ensure highest order of safety and efficiency in the operation of our vessels the training of navigating officer should be well organized.

While developing a course curriculumn for the deck officer the requirements of STCW convention and its associated resolution should be accommodated.

In order to make the education and training effective to achieve right degree of competence, the programme should be well balanced in theorey and practice.

Bearing in mind the nature of job of a navigating officer it is imperative that his training should be practical oriented. The operational practice should be the core element of his training. It is essential that besides safety aspects of ship operation a deck officer should have sustantial knowledge as regard commercial aspects of shipping.

It is desired that the international laws governing the operation of ship should be studied to a reasonable degree by a deck officer.

It is also desired that in order to operate, understand the increased number of eletronics equipment used on board a ship his foundamental knowledge in basic scientific subjects should be sound. It is also essential that the education and training received by a deck officer should have social recognition.

It is desirable that the education should be broad enough to give the career a broder dimension so that at certain stage a deck officer training and education can be utilised in shore based industries.

Bearing in mind the fact that the cadets joining the marine academy are bright enough to take deeper and broader education and traing.

Bearing in mind the requirements of the STCW convention the education and training of deck officer should be divided in to two level.

1. Basic level.(Watch keeper level)
2. Advanced level(Chief officer & master level).

BASIC LEVEL EDUCATION AND TRAINING

The basic level education and training should be broad.The objective is to achieve the following.

A right degree of competency.

A right academic standard.

The basic level education should cover the following subjects:

Mathematics

Phusics.

Chemistry.

Naval architecture.

Ship construction.

Personnel Management & industrial relation.

Ship management.

Navigation.

Meteorology.

Oceanography.

Chartwork.

Electronics.

Radar technology.

Electronic navigational aids.

Marine communication.

Cargo handling.

Maritime law.

Ship master business.

Professional & practical training should comprise of the following subjects.

Ship operation technology.

Medical care.

Safe working practices.

Safety on board ship.

Boat handling.

Signals.

Survival at sea.

Fire fighting.

It is essential that the education and training should be a careful balance of practical and theoretical studies.A high degree of importance must be placed on hands on training to achieve operational confidence and competence.

The education and training at master and chief officer level should be concentrated on fewer subjects related to the job of senior position on board.

They should comprise of:-

Maritime law.

Maritime economics.

Management.

Navigation.

Ship construction and stability.

Navigational aid & instruments.

It is essential that the model specialised courses developed by imo should be incorporated in the course curriculumn of deck officer.A list of such courses are given in the annex.

In order to achieve the training objectve it is important that the practical training units should be well equipped.The equipments should be compatible with the latest technology used on board.A deck officer practical training units should comprise of the following laboratories.

Chart room.

Radar room.

Electronic navigation aid rooms.

Instrument room.

Seamanship block.

Boat training facilities.

Cargo,stability and construction room.

Fire fighting facilities.

Sea training unit.

The equipments of each units should be sufficient to ensure smooth conduction of training.

Sea training should be a guided one . But since we do not have such facility,it is imperative that while performing training in the commercial vessels the cadet are given special tasks in the form of sea experience log or sea project. An effective means of communication shuld be established betwwen ship and the academy so that the senior officer on board do realise the training objectves.

The training and education of deck cadet should be extended to four years as engineering cadets. The format of the training should be as:

2 years in academy.

1 year at sea.

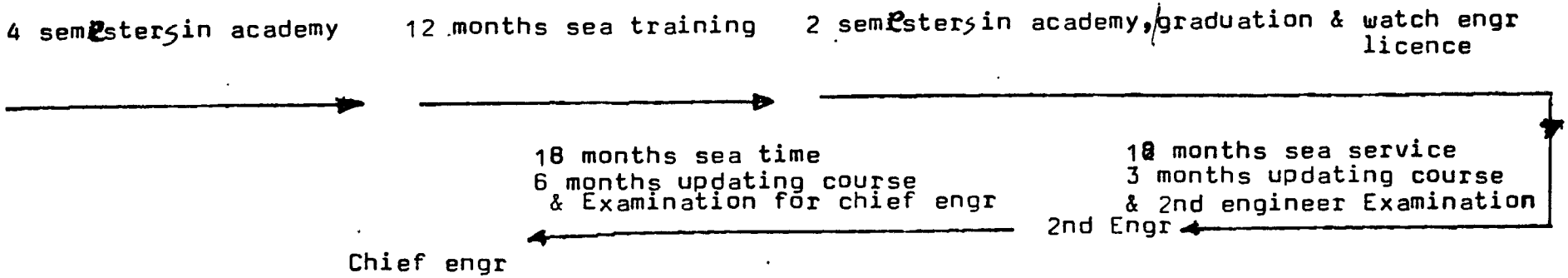
1 year in academy.

On completion of the 4 years education and training they should

qualify for class 4 certificate of competency and at the same time get a nationaly recognized degree.

8.4. PROBLEM OF TEACHING STAFF It is expected that by next year the Academy will be self sufficient in the field of teaching staff. Since it takes quite a number of years to be an experienced teacher, it is eesential that Academy should take step to retain the teacher for a longer period. It is essential that the problem of teaching staff should be given top priority. Academy should draw out a training & recruitment programme so that
Academy can maintain consistency in the number of teaching and technical staff. In fact if the existing vacancies are filled up academy can easily conduct a challenging programme.
Bearing in mind the fact that life in academy is definitely different from other shore organisation, it is essential that step should be taken to give the teacher enhanced facilities
In order to solve the problem of children education it is desirable that there should be a school within the Academy campus.
The Academy can also take the assistance of visiting lecturers from other educational institute & experienced maritime personnel working in the industries.
The composition of teaching faculty should a right combination of professional and academic people.
PROBLEM OF FUNDING Bearing in mind the fact that the country has definite limitation in releasing fund, it is essential that an active participation of ship owner, shipbuilders, port and other marine related industries should be sought to solve financial problems. The recurring budget should be shared by government, shipping industries

SUGGESTED SCHEME OF STUDIES AND TRAINING OF ENGINEERING OFFICER

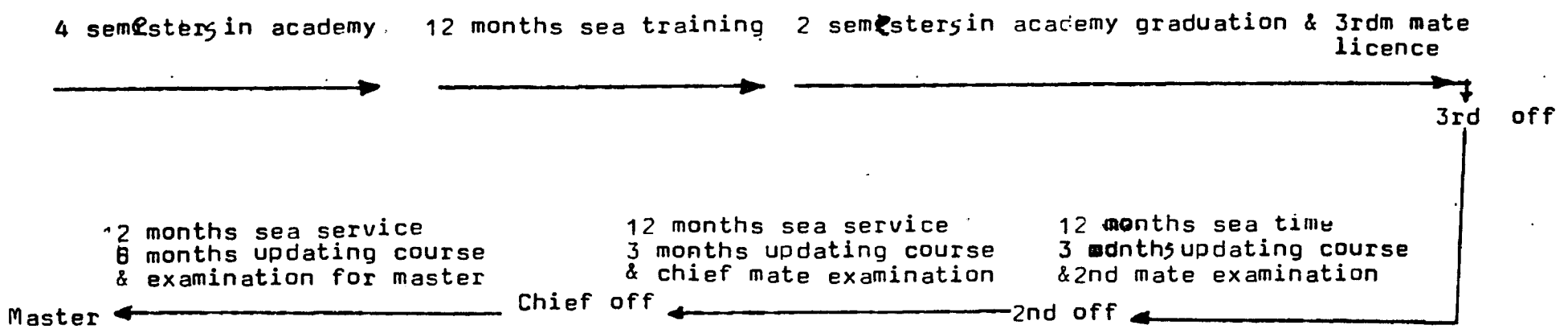


Note:- Degree to be awarded: Bachelor of Engineering (Marine)

Attendance of updating courses should be made mandatory

Prior to graduation, a cadet has to submit a project relating to engineering.

