

L.N. 132 of 1963

CUSTOMS TARIFF ACT, 1958
(No. 60 OF 1958)

Customs Tariff (Duties and Exemptions) (No. 6) Order, 1963

Commencement : 17th September, 1963

In exercise of the powers conferred by subsection (1) of section 6 of the Customs Tariff Act, 1958, the Governor-General, acting in accordance with the advice of the Council of Ministers, has made the following order—

1. This order may be cited as the Customs Tariff (Duties and Exemptions) (No. 6) Order, 1963, and shall apply throughout the Federation.

Citation and extent.

2. The First Schedule to the Customs Tariff Act, 1958 (which relates to import duties of Customs) as the same was replaced by the Customs Tariff (Duties and Exemptions) Order, 1962, is amended by the addition after item 4 of the following new item—

Amendment of First Schedule to No. 60 of 1958 L.N. 25 of 1962.

“4A. APPAREL AND HOUSEHOLD RUMMAGE showing signs of appreciable wear ; rags

—the pound 0 2 6
or *ad valorem* 33 $\frac{1}{3}$ per centum
whichever is the higher.”

MADE at Lagos this 17th day of September, 1963.

R. C. ONYEJEPU,
*Acting Deputy Secretary
to the Council of Ministers*

N.B.—This Legal Notice replaces L.N. 113 of 1963, published in *Gazette* No. 69 of 16th September, 1963.

F10251/S. 86

L.N. 133 of 1963

MERCHANT SHIPPING ACT, 1962
(1962, No. 30)

Merchant Shipping (Carriage of Passengers) (Amendment)
Regulations, 1963

Commencement : 24th October, 1963

In exercise of the powers conferred by paragraph (b) of section four hundred and twenty-seven of the Merchant Shipping Act, 1962 and of all other powers enabling him in that behalf, the Federal Minister of Transport hereby makes the following regulations—

1. These regulations may be cited as the Merchant Shipping (Carriage of Passengers) (Amendment) Regulations, 1963.

2. For sub-regulation (2) of regulation 46 of the Merchant Shipping (Carriage of Passengers) Regulations, 1963 (hereinafter referred to as the principal regulations) there shall be substituted the following sub-regulation—

“(2) Every ship to which this Part applies shall comply with the rules regarding life-saving appliances except that whenever deck passengers are carried, the boatage required need not exceed one hundred and twenty-five per cent of the number of persons on board and there shall be one life jacket for every person carried on board.

In this sub-regulation, “boatage” means the total aggregate capacity of the ship’s life-boats including the capacities of any inflatable life-raft and buoyant apparatus.”

3. For regulation 47 of the principal regulations, there shall be substituted the following regulation—

“47. Whilst ships to which this Part applies carry deck passengers a clearly legible painted notice in the following terms shall be displayed in a conspicuous position where it may be read by all deck passengers—

The deck from this mark to.....and from
.....to.....is certified for
the carriage of.....deck passengers, when not occupied by
cargo, stores or other encumbrances.

When cargo, stores or other encumbrances are carried in this space the number of deck passengers is to be reduced by one for every nine square feet of space so occupied.”

MADE at Lagos this 24th day of October, 1963.

R. A. NJOKU,
Federal Minister of Transport

THE MERCHANT SHIPPING (DISTRESSED SEAMEN)
RULES, 1963

ARRANGEMENT OF RULES

1. Short title and application.
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3. Limitation of time.
4. Stowaways.
5. Relief may be discontinued.
6. Wrecked seamen.
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8. Clothing and medical expenses.
9. Period of relief.
10. Disposal of distressed seamen.
11. Conveyance by foreign ships.
12. Return port to be specified : Action of proper officers *en route*.
13. Endorsement on Agreement and Issue of Conveyance Order.
14. Rates of passage.
15. Officers and superior ratings.
16. Rescued seamen.
17. Foreign seamen.
18. Seamen mentally deranged.
19. Seamen at infected ports.
20. Certain cases of illness, etc.

L.N. 134 of 1963

THE MERCHANT SHIPPING ACT, 1962

Merchant Shipping (Distressed Seamen) Rules, 1963

Commencement : 17th October, 1963

In exercise of the powers conferred by section 45 of the Merchant Shipping Act, 1962, the Minister hereby makes the following rules—

- Short title and application. 1. These rules may be cited as the Merchant Shipping (Distressed Seamen) Rules, 1963 and shall apply to all Nigerian masters, seamen, apprentices left behind at any place out of Nigeria.
- Persons entitled to relief. 2. Without prejudice to the generality of rule 1, the person entitled to be dealt with under these rules, and who are hereinafter referred to as distressed seamen are—
- (a) any persons mentioned under rule 1 whether they are citizens of Nigeria or not, found to be in distress in any place outside Nigeria, who have been shipwrecked or have been discharged from or left there by a Nigerian ship ; or
- (b) any persons mentioned under rule 1 who, being citizens of Nigeria, have been engaged by any person acting either as principal or agent to serve in a ship belonging to the Government or to a subject or citizen of a Commonwealth country other than Nigeria or a foreign country and are found to be in distress in any place outside Nigeria.
- Time limit. 3. A distressed seaman shall not be entitled to any relief under these rules unless he applies to the proper officer within three months from the date on which he left his last ship.
- Stowaways. 4. Stowaways and other persons not on the Articles of a ship are not entitled to relief unless they have been employed or engaged in some capacity on board the ship which left them behind.
- Relief may be discontinued. 5. When the proper officer is satisfied (by medical certification or otherwise) that a distressed seaman, who refuses to accept reasonable employment is fit to work, he shall discontinue any relief which may have been granted to such distressed seaman under these Rules.
- Wrecked seamen. 6. In case of a shipwreck, the dates from which members of the crew are entitled to relief may vary according to the time when they cease to be employed in connection with the wreck.
- Nature of relief. 7. Distressed seamen are to be relieved and maintained upon the most reasonable terms possible but only until employment can be found for them or arrangements made for their return to a proper return port.
- Clothing and medical expenses. 8. Distressed seamen, may if necessary, be supplied with clothing and bedding but not in a greater quantity than is absolutely required. The clothing supplied shall, as far as possible, be of the quality the seaman would normally wear. Medical advice and medicine may be provided when necessary.

9. No definite period may be fixed during which a seaman should receive relief, but in every case in which relief is continued for more than a month the proper officer shall make a special report of the circumstances to the Minister.

Period of relief.

10. Distressed seamen who are in receipt of relief from a proper officer and are unable to engage on a ship or to find other employment shall be sent to a proper return port as soon as practicable, but the proper officer at any place *en route* to such return port shall, if possible, obtain employment for the distressed seaman.

Disposal of distressed seamen.

11.—(1) Whenever there is no Commonwealth ship in which a distressed seaman can be sent either to a proper return port or to a port *en route* thereto, the proper officer may, if he considers it desirable, secure a passage for him in a foreign ship on the best terms available.

Conveyance by foreign ships.

(2) If the passage be not prepaid, application may be made by the master of the foreign ship to the proper officer at the port to which the distressed seaman has been so conveyed.

12.—(1) The proper officer at the port where a seaman is originally relieved, having determined, as laid down in the Act, the return port to which the distressed seaman is entitled to be sent, should indicate that return port on any document issued for his conveyance to that port or to any place *en route* to such return port.

Return port to be specified.

(2) Whilst a distressed seaman is in transit to a proper return port, the proper officer at any place at which that distressed seaman may be, may defray, on behalf of the authority originally making arrangements for the distressed seaman's return to a proper return port, any expenses on account of that distressed seaman which the authority originally acting in respect of him could defray.

Action of proper officers *en route*.

13. The proper officer shall whenever practicable, endorse upon the Agreement of any Commonwealth ship in which distressed seamen are to be conveyed, either to a proper return port or to a port *en route* to such port, the name of each man put on board, specifying the day he embarks, and shall also fill up, sign, and deliver to the master of such ship an Order in a form as prescribed in the Schedule hereto (hereinafter called a Conveyance Order) showing thereon either the port to which he is sent, or the country, to a port in which the distressed seaman is entitled to be sent.

Endorsement on Agreement and issue of Conveyance Order.

14. On arrival at the port to which a distressed seaman has been conveyed the master of the ship in which he was conveyed shall produce the Conveyance Order to the proper officer who, if satisfied that the distressed seaman has been so conveyed, maintained and provided for in excess of the number, if any, required to make up the complement of his crew, shall pay to the master, in respect of such distressed seaman an amount calculated as follows :—

Rates of Passage.

(a) For mates and engineers (whether certificated or not), surgeons, chief stewards, chief pursers, radio officers and apprentices (including midshipmen and cadets), ten shillings per day ;

(b) For other members of the crew, seven shillings and six pence per day.

15. Unless superior accommodation and subsistence be provided for mates, engineers, surgeons, chief stewards, chief pursers, radio officers and apprentices, the rates payable for distressed seamen of such ratings shall be the same as in sub-paragraph (b) of Rule 14.

Officers and superior ratings.

Rescued seamen.

16. Whenever a ship arrives at a port with distressed seamen on board, who have been rescued or picked up at sea, the proper officer may pay the master of the ship a subsistence allowance in respect of such persons at the rates hereinbefore mentioned.

Foreign seamen.

17. Expenses under these regulations shall not be incurred in respect of foreign seamen, who had previously served on a Commonwealth ship, if such seamen are in their own countries or in the colonies or territories administered by their own countries.

Seamen mentally deranged.

18.—(1) In order to provide for the passage to a proper return port of a distressed seaman suffering from mental derangement, the proper officer, with the object of ensuring that the requisite care and attendance shall be given to such distressed seaman during the voyages, may make a special arrangement with a master, agreeing to pay, if necessary, such sum for the passage in addition to the usual allowance as may appear fair and reasonable in the circumstances. A copy of the agreement so entered into shall in every case be forwarded to the Minister as soon as possible, and, also, in any case where it is desirable to send the distressed seaman to a foreign port or to a port in the Commonwealth, whether *en route* or otherwise, to the proper officer at that port.

(2) In the case of a distressed seaman arriving under such circumstances at his port, the proper officer may, in addition to the usual allowance, pay to the master the amount of the extra passage money on production of such agreement, if he is satisfied that the distressed seaman has received the special care and attendance stipulated for. The proper officer shall immediately advise the Minister of such payment and forward to him the original agreement and the receipt of the Master for the passage money.

Seamen at infected ports.

19. Whenever a passage to a proper return port is required for a distressed seaman in a port infected at the time with cholera, yellow fever or plague, or for a distressed seaman who has suffered from any of these complaints, whether the port from which he is sent be an infected port or not, a Certificate shall be obtained by the proper officer from a duly qualified medical practitioner to the effect that the distressed seaman is not a source of danger to others. The Certificate shall state the nature of the disease from which the distressed seaman has suffered, and should be given to the master of the conveying ship for production, if necessary, to medical and sanitary authorities at other ports, and should be retained by him until the distressed seaman reaches his proper return port, or, in the case of a distressed seaman conveyed to an intermediate port, the Certificate shall be delivered with the Conveyance Order to the proper officer at such port.

Certain cases of illness, etc.

20. In the case of a seaman discharged or left behind suffering from any illness due to his wilful act or default or to his own misbehaviour other than venereal disease, who has to be dealt with under these Rules, the expenses of providing necessary surgical and medical advice and attendance and medicine and also the expenses of the maintenance of such seaman until he is cured, or dies, or is returned to a proper return port, and of his conveyance to such port and, in the case of death, the expense (if any) of his burial, shall be met as far as possible out of his wages.