SUGGESTED SCHEME OF TRAINING FOR DECK OFFICER



Note:-Degree to be awarded: B.SC. Maritime studies (Nautical)

Attendance of updating courses shuld be made mandatory

Prior to graduation, a cadet has to submit a project.

PROPOSED COURSE CURRICULUMN FOR EDUCATION TRAINING OF SHIP OFFICER

COMMON CORE OF STUDIES AND TRAINING

Both deck and engineering cadet will undertake the following common core of studies.

Subjects	HOURS
Mathematics.	400
Physics.	200
Chemistry.	120
NAval architecture.	252
Ship construction.	54
Personnel management & industrial relation.	72
Ship management.	18
	Total: 1116

SPECIALIZED TRAINING

Medical care & personal hygiene.	40
Safety on board.	30
Survival at sea.	40
Fire fighting.	40
	Total: 150

SUMMARY OF COMMON CORE OF STUDIES: TOTAL:-1116+150==1266 hours

SUBJECT AREAS FOR DECK CADTES

Navigation	300
Meteorology	144
Oceanography	126
Chartwork	180
Electronics	216
Radar Technology	126
Electronic Navigational aids	126
Communications	108
Cargo handling	90
Maritime law	108
Ship master business	120
	TOTAL:1644

PROFESSIONAL PRACTICAL TRAINING FOR DECK CADETS

Signals	36
Ship operation technology (Seamanship)	280
Special sea project for sea training:(Operational)	1100
Boat handling	160

SUBJECT AREAS FOR ENGINEERING CADETS

Subjects	hours
Engineering thermodynamics.	180
Engineering mechanics.	126
Theory of machines.	108
Fluid mechanics.	108
Material technology.	108
Strength of materials.	108
Engineering drawing.	126
Engineering design	54
Marine heat engine.	108
Marine power plant.	218
Instrumentation.	36
Electro technology.	216.
Control engineering.	126
Automation	36
	TOTAL: 1658

PROFESSIONAL PRACTICAL TRAINING FOR ENGINEERING CADETS

Marine engineering technology	462
Sea project & training.	1100

SUMMARY OF TOTAL HOURS OF STUDY & TRAINING

DECK CADETS

COMMONECORE OF STUDIE: 1266

PROFESSIONAL STUDIES : 1644

PROFESSIONAL TRAINING: 1576

GRAND TOTAL : 4486

ENGINE CADETS

COMMON CORE OF STUDIES:1266

PROFESSIONAL STUDIES : 1658

PROFESSIONAL TRAINING: 1562

GRAND TOTAL : 4486

PROPOSED SEA PROJECT FOR RNGINEERING CADET

Objective:-The purpose of the sea project is to provide the cadet with firsthand experience of life at sea under the condition of training which will help him to gain knowledge and skills which he will need as an officer.

The emphasis is given on the practical daily tasks which the cadet must know before he can be an engineering watch officer.

EMERGENCY RULES AND EQUIPMENT

General instructions

The most important thing to be done upon joining a vessel is to familiarize yourself with the emergency rules and equipments. To accomplish this, make certain that the following points are covered fully and completely. If you require assistance, do not hesitate to ask 2nd or chief engineer.

1. Refer to station bills posted on board the ship. Note your boat station and your fire station and any other station to which you may be assigned.

Safety equipment

All ocean going vessels are provided with a water system that provides protection against fires in any part of the ship.

Note the fixed fire installations like co2, Hallon,.sprinklar or foam system that have been installed in your vessel.

Make a through study of fire-fighting and detecting system on your ship. Take each system seperately and learn all about it.

Note the remote control emergency equipments such as stoping of running pumps, boilers, engine room blowers, fuel valve to main engine, boilers etc. Ask the 2nd or any senior engineer where the remote equipments are, how they work and why they are provided.

Familiarize your self with the following signals or alarm:-
Fire alarm.
Alarm for boat station.

WRITTEN WORK

After careful study of safety equipments mentioned above fitted on board your vessel answer the following questions.

1. Describe in detail the following:-
(a). A sketch of the fire main system.
(b). A sketch of the fixed fire extinguishing system
(c) A list of the type, size and location of all portable and semi portable fire equipment in engine room.
2. Describe how fire and boat drills are conducted aboard your vessel.Include all the equipments tested and describe how the tests are carried out.
4. List & describe the remote emergency apparatus installed for use with main & auxilliary equipments. Mentioned their location and the reason.
5. What are the signal for a fire drill, abandonship, and a man overboard.
6. What actions are taken by the engine room watch keeper during a fire drill or a actual fire emergencies.

7. Explain what action you will take if you discover a fire on board ship.

8. What procedure shoul be followed if an electric fire is detected.

9. What precautions should be taken to prevent fire in engine room.

10. Where is the fixed fire extinguishing system installed.Describe its control with appropiate sketch.

11. What is the annual inspection requirement for fixed fire extinguishing installation.

12. How portable fire extingushers are charged.

13. Describe the type, location & general lay out of emergency fire pump.

14. Locate the international shore connection and isolating valve. Explain their function.

MAIN PROPULSION DIESEL

On joining your ship try to familiarize yourself with the main propulsion system of your ship & answer the following question.

1. What is the designation of the main propulsion unit? Explain the meaning.

2. List the name plate data for main propulsion unit including the reduction gear, clutches, coupling. Describe the main dimension such as size, speed, K.w.rating, reversing method, and control system.

3. Describe in detail the method of reversing the main engine. Explain the method used to vary and control engine speed.

4. What type of governor is used in your main engine. Describe

with sketch the function of governor?

5. Describe the starting system of your main engine.

6. Describe the procedures in step before the main engine is ready for staring in a cold weather.

7. Explain with sketch the lubricating path throughout your main engine.

8. Describe the liner lubrication.

9. Describe the main engine external lubrication system including the filters & coolers.

10. Describe the purification,transfer and storage system of lub oil in your ship.

11. Explain how to check lub oil level in the sump & and how often it is done & why?

12. What are the specification of lub oil used & its consumption?

13. Describe how the quality of lub oil is tested on board.

14. Describe the fuel oil storage & transfer system in your ship.

15. Describe the bunkering procedure.Give details of safety precautions to prevent fire and pollution.

16. Describe the fuel supply to fuel injection pump including filters, heaters and purifier.

17. Describe the fuel injection, including the control and variation of the timing & metering employed.

18. What is the cycle of operation of engine? Describe fully the timing of events.

19. What is meant by supercharging?. How is this accomplished in your engine.

20. What procedure is followed for securing main engine after "finished with engine" is given ?

21. Describe the complete cooling system of your engine, including

the raw and closed water circuit.

22. How is the main unit protected from over speed? Briefly describe the operation.

23. What control equipments are provided to protect engine from extreme operating condition such as overload, temperature, presure etc ?

24. What type of bearings are used in your engine and do you measure their wear ?Include main, crankpin & cross head bearing.

25. What is tappet clearance & how it is adjusted on inlet/exaust valve ?

26. Describe in detail what actions you will take to make a complete round of engine room before taking over a watch.

27. What is the number, size, pressure, and uses of air compressor on board your ship?

28. Describe the piston on main engine.Note the type and number of piston rings, piston removal procedure.

29. Describe in details the maintenance under taken on main propulsion unit during your stay on board.

DRAWINGS

1. Sketch & label the general engine room lay out.
2. Sketch in cross section a fuel valve of your engine.
3. Sketch the fuel system of the main engine.
4. Sketch the cooling system of the main engine.
5. Sketch the lubricating system of the main engine.
6. Sketch the air intake system of the main engine.
7. Sketch the exaust system of the main engine.

8. Sketch the cross section of a complete cylinder, including liner, piston, rod & associated valve gear.

SHIP ELECTRIC SYSTEM

General instruction

The generating plant on board a ship consists of two or more sets.- Some ships besides this has got an emergency generator or emergency battery set.Dtermine the number and location of such system. Study them carefully and answer the following questions-

1. Explain in detail how a main generator is started and paralle-led on board.Also explain how one is off loaded while running in parallel with other.
2. How are the lighting circuits supllied with power?
3. Where is the emergency generator or battery located?
4. List the parts and equipments emergency generator or battery serves.
5. What provision is employed to protect the various lighting cir-cuits, power circuits and generator from overloads,loss of voltage etc.
6. Does the main & auxilliary panel boards employ a method of determining the vital power cicuits? Explain the preferential trip system.
7. State in detail the method employed to clean the ship service generators & motors.
8. Give list of observations you will keep on generating set, panel boards and running electric motors as an watch keeping engi-

neer.

9. Describe the protection provided to detect earthing on your pannel board.

10. What type of storage batterries are used on board your ship.Give the following details.

(a) What are the active materials ?

(b) What is open circuit voltage of a fully charged battery ?

(c) What is its ampere-hour reading ?

(d) A line diagram of battery system.Show the numbers in series or parralel.

(e) What routine maintenance are carried out on board ?

(f) How are the batteries tested and charged ?

(h) How often the batteries are charged ?

(i) What precautions are observed while charging ?

(k) What precautins are to be taken to avoid an accident in battery room ?

(h) What provisions are made for the ventilation of battery ?

11.(a) What is the purpose of shore connection ?

(b) Where is the shore connection located ?

(c) What precautions must be taken before giving a shore connection ?

Drawings

1. Make a neat drawing of the main switchboard , showing all instruments, switches, etc., and identify same.

2. Make a circuit diagram for starter of one of the main pump with remote stoping device.

3. Make a circuit diagram showing the ground protection of electrical system.

LINE SHAFTING AND STERN TUBE

1. Describe the line shafting, including the bearings. What type of bearing is used in your ship and how they are lubricated ?
2. Explain in detail how to take out the tail shaft.
3. What type of stern tube is used in your ship ? How it is lubricated ?
4. List some of the reasons that would cause a line bearing to run hot. What actions you will take under such circumstances ?
5. Explain how the propeller is held on the tail shaft ?
6. Describe the thrust bearing usedin your ship. Explain its function.
7. What is the pitch and diameter of the propeller ? How do you compute engine speed ?
8. Give an example of a days run of engine miles,slip,observed miles. How do you compute the average RPM's and total revolution of the watch for the log book ?
9. If your ship is equipped with a controllable pitch propeller, explain how the pitch is varied. Explain how it operates.

Drawings

1. Make a drawing of a tail shaft showing all important parts and

labels. Include the stern tube.

2. Make a sketch showing how the line shaft bearing are lubricated on your ship. Include a cross-sectional view of a line shaft bearing.

STEERING GEAR

General instruction The steering gear in your ship will be one of the following types:- All electric, eletro-hydraulic. There will be a follow up control so arranged that the steering wheel can be turned to a desired angle and the steering will cause the rudder to come to the desired position and then stop.

As the steering is located in the stern and close to rudder and the ship is steered normally from the bridge, a means of control is required.It will be one of the following methods: Electric controller or hydraullic controller.

Carefully observe and study the steering system of your ship and answer the following question.

Written work

1. Name the manufacturer of your steering engine. Mention the type. Describe the system in detail.
2. What are the sources of power for steering ?
3. What type of control from the bridge is installed ?
4. How do you shift steering from one mode of operation to the other ?
5. What arrangements are made for emergency operation ?
6. List the important points which require careful checking when inspecting & servicing the steering gear.

7. What are the regulation on testing a steering gear prior to departure from a port.

8. List the steps necessary for starting & testing the steering gear before leaving a port.

10. Explain how air is detected and removed from an electro hydraulic system ?

11. What type of pump is used on steering gear ? Describe the pump actionin moving the rams.

12. Explain how the steering gear answers rudder signal from bridge correctly without overcompensating.

13. What is used on the steering system for rudder stop ? Explain their operation.

Drawing

1. Draw and level the steering system on your ship.

REFRIGERATION AND AIR-CONDITIONING SYSTEM

1. Describe in detail the ship's service refrigeration system.It should include the following:

(a) Compressor.

(b) Refrigerant.

(c) Control devices.

(d) Heat exchanger.

2. Explain how oil is added to the system.

3. Explain how gas is charged to the system.

4. Describe the maintenance performed on the ship's refrigeration system, including procedure for detecting leaks.

5. Describe in detail the ship's air conditioning system. This should include the following:

(a) Compressor

(b) Refrigerant.

(c) Controls.

(e) Heat exchanger.

6. If you are on a vessel with cargo refrigeration system, you are required to describe the same as question 1.

7. Explain the construction detail of a expansion valve fitted in your ship on any one the above plants.

8. Explain how you will understand whether your plant is under-charged or overcharged.

Drawing

1. Make a line schematic diagram of your ships refrigerating plant.

BOILER

When you are on board a ship with a boiler read the boiler manual and details of its mountings and then answer the following:

1. What type of boiler is fitted in your ship ?
2. Describe the feed arrangement.
3. List the mountings fitted on a boiler.
4. Describe how to read and blow down a boiler gauge glass.
5. Describe the safety valve with a sketch & mention the setting procedures.
6. Describe the precautions taken prior blowing down a boiler.
7. Describe the combustion control equipment of your boiler.
8. Describe how the water level is maintained.
9. Explain the action to be taken if a low water level is experienced in a steaming boiler.
10. Explain why it is essential to maintain boiler water treatment ? Explain how oxygen, salinity, alkalinity and Ph are maintained.
11. Describe the boiler maintenance programme and the work performed on board during your stay.
12. If you have a exaust gas economiser on board your vessel describe the monutings on it.
13. Explain how the same is put on line with the domestic boiler.