SCHEDULE

<p>M. of T. Form C. 1</p> 	<p>ORDER</p> <p>For the Conveyance of a Distressed Common- wealth Seaman</p> <p>Merchant Shipping Act, 1962, Section 40 and Second Schedule</p>	<p>For use at Ministry of Transport</p> <hr/> <p>No.</p> <hr/> <p>Year</p>
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Heads of State of Commonwealth Countries or British Possessions, or any persons acting under their authority; Commonwealth Consular Officers in Foreign Countries, and, in places where there are no such officers, Commonwealth Resident Merchants; and Superintendents of Mercantile Marine Offices in Nigeria, are empowered to order passages for distressed Seamen by Commonwealth ships bound either to the ports at which they were shipped, or to ports in the country to which they belong or to ports agreed upon at the time the Seamen were discharged. Masters of such ships are bound under liability to a fine not exceeding £100 to afford passages and maintenance to such Seamen, not exceeding in number one for every 500 register tons, and to provide them with proper berths effectually protected against sea and weather.

PART 1.—ORDER TO MASTER OF CONVEYING VESSEL

To the Master of the Ship..... Official No.....		
<p>Pursuant to the Merchant Shipping Act, 1962, Chapter 9, you are hereby required to receive on board your vessel and convey to..... the Commonwealth Seaman named below.</p> <p>For his subsistence if Supernumerary over and above the complement of the Crew you will be paid at the Rate authorised by the Ministry of Transport on complying with the requirements mentioned herein.</p>		
<i>Name of Seaman</i>	<i>Rating and Dis. A No.</i>	<i>Name, Official No., Registry of last ship</i>
		<i>(Nationality, if foreign)</i>
(FULL particulars of Seaman's last voyage to be entered on Page 2)		
Dated at..... this..... day of..... 19.....		
	<p>..... <i>Signature</i></p> <p>..... <i>Title</i></p>	
<p>An endorsement as to the conveyance should be made on the Agreement of the conveying ship, and the seaman's proper return port should be stated.</p> <p>The seaman's effects, Discharge Book, and Account of Wages (F1), if rendered, should accompany him.</p>		

IMPORTANT INFORMATION FOR MASTER OF CONVEYING
VESSEL

Entries should be made in the Official Log Book of the receipt on board of the distressed seaman and of any medical attention or comforts given and of his disembarkation.

If the man is transferred to any other ship, the particulars, with the date of transfer and the Ship's name, must be entered at the time of the transfer in the Official Log Books of both vessels.

On arrival at the port to which the seaman is ordered to be conveyed, the Master shall arrange for him to be taken to the Superintendent of a Mercantile Marine Office, if in Nigeria, or to the corresponding officer, if in a Commonwealth Country or British Possession abroad, or to the Commonwealth Consular representative in the case of Foreign Countries.

Responsibility for the payment of the claim will not be accepted unless the Seaman is produced or adequate reasons furnished to show why this cannot be done.

When the Master appears before the Superintendent or other Officer he must make the declaration overleaf.

The conveyance rates allowed by the Ministry of Transport are :—		<i>Per day</i>	
		s	d
1. Mates and engineers (certificated and uncertificated), surgeons, chief pursers, chief stewards, wireless operators, and apprentices (including midshipmen and cadets) when diet and accommodation superior to that usually afforded distressed Seamen are furnished ; otherwise same as No. 2	}	10	0
2. Other members of a crew, and of Chinese and other native Seamen when afforded the same diet as European Seamen	}	7	6
3. Lascars and other native Seamen when subsisted on similar diet		4	0
A SEPARATE FORM TO BE USED FOR EACH MAN			

PART 2.—PARTICULARS OF THE SEAMAN'S LAST VOYAGE
to be completed by the Officer who issues the Order

It is most important that the undermentioned particulars of the seaman's last voyage should be correct as they form the basis of settlement with the seaman when landed. Care should be taken that advances of wages and expenses chargeable to the seaman are deducted, and that only the NET BALANCE IN HAND is stated. If the wages were paid by Bill this should be stated below but no figures inserted. When the balance is stated in currency the rate of exchange should be stated.

WHERE SHIPPED		STATE CAUSE OF LEAVING SHIP	
NAME, PORT OF REGISTRY AND OFFICIAL NO. OF SHIP		(1) Illness.—(State nature and whether due to seaman's own fault.)	
WHERE DISCHARGED OR LEFT BEHIND		(2) Injury.—(State nature and whether in service)	
		(3) Imprisonment.	
		(4) Termination of agreement.	
		(5) Mutual consent.	
		(6) Other cause: to be specified.	
DATE OF LEAVING BEHIND		Was seaman discharged with official sanction?	
Seaman's proper Return-Port, i.e., final Port of destination as agreed by him, or as decided by the proper officer.		Have expenses been incurred	
		(1) Chargeable to Ministry of Transport?	
		(2) By Agents?	
		Where expenses are to be deducted from wages (see PART 6), state clearly if all deductions have been made.	
BALANCE OF WAGES			
Amount deposited in cash with Consul or Officer :—	Advances from Wages :—	Balance remaining due on Seaman's departure :	
Currency Sterling	Expenses (if chargeable to wages) :—	Currency	Rate of Exchange
		equal to.....	
		Pounds
		shillings..... pence

**PART 3.—DECLARATION TO BE MADE BY THE MASTER OF THE CONVEYING
VESSEL BEFORE THE SUPERINTENDENT OR OTHER OFFICER AT THE PORT
TO WHICH THE SEAMAN IS CONVEYED**

Complement of Crew	No. of Crew while the Distressed Seaman was being conveyed	Date when Subsistence on board commenced	If landed, where? If not landed, cause to be stated	Date when landed or otherwise disposed of	No. of Days subsisted

I, Master of the Ship Official No. do solemnly and sincerely declare that the Seaman above referred to was maintained by me for the period stated during the whole of which time I had my full complement of men (excepting) exclusive of the aforesaid Seaman, and that the above statements are correct.

Date Master's Signature

CLAIM FOR MEDICAL ATTENDANCE AND EXTRA DIET—ON PAGE 4

This Form is now to be delivered by the Master of the Ship to the Superintendent or other Officer, who will examine it carefully making reference to the Ships' papers and inquiries of the Seaman conveyed. If the Superintendent or other Officer thinks that there is any reason to doubt the correctness of the above Declaration, or any of the particulars given on this form, he will refuse payment, and report the matter to the Ministry of Transport, with full explanations of his reason for so refusing. If there is no reason to doubt the correctness of the particulars given by the Master, and the claim is in order, he will then calculate the amount to be paid according to his instructions, and pay the same to the Master, first filling up the certificate on the following page.

**PART 4. CERTIFICATE OF THE SUPERINTENDENT OR OTHER OFFICER AT THE PORT
WHERE THE SEAMAN IS LANDED**

No. of days maintained.	Rate per day. (see page 1)	Amount	
Medical Attendance, extra diet, wines, etc., as on page 4.			

I CERTIFY that the above declaration was made before me and that the amount shewn in the margin is due for the conveyance of the above named seaman.

Dated at
this day of 19.....

Signature of Superintendent
or other Officer }

PART 5.—RECEIPT OF MASTER FOR CONVEYANCE

Received the sum of :—		
.....poundsshillingspence
Date.....	Signature of Master	

PART 6.— † SETTLEMENT OF BALANCE OF WAGES AT THE PORT WHERE THE SEAMAN IS LANDED

When the balance of wages has been paid by a Bill, settlement with the Seaman must be deferred until instructions have been obtained from the Ministry of Transport.

Balance of Wages as stated on page 2				I declare that I am proceeding to : (Address)
Return Port Expenses : (where chargeable to wages)				
Rail Fare to.....				I acknowledge receipt of : Wages
Rail Warrant to.....				
Subsistence.....				Subsistence, etc.....
.....				
.....				
Total Expenses				Total :
Net Balance due to Seaman			pounds
			shillings
			pence,
				and Railway Warrant to
				Signature of Seaman
				To be witnessed by } independent third } party if Seaman can- } not sign his name. }
				Date.....

† Conveyance expenses and other expenses, if any, incurred by the Officer are to be deducted from wages in the following cases :—

- | | |
|--|--|
| (1). Illness due to the seaman's own wilful act or default or misbehaviour. | (b) On ground of imprisonment for misconduct ; |
| (2). Injury not sustained in Ship's service. | (c) By order of a Naval Court for misconduct ; |
| (3). DISCHARGE : (a) by mutual consent during the currency of the Agreement or on termination of Agreement where no provision has been made to meet expenses ; | (d) At the port where the seaman was shipped, or a neighbouring port ; |
| | (e) From a foreign vessel. |
- NOTE : In all cases of misconduct, refer to Headquarters of Ministry of Transport before payment.

SUMMARY

	£	s	d	PORT OF
				1. Conveyance expenses
2. Medical Attendance, etc.				for month ending 19
3. Return for expenses : (a) Rail Fare (incl. Warrant)				and
(b) Subsistence				for month ending 19
(c) Boarding				£
(d)				or
4. Wages				Charged in account with Ministry of Transport.
				for quarter ending 19

CLAIM FOR MEDICAL ATTENDANCE AND EXTRA DIET

In special cases where in the opinion of the Surgeon, the health of a Seaman conveyed under this Order demands Medical Attendance, extra diet or wines, entries should be made in the Official Log Book of the days on which such attendance, etc., was given and signed by the Master and the Surgeon who should complete the form below in order to obtain the allowance of 1/- a day granted in cases where Distressed Commonwealth Seamen have required such attendance or extra diet, and payment for wines supplied under the Surgeon's order.

NATURE OF ILLNESS	Dates upon which Medical Attendance or Extra Diet or both were given		No. of Days	Wines and Spirituous Liquors supplied		Total Amount Due	I hereby acknowledge having received the Medical Attendance, etc., stated hereon. Signature of Seaman }
	Medical Attendance	Extra Diet		Description	Price		
							Certified in accordance with Official Log Book. Master. Surgeon.

MADE at Lagos this 17th day of October, 1963.

R. A. NJOKU,
Federal Minister of Transport

EXPLANATORY NOTE

These Rules lay down the procedure for dealing with distressed seamen and contain provisions which appear to the Minister to be necessary to implement the provisions of Chapter 9 of the Merchant Shipping Act, 1962.

EXAMINATION FOR CERTIFICATES OF COMPETENCY
(ENGINE-ROOM) REGULATIONS, 1963

ARRANGEMENT OF REGULATIONS

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5. (2) Remission of service afloat.
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7. Service afloat.
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11. Marine Engineering training schemes.
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21. Endorsements.
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23. Remissions.
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28. Service in ships trading entirely abroad.
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30. Other service.

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52. Marine Engineering Assistant's examination.
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58. Syllabuses.
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SECOND SCHEDULE—Syllabuses for Inland Waters Certificates.

THIRD SCHEDULE—Syllabuses for Third Class Engineers Certificates.

FOURTH SCHEDULE—Syllabuses for First and Second Class Engineers Certificates.

FIFTH SCHEDULE—Validity of other countries Certificates.

SIXTH SCHEDULE—Reading the water-gauge.

SEVENTH SCHEDULE—List of Approved Workshops.

L.N. 135 of 1963

MERCHANT SHIPPING ACT, 1962
(1962, No. 30)

Certificates of Competency (Engine-Room) Regulations, 1963

Commencement : 24th October, 1963

In exercise of the powers conferred by section 427 of the Merchant Shipping Act, the Federal Minister of Transport hereby makes the following Regulations.