SHIP STRUCTURE AND ARRANGEMENT

1. Define the following terms and give the dimension for your vessel.

(a) Length overall.

(b) Length between perpendicular.

(c) Extreme breadth.

(d) Breadth moulded.

(e) Depth moulded.

(f) Load draft.

(g) Summer freeboard.

(h) Dead weight.

(i) Gross tonnage.

(j) Net tonnage.

2. Make a large and detailed drawing of the bow section of your vessel profile, extending from the stem to the forward collision-bulkhead showing:

(a) Fore peak tank with floors, breat hooks, etc.

(b) Chain locker, chain pipes, cofferdam under chain locker.

(c) Hawsepipes.

(d) Bulwarks.

(e) Windlass.

3. The bow of a vessel is subjected to tremendous forces and stresses.By investigating the structure of the bow, explain in 150 words how the danger of pounding, panting are minimised.

4. Make a large & detailed drawing of astern section of your ship profile, extending from the stern to the after collision bulk head showing:

(a) After peak tank with floors, stringers, etc.

(b) Steering compartment.

(c) Access to tanks and othercompartments.

5. Make a drawing to scale of your ship's rudder showing:

(a) The rudder and how it is secured to the ship.

(b) The type of rudder ins talled in your vessel.

(c) Label the following members & parts:

(1) Stern or rudder post.

(2) Pintles (3)Rudder head which leads to steering engine.

(4) Anodes

6. Sketch a plan view of the weather deck on the starboard side from the forepart of the midship section to the bow showing the location of each of the following:

(a) Stinger plate.

(b) Mooring bits.

(c) Freeing ports.

(d) Hawse pipe.

SHIPS PIPING SYSTEM

1. Make a line diagram of ballast system of your ship.
2. Make a line diagram of bunker system of your ship.
3. Make a line diagram of auxiliary steam system of your ship.
4. Make a line diagram of drinking and fressh water system of your ship.
5. Make a line diagram of bilge system of engine and cargo hatch spaces.Indicate the position of oily bilge seperator.
6. Describe in detail the oily bilge seperator on board ypur ship.Also mention whether it conforms to the requirement of MARPOL.
7. While tracing the pipe line specially note the bilge injection valve and describe its function.State its dimension.To which of your ship the bilge injection valve is connected and why.
8. Make a line diagram of sea water system of your ship.
9. Make a line diagram of dirty oil and sludge line.Note the location of the connection provided for discharge to shore facilities if any.

DECK MACHINERY

It must be remembered that the deck machinery for cargo operation are of particular importance.Breakdown of a cargo gear during cargo operations are expensive. Both care & knowledge is required for the upkeep of them.

Written work

1. Describe the operation of winlass of your ship.
2. What type of winches are used in your ship ? what are their operating characteristics ?
3. Describe the operational principle of any of the winches of

your ship.

ENGINE ROOM RECORD

Maintenance of record is one of the most important function of engineering department.

The records are:

Engine log book.

Engine store & spare inventory.

Machinery maintenance schedule.

Machinery maintenance record.

Machinery history book.

Machinery defect list etc.etc.

It is essential that a cadet get training regarding proper maintenance of record.

Written work

1. What procedure was employed to record the operating hours on the main propulsion unit and its associated equipments between overhauls ?
2. Explain how the maintenance performed on the main propulsion units and other engine room equipments was recorded ,including bearing clearances,limitations,tests performed and inspection results.
3. Explain how the maintenance to be performed are scheduled.
4. Reproduce one page of engine room log book.Complete the same with required data for a complete sea watch.
5. Describe the method employed to maintain spare inventory and storage on board a ship. Give an explanation highlighting its importance.

Note: Cadet should also be given training in making log abstract, voyage reporting and in making noon report.

CADETS ON TANKER VESSEL

If a cadet is sailing in a tanker vessel he has to undertake the following additional job.

1. What is the order or sequence in which the cargo was loaded ? Explain the reasons.
2. What safety precautions must be taken while working on the deck and in the pump room ?
3. List the number, type and capacity of cargo pumps in your ship. Note the drive of the pumps.
4. Explain how the cargo tanks are stripped.
5. Explain how the cargo tanks are cleaned and why it is necessary to do so.
6. Explain how you can ascertain that a tank is gas free.
7. Explain how the tanks are "Topped off".What do the terms "Ullage" and "Innage" mean ?
8. Explain the proper procedures to follow when connecting the cargo hose to the manifold before discharging or receiving cargo.
9. Explain how to compute the expansion/contraction of cargo. How is the expansion accounted for ?
10. What action is required of the engine watch officers when receiving and discharging cargo ?
11. What is meant by a pressure-vacumn valve ? where are they located? Explain their function with an sketch.
12. If you have a innert gas generator in your ship explain with a line diagram its important features. Specially note the following:

(a) Source of innert gas.

(b) Location of Blowers, scruber, deck isolating valve,deck seal oxygen content monitor and safety alarms.

PERFORMANCE CHECK LIST

The list should be elaborate and the objective is to ascertain that a cadet can satisfactorily carry out essential operations.The list should be endorsed by chief engineer/2nd engineer who will be assessing the performance.

A model copy of such performance check list developed by IMO is attached in the annex.Infact the performance list is the same as the one being used by our Marine Academy for engineering cadet during their 2nd phase(sea training)

PROPOSED SEA PROJECT FOR DECK CADET

SUBJECTS COVERED

Safety

Seamanship

Cargo work

Rules of the road

Ship const. & stabilty

Navigation

Mar. Engr. for deck cadet.

SAFETY

General instruction

During your sea training and also during your subsequent career at sea always observe the following safety precautions.

1. Never enter a cargo hold or tank unless others are aware of where you are going.
2. Never go alone. Take some one along to lend assistance in the event of an accident.
3. Always carry a flash light.
4. Never enter a hold via a hatch opening when cargo work is going on.
5. Always wear a safety helmet when you are on deck.
6. Never step on, straddle or stand in the bight of any wire or other line.
7. Never enter a tank unless it is absolutely known that it is gas free.
8, Always wear work gloves whenever you will be handling wire rope.

SEAMANSHIP

General instruction

You are being placed on merchant vessels so that you can use them as sea going laboratories.The questions contained herein are meant to direct you to seek out much pertinent information about your ship that a competent ship's officer should know.Keeping this in mind,the questions should be answered from your observations, information learned through working. and through discussions with the officers aboard your vessel.

1.Write a detail report on the lifeboats aboard your vessel.Include the following items.

(a) The construction material.

(b) Provision for bouyancy.

(c) Number of boats & propulsion mechanism.

(d) Capacity, markings and paint colouring

(e) Type of releasing gear.

(f) The maintenance required & its frequency.

(g) The testing required of the engine & the procedure.

2. Describe the lifeboat davits found on board your vessel & explain in detail the procedure that must be followed in launching, recovering, securing & maintenance of life boat davit.

3. Describe in detail the in- place fire fighting & detecting system aboard your vessel. Include the following in your report:

(a) Location and operation of alarm system.

(b) The type, location, & the quantity of extinguishing equipments.

(c) Areas protected.

(d) The method of determining that the detectors are operating.

(f) The procedure followed in detecting and eventualy extinguishing the same.

4. Describe the steps that must be followed in extinguishing a fire in the galley area.

5. Prepare a plan view drawing of your ship showing the location of all:-

(a) Fire station

(b) Emergency gear locker.

(c) Life boats & liferafts

(d) Life rings

(e) Emergency generators or battery.

(f) Fire extinguishers,

(g) Line throwing apparatus.

(h) Any other safety equipments.

6. Locate and explain the operation of the following equipment:

(a) Self contained breathing apparatus.

(b) The line throwing apparatus.

(c) The inflatable liferafts.

(d) Ship's emergency generator or battery.

7. Locate the "Not under command" lights .

(a) Are they fixed in position ?

(b) Describe the lights and when they are to be used ?

8. Before leaving a port there are certain crucial items to be tested. What are the regulations governing this test ? Describe all the log entries made regarding this test.

9. Describe in detail the maintenance work performed on cargo gear on your vessel.

10. Describe the procedure followed by a third mate in taking over a watch and out line the duties he performs during his watch.

11. Describe the procedure followed by a third mate in taking over his watch in a port when cargo work is on. 12.List the log books that are maintained in your vessel with a brief description of each.Give a close scrutiny to official log book and give a more detailed reports of itsimportance & inclusions.

13. An important aspect of deck operations take place prior to or shortly after you are heading out to sea is to "secure the vessel for sea".Describe in detail the work that this operation entails.Include the following

(a) The disposition of mooring lines.

(b) The ground tackle.

(c) The cargo lifting equipment.

(d) Midship house

(e) The safety requirements.

14. Describe the accomodation ladder used on board your vessel.

(a) How is the ladder constructed.

(b) How is the ladder rigged.

(c) What safety precautions must be taken while rigging and using the ladder.

15. While berthing in a pier it is necessary to put out certain lines to hold the ship in position along the pier. There are generally two groups of men assigned this responsibilities.

Describe the procedure in detail followed at the bow of the vessel intying up.It should include:

(a) the procedure followed in calling crews. What personnel are involved ?

(b) What kind of lines are generally used ?

(c) what kind of stoppers are used in handling the lines ?

(d) If your vessel is equipped with an automatic tension winch,- describe the winch, its settings, and mention which setting is generally used.

(e) the method of communication with the bridge.

16. Give a similar account of actions taken by aft station.

17. While entering a port it is necessary to take a harbour pilot. Describe in detail the procedure adopted in taking a pilot. The description should include the following:

(a) Means of communication with the pilot boat.

(b) Rigging of pilot ladder.

(c) What other line is available to handle pilot bag.

(d) Describe how the master maneuvered the vessel in picking up the pilot.

(e) what informations are required for the pilot once he arrives on the bridge ?

18. Describe in detail the the procedure followed while carrying out fire and boat drill.

19. Prevention of polution is one of the most important asfects of ship operation. Describe in detail what arrangements are made on your vessel to prevent pollution of the seas. Include in your answer the following:

(a) Physical equipment to help prevent pollution such as plugs for scuppers,holding tanks, or any other which might be on board your ship.

(b) How oil residues from bunker or ballast tanks are disposed off ?

(c) How is the garbages disposed off in port or out at sea.

(d) The necessity of oil record book. What are the rules regarding pumpiing the oilybilges and its prescribed limitation ?

19. Explain in detail what procedure and action you will take if it is reported to you that a man is overboard while you are on watch in the bridge.

20. Describe in detail the procedure that may be followed on board ship when proceeding to an anchorage.It should include the following:

(a) Early discussion between master and chief mate regarding anchoring procedure, length of anchor chain, crew members involved,the method used in releasing anchor,the method of communication between bridge and forward station, the method of determining the fact that the anchor is holding, etc.

(b) Write a log entry showing the entire anchoring sequence.

20. What is the traffic seperation scheme? Write in detail about any traffic lane you have encountered. Your report should include the following:

(a) The width of the lane.

(b) The configuration of the lane.

(c) Any speed restriction mandatory or recommended.

20. Explain in detail the actions that a watch officer and master must take during conditions of reduced visibility.The report should include the following:

(a) The very first action by the watch officer.

(b) The persons on board who are notified & how it is accomplished.

(C) The actions to be taken in variuos degree of reduced visibilty.

(e) How these actions differ in harbour,coastal,or deep water.

21. Explain in detail the actions taken by a watch officer & eventualy by master when encountering heavy weather that results in heavy pounding,rolling.orpitching.The report should include the following:

(a) Immediate action taken as to speed and course adjustment.

(b) Explain the the relative dangers of various conditions listed in the question.

22. Describe the detail action to be taken when nayigating a vessel in shallow and restricted channel.The report should include:

(a) The regulated maximum speed and the reason thereoff.

(b) The squatting effect on the vessel.

(C) Any increase in vibration.

CARGO WORK The sea project on cargo work for a deck cadet should be made up of three parts:

(a) General purpose vessel.

(b) Container vessel.

(c) Tanker vessel.

The assignment should be given according to the vessel. It is desirable that a cadet should be given an opportunity to work in at least two of the vessels mentioned above during their sea period of training. Each type of vessel has got its speciality in handling the cargo & its equipment for the purpose. A project for the general purpose vessel is given below.

BREAK BULK VESSEL

1. Make a diagram of the main deck of your vessel displaying all hatches & their dimensions along with the location of all cargo winches.(Supplement with photo if possible)

2.(a). Describe the hatch closing apparatus & illustrate with a diagram.

(b) Describe the method used on board your ship to maintain the water tight integrity of the main deck hatch cover.

3.(a). List the deck capacities for all decks on the vessel, & describe how you would use these capacities when stowing cargoon these decks.

(b) What would you do if the cargo's weight were to exceed the deck capacity.

4.(a) What is the total bale & grain capacity of vessel as compa-

red to that of the largest hatch.?

(b) Why there is difference between the two?

5.(a) Describe the side battens of your ship as to dimension,construction & function.

(b) What is the procedure in repairing or replacing the side battens.

6.(a) Diagram the limber system in one of the hatches. Describe its purpose and what should be inspected at regular intervals.

(b) Describe how often & when soundings are taken alongwith the function of the striking plate.

7. Why it is important to have vapour proof ligtingshades in the cargo hold.

8.(a) What is the total capacity of refer spaces in your vessel used for cargo/ship's provision stores.

(b) How is a record of temperatures maintained and explain why it is so important.

9.(a) Describe briefly the function of a dehumidifier.Describe in detail the one fitted in your ship(if any).

(b) What are the basic & general rule for ventilating the cargo hold.

(c). For a five consecutive day period during the voyage, list the outside dew point and the hold dewpoint of eachcargo hold.- Describe the action you will take based upon the records so taken.

10.(a). Draw a profile plan of the vessel showing the location of the deep tanks & their cubic capacities.

(b). List three liquid & general cargoes that can be carried in the deep tanks.

11. Make a list of at least 10 cargoes that you have seen carried

as special cargo & where they have been stowed.

12. For any cargo that is designated as " heavy lift"prepare the following:

(a). Location on the vessel & why it was done so.

(b). Describe dunnaging & other preparation prior to loading.

(c). Describe the gear used in slinging and loading.

(d). Describe the securing arrangement.