CHAPTER 1—INTRODUCTORY

Short title
and applica-
tion.

1. These regulations may be cited as the Certificates of Competency (Engine-Room) Regulations, 1963 and shall apply to examinations for certificates of competency which are required to be held by the engineer officers and the ratings of merchant ships under the Merchant Shipping (Manning) Regulations, 1963.

PART I—SEA-GOING CERTIFICATES

CHAPTER 2—GRADES OF CERTIFICATES

Classes of
Certificates.

2.—(1) The Minister may grant the following classes of certificates—

- (a) First Class ;
- (b) Second Class ; and
- (c) Third Class.

(2) Each class of certificate may be subdivided as follows—

- (a) Steam Certificates, entitling the holders to serve as certificated engineers in steamships ;
- (b) Motor certificates, entitling the holders to serve as certificated engineers in motor ships ; and
- (c) Combined Steam and Motor Certificates, entitling the holders to serve as certificated engineers in both steam and motor ships.

(3) Holders of certificates shall, after serving the necessary period of qualifying time afloat in another type of ship and passing the endorsement examination in the same class as for the certificate which they hold be furnished with a combined certificate. A candidate who holds a certificate of a higher class and passes the examination for a lower class of certificate only for the other type of ship, may have his certificates for the higher class endorsed accordingly.

Certificates
of Service.

3.—(1) An Engineer Officer who has attained the substantive rank of Lieutenant and above or the substantive rank of Engineer Lieutenant (Marine Engineer) in any Commonwealth Navy and who has performed not less than 21 months qualifying service afloat as Watch-keeping Engineer Officer or Senior Engineer Officer or Engineer Officer since attaining such rank (acting rank, if any, to count) may apply to be granted a Certificate of Service as First Class Engineer without examination.

(2) An Engineer Officer who has attained the substantive rank of Engineer Sub-Lieutenant (Marine Engineer) in any Commonwealth Navy and who has performed not less than 21 months qualifying service afloat as a Watch-keeping Engineer Officer, Senior Engineer Officer or Engineer Officer since attaining such rank (acting rank, if any, to count) may apply to be granted a Certificate of Service as Second Class Engineer without examination.

(3) Service, other than that concerned with ships' main boilers, propelling machinery and auxiliary machinery connected therewith, (*e.g.* service as flight engineer or on servicing of aircraft) shall not be accepted.

(4) Temporary or Reserve Officers shall not be eligible for the grant of Certificates of Service.

(5) Certificates of Service shall entitle the holder to go to sea, in the grades certified, as engineers of any ship in the Nigerian Merchant Service, however propelled.

4. Candidates for examination shall apply therefore only on the official application form obtainable from any examiner. The form properly completed, together with the necessary fee specified in the Merchant Shipping (Fees) Regulations, 1963, and any testimonials, discharges, certificates or any other documents which may be required by the examiner, shall be lodged with the examiner at the proposed place of examination. If the examiner is satisfied that the candidate's application and service are in order, he shall inform the candidate as to the time and place of the examination.

Application.

CHAPTER 3—QUALIFICATIONS REQUIRED FOR THE VARIOUS GRADES OF CERTIFICATES OF COMPETENCY

5.—(1) A candidate for a Third Class Certificate shall be a person—

- (a) of not less than 21 years of age ;
- (b) whose workshop service is fully in accordance with paragraphs 9, 10 or 11 of these regulations in respect of quality and length ;
- (c) who holds the Marine Engineer Assistants Certificate of Competency and has completed sea service as set out in regulation 16 for a Second Class Certificate ; and

(d) regulations 12, 13, 14 and 15 shall apply to third class candidates, as they apply to second class candidates, except in the case of regulation 15, where the compensatory sea service may have been performed on ships of 50 NHP or 250 BHP.

Qualifications for Third Class Certificate.

(2) A candidate who can show that he has attended courses in Marine or Mechanical Engineering at an approved technical college or institute, may be allowed to count time spent at half rate towards the service afloat. Such allowance shall not exceed three months in all. In order to obtain such allowance, the candidate may be required to produce a certificate from the authority in charge of the college or institute to the effect that he has been engaged on a course specialising in marine or mechanical engineering, and the certificate should also show the number of hours of attendance actually on the course and state whether or not the candidate's work has been satisfactory.

Endorsements of Third Class Certificate.

6.—Candidates for the endorsement of a Third Class Certificate shall have completed—

(a) for the Motor Endorsement of a Steam Certificate, a further period of three months service afloat on the main propelling machinery of a motor ship of not less than 250 brake horse-power; and

(b) for the Steam Endorsement of a Motor Certificate, a further period of six months service afloat on the boiler and main propelling machinery of a steam ship of not less than 50 nominal horse-power.

Service afloat.

7. Service required afloat by regulations 5 (1) and 6 may be performed in any ship in the foreign, home, coasting or inland water trade. Service in the foreign, home or coasting trade may be performed in any capacity in the engine or boiler room if the duties consist of regular watch keeping. Service in the inland water trade shall have been in the capacity of marine engineering assistant in charge, except where an endorsement is required when the capacity of second engineering assistant will be accepted.

Qualification for Second Class Certificate.

8.—(1) A candidate for a Second Class Certificate shall

(a) be not less than 21 years of age;

(b) satisfy at least one of the requirements of these regulations relating to workshop service, subject to the provisions as to compensatory sea service; and

(c) have performed the requisite sea service as set out in these regulations.

(2) A candidate for the endorsement of a certificate shall have performed the extra sea service set out in these regulations.

Service as apprentice or journeyman.