13.(a) Give the trade name, chemical name, and IMO classication number of five dangerous cargoes that you have carried aboard your vessel during your training.

(b) Attach a cargo plan of a voyage and show all calculations in the computation of final G.M.

SHIP CONSTRUCTION & STABILITY

1.List all of the following particulars of your vessel as given in the capacity plan

(a) Length overall

(b) Length between perpendiculars

(C) Length on the load waterline

(d) Extreme breadth

(e) Depth (Extreme)

2. Define the difference between extreme & moulded measurements as applied to breadth & depth measurements of ship.

3. Define the term displacement as applied to weight/volume conversion of a vessel. Also define:

(a) Light ship displacement.

(b) Load displacement

(c) Deadweight

4. Calculate the deadweight and displacement of your ship for at least 5 departures from port.Consult the ship hydrostatic curves or tables and show all work in volved in calculation.

5. Explain while calculating gross tonnage how the following spaces are treated:

(a) Fore & after peak tanks.

(b) Bridge.

(c) Double bottom spaces.

6. Explain while calculating net tonnage how the following spaces are treated:

(a) Engine room

(b) Passenger quater.

(c) Crew's quater.

7.(a) Locate and make a sketch of the load line area marked on the sides of yuor vessel.Indicate all relevant information.

(b) define the term "assigned free board" (c) Describe in detail the main regulations pertaining to load lines.What authority assigns load lines ? Is a certificate issued ?

What is its duration ? what official log entries are required.

8. Describe how the load lines are used aboard yuor ship with respect to seasonal considerations.

9. Calculate the maximum permissible drafts for one voyage (port -port)in a loaded condition taking into consideration the following:

(a) Seasonal restriction

(b) Distance to load line zone

(c) Fuel to be burned.

(d) F.W.A.

10. Draw a plan view of weather deck of your vessel noting the locations of the following:

(a) Striger plate.

(b) Mooring bits

(c) Freeing ports.

(d) Chocks.

(e) Mooring equipments

(f) Tank sounding pipes & vents.

(g) Hatches.

11. Describe in detail the framing system of your ship.Discuss the practical reasons of their usage noting:

(a) Frame spacing throughout your vessel

(b) The use of webs or deep webs.

12. Describe how the decks within the ships hull are supported noting:

(a) plcement & arrangement of pillars.

(b) Placement & arrangement of beams & girders.

13. Make a sketch of chain locker & related piping system.Also describe the procedure used to pump out chain locker.

14. Make a drawing of ship's rudder showing:

(a) The rudder & how it is secured to ship.

(b) Rudder post

(c) pintles & gudgeons

(d) rudder stock

(e) zinc plates

15. Make a large & detailed drawing of the bow section of your ship's profile, extending from the stem to the forward collision bulkhead showing:

(a) fore peak tank with floors,breast hooks,etc.

(b) Bosuns store room

(c) Chain locker,chain pipes, cofferdam under chain locker

(d) Manhole to peak tank

(e) All decks & flats

(f) Hawsepipes

(g) Bulwarks

(h) Windlass

MARINE ENGINEERING

The objective of this project is to familiarise a deck cadet with certain of the engine room machinery together with its operation.

Main engine

(a) Give a brief description of the main engine of your ship and also draw the power train from engine to propeller.

(b) Give a brief account of the following operation:

1. Warming up of main engine.
2. Operation while maneuvering.
3. Normal operation when underway.
4. Securing after F.W.E.

Emergency generator

(a) A brief description of the emergency generator and associated system

(b) List the light and power circuits on the emergency busbar.Mention the occasions when emergency generator is used.

Boiler

(a) Give a brief description of the boiler on board your ship.Name the important mountings on the boiler.

(b) Give an account of the following operation:

1. Lighting & raising steam.
2. Shuting off.

Refrigeration

(a) Give a brief description of the refrigerationsystem of your ship.Touch upon the cycle and the equipments installed.

(b) If you are in a container vessel explain how the containers are refrigerated.

Electrical system

(a) Give a brief description of the electric system of your ship.

(b) Define, explain the function of the following:

1. Fuse
2. Circuit breaker
3. Battery
4. Relay
5. Ground wires on electrical appliances.

Engine room organization

(a) Make an organizational chart of engine room.

(b) List & describe the duties & responsibilities of each member of engine department.

Steering gear

(a) A brief description of the steering engine on your ship.

(b) Description of how steering gear is tested.

(c) Emergency steering arrangement that can be made.

NAVIGATION

This portion of a sea project is one of the most important part of training of a deck cadet.High degree of importance should be placed on practical part of it.A cadet should undertake watch under the guidance of a senior officer preferably chief mate & learn how to use the modern navigational equipment fitted on board a vessel. The bridge watch should be at least for six months.A cadet should be taught about the practical use of radar, gyrocompass, logs & fathommetrs, radio navigational aids available onboard.A cadet should be given assignment sheet to be duly endorsed by the master of the vessel.Tha academy should maintain a record of the navigational equipments available on board different ship the cadets are assigned. This will help to detect the missing part of the equipment in which the cadet could not make himself familiar with.

RULES OF THE ROAD

There should be specific questions partaining to safe navigation by observing appropiate rules of the road.The cadet will have to make answer of the question given by the academy.The senior deck officer on board will also test the knowledge of deck cadet in this respect.There should be a performance form to be endosed by the master of the vessel to the fact that he or the chief mate has tested the knowledge of the cadet on rules of the road and he has found him satisfactory.

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MARITIME TRAINING PROGRAMME (ENGINEER OFFICER)

ENGINEER OFFICER OPERATIONAL EXPERIENCE

P E R S O N A L E X P E R I E N C E L O G

AND

S E A T R A I N I N G G U I D A N C E N O T E S

Name _____

PERSONAL EXPERIENCE LOG

CONTENTS

*****

1. INTRODUCTION

The objective of sea training is to provide real life experience of shipboard operational procedures and practices to the marine officer undergoing training.

If properly carried out with effective professional supervision, the outcome of the training programme will be the acquisition of skill, knowledge and experience which make important contributions to professional competence and responsibility.

2. PERSONAL HISTORY SECTION

Full Name _____

Permanent Home Address _____

Date of Birth _____

Seamens Registration Number _____

Training College _____

Shipping Company undertaking training _____

Government Administration Department _____

3. GENERAL GUIDANCE NOTES

.1 The information required in Section 1, "Personal History", should be written into the log in block capitals as soon as the 'log' is issued. The name should be printed in capitals on the front cover.

.2 As soon as possible after joining a ship, the section on Ship Service and Ship Data should be compiled and written into the log. Each ship should be listed in numerical sequence 1, 2, 3, etc. and this number must be used when compiling sections 4, 5, 6 and 7. The Master should, wherever possible, validate the ship service record entries.

.3 There should be a conscientious effort to carry out all the duties and activities listed in sections 5 and 6, and where necessary section 7. Before attempting a training duty or activity, procedures should be fully discussed with more experienced staff and advice and instructions noted. A real effort is required by all concerned to make the training and the acquisition of knowledge and experience fully effective.

.4 Before commencing any of the activities, carefully read the Sea Training Guidance notes (Section 8), and the Safety Aboard Ship syllabus.