9. A candidate shall have performed satisfactory service for not less than four years as apprentice engineer or journeyman on work suitable for the training of a marine engineer in the manufacture or maintenance of machinery. Not less than one of these four years' workshop service shall have been devoted to fitting, erecting or repairing machinery of a suitable size or description (*e.g.* work on marine engines, substantial auxiliary machinery of a type fitted in ships, or on motive power machinery which has a similar value in the training of marine engineers) either in the works or outside; the remaining three years may have been spent on work of this nature or other suitable work, subject to a time allowance for each type of work, examples of which are specified below—

Metal Turning	Full time up to a maximum of 2 years
Brass Finishing	Full time up to a maximum of 1 year
Boiler Making or repairing of boilers	Full time up to a maximum of 1 year
Pattern Making	Full time up to a maximum of 1 year
Planing, Slotting, Shap- ing and Milling	Full time up to a maximum of 1 year
Tool Room	Full time up to a maximum of 1 year
Approved schemes of training in the use of hand and small machine tools	Full time up to a maximum of 1 year
Smith work	Full time up to a maximum of 6 months
Coppersmith work	Full time up to a maximum of 6 months

Welding	Full time up to a maximum of 6 months
Work in drawing office on arrangement, detail or design	Full time up to a maximum of 1 year but if more than 1 year has been spent in the drawing office only half the additional time shall count.
Electrical shop or repair work not already covered above (excluding work of a minor nature) ..	Full time up to one year; additional at half rate. Maximum, 18 months.

10.—(1) As an alternative to regulation 9, the Ministry may consider a candidate who has performed satisfactory service for not less than four years in an organised student or technical apprenticeship accepted by the Ministry, provided that the candidate has obtained one of the technical qualifications referred to in regulation 50 and has devoted not less than one year to fitting, erecting or repairing machinery of a suitable size or description.

Alternative qualifications.

(2) As a further alternative, the Ministry may consider a candidate who has satisfactorily completed a full-time course of study of at least the standard of Higher National Diploma of the United Kingdom in mechanical engineering approved or recognised under regulation 50 for a period of not less than three years at a technical college or university. The candidate shall have served for not less than 24 months in workshops on work suitable for the training of a marine engineer as prescribed in regulation 8 or otherwise to the satisfaction of the Ministry. Not less than six consecutive months of this period should have been devoted to fitting, erecting or repairing machinery of a suitable size as required by regulation 9.

(3) Suitable workshop training carried out during technical college or university vacations and periods totalling not more than six months spent in works' apprentice training schemes for fitters and turners or on similar training in technical college or university workshops may be allowed to count towards the required 24 months' service up to an overall maximum of nine months. Separate periods of training shall be of not less than one month's duration.

11.—(1) The approved alternative scheme for the training of Engineer Officer shall consist of—

Training schemes for marine engineer.

(a) a two-year Ordinary National Diploma course of the United Kingdom in mechanical engineering at an approved technical college or its equivalent with additional practical training courses during vacations ;

(b) a period of eighteen months service as an apprentice engineer at sea ; and

(c) a period of twelve months special training in a shipyard or marine engine builder's works or other suitable engineering works.

(2) Candidates who have satisfactorily completed this course of training or any modification of this scheme approved by the Ministry or other approved scheme operated by other Commonwealth countries may be accepted.

12. No workshop training or time devoted to apprenticeship before the age of 15 years shall be accepted.

Minimum age.

Testimonials.

13. All candidates shall be required to produce testimonials, which shall be in the form set out in the First Schedule except in the case of apprentices trained under any of the schemes specified in Regulation 11, as to their workshop service. These testimonials shall be signed by the employer or his representative, and shall testify to the candidate's conduct and ability and state the kind of work on which he has been engaged and the period of time spent in each branch (*e.g.* fitting, erecting, turning, machine work, etc.). Testimonials shall be returned to the candidates when the examination is completed.

Training in foreign establishments.

14. Time spent in technical training establishments in foreign countries may not be accepted except in special circumstances.

Compensatory service.

15.—(1) Where candidates perform workshop service for the period of time prescribed in Regulation 9 or 10, deficiencies in any of the types of service, which can be assessed in each case by the Ministry, shall be made up by further workshop service of a suitable character or by compensatory service on regular watch or on day work at sea.

(2) Compensatory sea service shall be performed either

(a) on day work as engineer on board foreign-going or home trade ships of not less than 66 nominal horsepower if steam, or 373 brake horsepower, if motor; or

(b) on regular watch on such ships.

(3) Time so spent on foreign-going ships may be accepted as having two-thirds of the value of suitable workshop service and on home trade ships as having four-ninths of that value.

(4) No day work at sea performed before the age of 20 shall be accepted.

Sea Service for Second Class Certificate.

16. Candidates for a Second Class Certificate of Competency shall, in addition to the workshop service and where applicable, any of the training schemes previously mentioned, complete the following period of sea service—

(a) for a Steam Certificate, 21 months, of which at least nine months shall have been spent on the boilers and main propelling machinery of a steamship. This period of at least nine months shall include at least six months' service on the boilers and three months service on the main propelling machinery, but the service on the boilers and on the main propelling machinery can be simultaneous. The remaining twelve months may be spent on the boilers of a steamship, the main propelling machinery of a steam or motor ship, on suitable auxiliaries of a steam or motor ship, or on day work.

(b) For a Motor Certificate, 21 months, of which at least six months shall have been spent on the main propelling machinery of a motor ship. The remaining 15 months may be spent on the main propelling machinery of a steam or motor ship with not more than six months on the boilers of a steamship, or on day work.

(c) For a Combined Steam and Motor Certificate, 24 months, of which at least—

(i) Nine months shall have been spent on the boilers and main propelling machinery of a steamship. This period shall include at least six months service on the main propelling machinery, but the service on the boilers and main propelling machinery may be simultaneous; and

(ii) Six months shall have been spent on the main propelling machinery of a motor ship. The remaining nine months may be spent on the boilers of a steamship, the main propelling machinery of a steam or motor ship, on suitable auxiliaries of a steam or motor ship, or on day work.