.5 Each duty and activity must be carried out under the supervision of an experienced senior engineer officer, who is required to validate that the operations has been properly and correctly carried out and completed. The Chief Engineer should countersign the entry.

.6 Every endeavour should be made to carry out all the duties and activities listed, particularly the priority assignments. However, it is recognised that the vessel's itinerary or machinery situation may not allow some assignments to be carried out. In such cases an appropriate entry should be made in the 'remarks' column. Such assignments should receive special attention during the post-sea college phase, and should be completed during subsequent sea service.

.7 Space is available in section 6 for the insertion and carrying out of other additional assignments which the senior engineer officer may feel to be of particular value as a training aid.

.8 The compilation of more extensive personal "engineering knowledge" reference file concerning the machinery installation, its design, operation and maintenance is strongly advised.

4. SHIP SERVICE RECORD

SHIP REF. NO.	NAME OF SHIP	SERVICE PERIOD			SIGNATURE OF MASTER OF VESSEL
		Dates		Service (months)	
		Joining	Leaving		

5. SHIP DATA SECTION

SHIP REFERENCE NUMBER					
GENERAL SHIP DATA		PROPULSION PLANT DATA			
Ship name	MV/SS	STEAM		DIESEL	
Port of Registry		Type of Boilers		Engine Type	
Cargo capacity and type		Steam press	bar	NO Cyls	
Length (m)		Steam temp.	^{o}C	Bore/ stroke	
Beam (m)		Type of Turbines		Service RPM	
Draft (m) loaded				Brake power	
Service speed knots				Kg fuel kw/hour	
Shaft power (kw)				Turbo-charger	
NO propellers					
Bunker capacity		Shaft power		Waste heat Recovery	
Fuel type and and viscosity		Kg. fuel /kw/hour			

5. SHIP DATA SECTION

SHIP REFERENCE NUMBER					
GENERAL SHIP DATA		PROPULSION PLANT DATA			
Ship name	MV/SS	STEAM		DIESEL	
Port of Registry		Type of Boilers		Engine Type	
Cargo capacity and type		Steam press	bar	N° Cyls	
Length (m)		Steam temp.	°C	Bore/ stroke	
Beam (m)		Type of Turbines		Service RPM	
Draft (m)loaded				Brake power	
Service speed knots				Kg fuel kw/hour	
Shaft power (kw)				Turbo-charger	
N° propellers					
Bunker capacity		Shaft power		Waste heat Recovery	
Fuel type and and viscosity		Kg. fuel /kw/hour			

5. SHIP DATA SECTION

SHIP REFERENCE NUMBER					
GENERAL SHIP DATA		PROPULSION PLANT DATA			
Ship name	MV/SS	STEAM		DIESEL	
Port of Registry		Type of Boilers		Engine Type	
Cargo capacity and type		Steam press	bar	N° Cyls	
Length (m)		Steam temp.	°C	Bore/ stroke	
Beam (m)		Type of Turbines		Service RPM	
Draft (m)loaded				Brake power	
Service speed knots				Kg fuel kw/hour	
Shaft power (kw)				Turbo-charger	
N° propellers					
Bunker capacity		Shaft power		Waste heat Recovery	
Fuel type and and viscosity		Kg. fuel /kw/hour			

5. SHIP DATA SECTION

SHIP REFERENCE NUMBER					
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Ship name	MV/SS	STEAM		DIESEL	
Port of Registry		Type of Boilers		Engine Type	
Cargo capacity and type		Steam press	bar	N° Cyls	
Length (m)		Steam temp.	°C	Bore/ stroke	
Beam (m)		Type of Turbines		Service RPM	
Draft (m) loaded				Brake power	
Service speed knots				Kg fuel kw/hour	
Shaft power (kw)				Turbo-charger	
N° propellers					
Bunker capacity		Shaft power		Waste heat Recovery	
Fuel type and and viscosity		Kg. fuel /kw/hour			

Item no.	ASSIGNMENT / DUTY	Ship ref. no.	Assignment carried out and completed			REMARKS
			Date	Supervising Senior Engineer Officer	Confirmed Chief Engineer Officer	
1.	Search out and make line sketches of the following pipe systems: (a)bilge (d)main steam (b)ballast (e)auxiliary steam (c)fire main (f)fuel transfer					
2.	Locate and insert on the sketches in item 1: (a)all valves, indicating function (b)all filter units, stating period between cleaning (c)any remote or emergency controls (d)overflow arrangements for fuel transfer (e)emergency bilge pumping arrangements.					
3.	Determine the location of all safety and emergency equipment aboard the ship. Compile a list indicating position of each item. Compile a special list for the engine room.					
4.	Pump out, and clear all bilges in the vessel. Make use of the sketch from items 1 and 2, and during this activity ensure that all anti-pollution regulations and requirements are observed.					
5.	Transfer fuel from bunkers to service tanks observing all safety and anti-pollution requirements.					

Item no.	ASSIGNMENT / DUTY	Ship ref. no.	Date	Assignment carried out and completed Supervising Senior Engineer Officer	 Confirmed Chief Engineer Officer	REMARKS
6.	Start main generator, or alternator, run up to speed, and making use of paralleling procedures change over machines					
7.	Admit steam to a line or system, taking all precautions against thermal and pressure shock and the avoidance of "water hammer". Close down a steam line, observing procedure for draining.					
8.	Load bunkers, observing all precautions and requirements relating to safety, spillage and pollution prevention.					
9.	Make an examination, internal and external, of an auxiliary boiler, during shut-down for cleaning. Overhaul water gauge fittings and check that passages, cocks and valves are clear. Open up and inspect safety valves. Raise steam and when on load, check water level, applying appropriate cross-checking procedure.					
10.	Prepare and test steering gear for a sea passage, and make routine checks and tests on the system during the voyage.					

6. PRIORITY ASSIGNMENTS AND DUTIES

Item no.	ASSIGNMENT / DUTY	Ship ref. no.	Assignment carried out and completed			REMARKS
			Date	Supervising Senior Engineer Officer	Confirmed Chief Engineer Officer	
11.	For Diesel Main Propulsion Machinery (a) Identify and understand the system for: (i) air starting (iv) cooling (ii) fuel supply (v) air supply (iii) lubrication					
	(b) Change, overhaul and test (i) fuel valve (ii) air start valve (iii) relief valve (iv) exhaust valve					
	(c) Identify the pressures and temperatures throughout the systems in (a) for normal running. (d) At a convenient time, in port, make a crankcase inspection and report on the procedure adopted.					
	(e) Prepare main machinery and ancillary support systems for a sea passage.					
	(f) Identify and understand the main engine control system, and, under supervision, operate the controls during periods of engine manoeuvring.					

Item no.	ASSIGNMENT / DUTY	Ship ref. no.	Assignment carried out and completed Date	Supervising Senior Engineer Officer	Confirmed Chief Engineer Officer	REMARKS
12.	For Steam Main Propulsion Machinery (a) Identify and understand the systems for: (i) fuel supply and its control in the boiler combustion system (ii) supply of combustion air and its control (iii) steam flow from boiler through the engine and essential auxiliaries (iv) condenser operation (v) engine and gearbox lubrication					
	(b) Dismantle, overhaul and test: (i) boiler fuel combustion burner (ii) boiler water level gauge (iii) one other boiler mounting					
	(c) Identify the temperatures and pressures throughout the system for normal running.					
	(d) Raise steam on main boiler. (e) With boiler steaming, check water level, making use of appropriate cross-checkprocedures.					
	(f) Warm through main engines. (g) Prepare main and ancillary plant for a sea passage. (h) Identify and understand the engine control system, and operate the controls during periodsof engine manoeuvring.					