17. A candidate for the endorsement of a Second Class Certificate shall have completed—

Endorsement
of
Certificates.

(a) for the motor endorsement, of a Steam Certificate, a further period of three months, if the candidate has served on the whole for not less than six months on the main propelling machinery of a motor ship ; and

(b) for the steam endorsement of a Motor Certificate, a further period of six months, if not less than nine months service in all shall have been served on the boilers and main propelling machinery of a steamship. This period of nine months shall include at least six months' service on the main propelling machinery, but the service on the boilers and on the main propelling machinery may have been simultaneous.

18. Service required under regulations 16 and 17 shall have been performed in foreign-going steamships of not less than 66 nominal horse-power or motor ships of not less than 373 brake horse-power, as an engineer at sea on regular watch for not less than eight out of each 24 hours' service claimed, except that—

Type of
service
required.

(a) day work, by which is meant engineering work at sea other than that performed on regular watch, shall be counted at half rate with a maximum allowance of six months towards the qualifying period of sea service, if the work has been carried out within the engine or boiler spaces of a steam or motor ship at sea ; and

(b) the conditions under which service performed in ships other than foreign-going ships is allowed to count are set out in regulations 27 to 30.

19. Candidates may be granted a remission of sea service not exceeding three months in respect of each of the following requirements which they fulfil—

Remissions.

(a) candidates whose workshop service has been principally devoted to work on marine engines (steam or motor) or to other marine engineering work acceptable to the Ministry, or who have satisfactorily completed a course of training under regulation 11 incorporating such workshop service ; and

(b) candidates who, before commencing their qualifying sea service, have passed Part A of the examination for a Second Class Certificate or who have obtained a certificate, diploma or degree recognised by the Ministry as conferring full or partial exemption from Part A of the examination for a Second Class Certificate of Competency.

20. Candidates for a First Class Certificate shall except as provided in regulation 24, hold a Second Class Certificate and, whilst holding it, shall have completed the same period of sea service as that required in regulation 16 for the Second Class Certificate for Steam or Motor, as the case may be.

Qualifica-
tions for
First Class
Certificate.

21. Candidates for the endorsement of a First Class Certificate shall have completed the same period of sea service as that required in regulation 17 for the endorsement of a Second Class Certificate for Steam or Motor, as appropriate.

Endorse-
ments.

Type of
service
required.

22.—(1) Service required under regulations 20 and 21 shall have been performed in foreign-going steamships of not less than 99 nominal horse-power or motor ships of not less than 560 brake horse-power or both as an engineer at sea on regular watch of not less than eight out of each 24 hours' service claimed. This service shall have been performed as senior engineer in charge of the entire watch, but service as second in seniority on ships propelled by two or more sets of engines, or in large single screw ships where there are three or more engineers on regular watch at the same time, may be accepted at full time value. Service below this rank on such ships shall count at half rate.

(2) Day work shall not be accepted.

(3) The conditions under which service performed in ships other than foreign-going ships is allowed to count are set out in regulations 27 to 30.

Remissions.

23. Candidates may be granted a remission of sea service not exceeding three months in respect of each of the following requirements which they fulfil—

(a) Candidates awarded a remission under regulation 19 (a); and

(b) Candidates who, before commencing their qualifying sea service, have passed Part A of the examination for a First Class Certificate, or who have obtained a certificate, diploma or degree recognised by the Ministry as conferring full or partial exemption from Part A of the examination for a First Class Certificate.

Service
abroad.

24.—(1) The Minister may, in special circumstances, allow a candidate who, in consequence of service abroad, had no opportunity to obtain a recognised Second Class Certificate to be examined for a First Class Certificate, if he is able to produce satisfactory evidence as to the character of his service, and in particular that his apprenticeship or technical studies, including workshop service, would have been acceptable if he were a candidate for the Second Class Certificate in Nigeria in the normal way. In general, such a candidate may be required to prove that he has served for at least four years in steamships of at least 99 nominal horse-power or motor ships of at least 560 brake horse-power or both of which period at least 18 months shall have been spent in charge of the entire watch on the boiler and main propelling machinery of a steamship or on the main propelling machinery of a motor ship. A candidate shall be able to give evidence of sufficient workshop training and, where appropriate, of studies at an appropriate technical institution. In particular, he shall satisfy the Ministry that he is competent in Drawing and may be required to pass an additional paper equivalent to Paper (iv) of Part A of the Second Class examination in this subject, unless he is entitled to be exempted from an examination in this paper in accordance with the provisions of regulation 58.

(2) If any such candidate fails to pass the examination for the First Class Certificate but shows that he has reached the standard required for a Second Class Certificate, he may be granted such a certificate, but no part of the fee will be refunded.

Sea service.

25.—(1) Sea service shall mean service on Articles as engineer.

(2) When part or the whole of the qualifying service has been performed in ships which for considerable periods have not been to sea, a statement from the owners of the ship shall be produced showing the proportion of

time actually spent at sea. If this time amounts to not less than two-thirds of the service required to qualify for the examination, the service may be accepted in full, but where the actual service at sea falls below this proportion, the deficiency shall be made up by additional service at sea.

(3) Service in ships, where a watch-keeping engineer is required, as part of his regular duties, to do stocking or other work not usually performed by an engineer in the Merchant Navy, cannot be accepted as qualifying sea service.

26. Time served on auxiliary machinery which are run in conjunction with the main propelling machinery and which are essential to the running of the main propelling machinery or boilers or both shall, subject to the conditions as regards the minimum service on boilers and main engines, be allowed to count in full towards the qualifying period of sea service. Time served on suitable auxiliaries run independently of the main propelling machinery may be allowed to count at half rate.

Service on
auxiliary
machinery.