6. PRIORITY ASSIGNMENTS AND DUTIES

Item no.	A S S I G N M E N T / D U T Y	Ship ref. no.	Assignment carried out and completed			R E M A R K S
			Date	Supervising Senior Engineer Officer	Confirmed Chief Engineer Officer	
13.	Carry out the duties of assistant engineer officer of the watch for a minimum period of 240* hours, paying special attention to the following items:					
	(a)Correct procedures for receiving and handing on the watch.					
	(b)The activities during the watch.					
	(c)The observance and noting of machinery performance and condition.					
	(d)Maintenance of the engine room log book.					

* A normal watchkeeping period is four hours, which is followed by an eight-hour off-duty period. The minimum period of 240 hours of watchkeeping therefore represents 30 days of watchkeeping duty during sea passages. This period of watchkeeping duty must be supervised by a competent senior engineer officer.

Item no.	ASSIGNMENT / DUTY	Ship ref. no.	Assignment carried out and completed			REMARKS
			Date	Supervising Senior Engineer Officer	Confirmed Chief Engineer Officer	
14.	Start up emergency fire pump, check performance in relation to various parts of the ship, shut down system leaving it in a state of readiness.					
15.	Understand the operation and means of checking fixed fire extinguishing system fitted. Be aware of all safety precaution required prior to operating system.					
16.	Make a line diagram of the emergency electrical system fitted, showing the circuits served and any safety devices fitted.					
17.	Understand the need for a complete engine movements log during periods of manoeuvring.					

6. PRIORITY ASSIGNMENTS AND DUTIES (Spare)

Item no.	A S S I G N M E N T / D U T Y	Ship ref. no.	Assignment carried out and completed			R E M A R K S
			Date	Supervising Senior Engineer Officer	Confirmed Chief Engineer Officer	

7. NON-PRIORITY ASSIGNMENTS AND DUTIES

Item no.	A S S I G N M E N T / D U T Y	Ship ref. no.	Assignment carried out and completed Supervising Date	Senior Engineer Officer	Confirmed Chief Engineer Officer	R E M A R K S
1.	Start and run air compressors. "Top-up" air storage tanks.					
2.	Start and operate centrifuges. (a)Observe all anti-pollution requirements. (b)When operation is complete, open up unit, clean all parts, re-assemble.					
3.	Operate ship's refrigeration plant. (a)Ensure start and stop procedures are correctly carried out. (b)Observe and note normal operating temperatures of the refrigerant. (c)Understand the influence of circulating water temperature. (d)Understand and know the refrigerant charging procedure.					
4.	Operate the fresh water equipment. Apply tests and conditioning for purity and potability.					
5.	Carry out chemical tests on: (a)boiler water and feed water; and/or (b)diesel engine circulating water.					

Item no.	ASSIGNMENT / DUTY	Ship ref. no.	Assignment carried out and completed			REMARKS
			Date	Supervising Senior Engineer Officer	Confirmed Chief Engineer Officer	
6.	Obtain samples and carry out tests and checks on: (a)bunker fuel - water sludge; (b)lubricating oil - condition - water-acidity.					
7.	Making appropriate measurements and observations, estimate power developed by main engine.					
8.	Open up, as service conditions permit, two items of auxiliary equipment: (a)make inspections and tests to determine wear and deterioration of all parts; (b)repair or renew parts as required; (c)re-assemble and test.					
9.	Check all tanks and cofferdams in the machinery spaces. Locate and note means for sounding and means for pumping out these spaces.					
10.	Locate the position and quantity of all spare gear; compile a list. Check the list against the official spare gear log.					

7. NON-PRIORITY ASSIGNMENTS AND DUTIES

Item no.	A S S I G N M E N T / D U T Y	Ship ref. no.	Assignment carried out and completed			R E M A R K S
			Date	Supervising Senior Engineer Officer	Confirmed Chief Engineer Officer	
11.	Check and test the engine of a motor lifeboat. Know and understand any special operational characteristics.					
12.	Know and understand, for all deck machinery: (a) Function (b) Operation (c) Maintenance (i)anchor windlass (ii)winches (iii)capstans					
13.	Attended at least twice, with instruction; (a) ship's lifeboat drill; (b) fire-fighting drill.					
14.	Has acquired a knowledge and understanding of bridge watchkeeping procedures.					

List of Model Specialized Courses for Selective Offering

TABLE 1

Subject	Participants	Course Level	Remarks
1 Dangerous and Hazardous Cargoes (Other than Special Requirements for oil, chemical and liquefied gas tankers)	Officers and Key Ratings	Advanced	STW Conference Resolution 13 Assembly resolutions A.437(XI) and A.537(13)
2 Special requirements for oil, chemical and liquefied gas tankers	Officers and Ratings	Familiarization	STCW Convention Chapter V Resolutions 10, 11 and 12 (Resolution 16) (Assembly resolutions A.286(VIII) and A.437(XI))
	Masters, Senior Officers and Key Personnel	Advanced	
3 Human Relationships	Supervisory Personnel	Basic	STW Conference Resolution 22
4 Shiphandling Simulator	Masters and Senior Deck Officers	Advanced	STW Conference Resolution 17
5 Radar Simulator	Masters and Deck Officers	Advanced	STW Conference Resolutions 1 and 18 (Assembly resolution A.483(XII))
6 Automatic Radar Plotting Aids (ARPA)	Masters and Deck Officers	Advanced	STW Conference Resolution 20 (Assembly resolution A.482(XII))

TABLE 2

Subject	Participants	Course Level
1 Electronics	Primarily Engineer Officers	Advanced
2 Control Engineering and Automation	Primarily Engineer Officers	Advanced
3 Fuel Combustion and Plant Efficiency	Primarily Engineer Officers	Advanced
4 Planned Maintenance for Machinery Installations	Primarily Engineer Officers	Advanced
5 Financial, Technical and Personnel Management	Supervisory Personnel	Advanced
6 Bridge Team Work and Passage Planning	Masters and Senior Deck Officers	Advanced
7 Maritime Search and Rescue	Primarily Masters and Deck Officers	Advanced
8 Maritime Law	Masters and Senior Deck and Senior Engineer Officers	Supplementary or Updating

***

Subject	Participants	Course Level	Remarks
7 Radio/Electronic Equipment Maintenance	Primarily Radio Officers	Supplementary or Updating	STW Conference Resolution 14, Part II
8 Medical Care	Persons in charge of Medical Care Aboard Ships on Certain Voyages	Advanced	Assembly resolution A.438(XI)
9 Personal Survival	Primarily New Entrants	Basic	STW Conference Resolution 19
10 Maritime Safety Training of Personnel on Mobile Offshore Units	Primarily personnel with designated respons-ibility for the survival of others	Basic	Assembly resolution A.538(13)