27. Service in home trade ships shall be allowed to count at two-thirds rate, if the class of service and the horse-power of the ship render the service acceptable in all other respects.

Home trade
ships.

28. Service in ships trading entirely abroad shall be accepted as equivalent to service in foreign-going ships, if the distance between the ports visited during the course of the voyage is at least 500 miles. If the distance is less than 500 miles, the service shall be accepted as equivalent only to service in the home trade allowed and to count two-thirds rate.

Service in
ships trading
entirely
abroad.

29. Service as watch-keeping engineer in lake or river vessels shall be counted at half-rate for a Steam or Motor Certificate, or a combined Steam and Motor Certificate if—

Lake or river
service.

(a) in the case of a candidate for a Second Class Certificate, the service has been performed in vessels of not less than 66 nominal horse-power if steam, and not less than 373 brake horse-power if motor, and the candidate has had, in addition to his lake or river service, at least three months qualifying service in the home trade ; and

(b) in the case of a candidate for a First Class Certificate, the service has been performed in vessels of not less than 99 nominal horse-power if steam, and not less than 560 brake horse-power if motor, and the candidate has had, in addition to his lake or river service, at least six months qualifying service at sea in a foreign-going ship or the equivalent service in the home trade.

30.—(1) Service as engineer in tugs, dredgers or pilot vessels shall be accepted to count as qualifying service at half-rate.

Other
service.

(2) Candidates for Second Class Certificates may perform all their qualifying sea service on regular watch in sea-going tugs, dredgers or pilot vessels subject to the limitations of horse-power set out in Regulation 18.

(3) Candidates for First Class Certificates shall, however, in addition to their service in sea-going tugs, dredgers and pilot vessels of suitable horse-power, have served in a qualifying capacity as set out in Regulation 22 for not less than six months in a foreign-going ship, or have performed equivalent service in the home trade.

Testimonials

31.—(1) Every candidate shall produce testimonials in the form set out in the First Schedule in respect of the qualifying period of his service, signed in each case by the Chief Engineer or engineer officer in charge under whom his service has been performed, stating his actual rank on watch, the number of engineers simultaneously on watch on the boilers or the main propelling machinery or both and the nature of the duties performed by him. When the candidate is a Chief Engineer, he shall produce testimonials signed by his superior officer in the company or service in which he is employed and the whole of the candidate's sea service shall be covered by testimonials certifying his sobriety, experience, ability and general good conduct.

(2) Testimonials signed by Chief Engineers shall be endorsed by a representative of the owners.

(3) Testimonials shall be returned to candidates when the examination is completed.

Physical defects.

32. When a candidate is somewhat hard of hearing or suffers from any physical defect of such a nature as might interfere with the proper performance of his duties as engineer on watch, the signatories of his testimonials shall state whether such defect did in fact interfere in any way with the efficient discharge of the candidate's duties.

Service in foreign ships.

33. Where in the case of the service of engineers in foreign ships, the length of service cannot be verified directly by this Ministry, the testimonial of service shall be confirmed either by the Consul of the country to which the ship in which the candidate served belonged, or by some other recognised official authority of that country, or by some responsible person having personal knowledge of the facts required to be established. The testimonial shall otherwise be endorsed by a Commonwealth Consular official.

Calculation of service.

34. The candidate's service, as shown on his discharges or other document shall be reckoned by the calendar month. The number of complete months from the commencement of the period shall first be computed and thereafter the number of odd days should be counted. The day on which an agreement commences as well as that on which it terminates, shall both be included. All odd days shall be added together and reckoned at 30 to the month.

Penalty for misconduct.

35. Candidates who have neglected to join their ships after having signed Articles, or who have deserted their ship after having joined, or who have been found guilty of gross misconduct, shall be required to produce satisfactory proof of two years subsequent service and good conduct at sea, unless the Ministry after investigation, shall see fit to reduce this period.

PART II—INLAND WATERS CERTIFICATES

CHAPTER 4

GRADES OF CERTIFICATES, QUALIFICATIONS, ETC.

Grades of certificates.

36. The Minister may grant the following certificates :—

- (a) Marine Engineering Assistant ; and
- (b) Motorman.

37.—(1) A candidate for a certificate of competency as Marine Engineering Assistant shall :—

Qualifications.

(a) be not less than 21 years of age ; and

(b) shall have served an apprenticeship in an approved engineering works for at least four years, during the last year of which he shall have had practical experience of working on the boilers or main propelling machinery or both of an operational craft for at least six months. More than 12 months of such apprenticeship may have been served on board operational craft up to a maximum of two and a half years, but any time so spent in excess of 12 months shall not count unless it has been performed on craft of more than 50 nominal horse-power if steam, and 150 brake horse-power if motor.

The list of approved workshops is in the Seventh Schedule.

(2) A candidate for a certificate of competency as Motorman shall :—

(a) be not less than 18 years of age ; and

(b) have served in an engine room capacity on an operational craft with an engine similar to that upon which he wishes to be examined.

(3) A certificate of competency as Motorman shall only entitle the holder to serve as motorman in charge of the engine for which he is qualified and if he requires qualification in another type of engine he must take the examination for same and, if he is successful, he may have his certificate endorsed accordingly.

(4) Regulations 14, 32, 34, and 35 shall apply to inland waters certificates as they apply to sea-going certificates.

38. Candidates for the certificate of competency as Marine Engineering Assistant may take the examination in either Steam or Motor. If candidates desire to be qualified in both steam and motor they may apply for the requisite endorsement to their Certificates. To qualify for a steam endorsement to a Motor Certificate candidates shall prove at least six months further service on the main propelling machinery of steam vessels and a further three months on the boilers and auxiliaries of steam vessels. The service on the main propelling machinery and on the boilers may have been simultaneous. To qualify for a motor endorsement to a Steam Certificate, candidates shall be required to prove at least six months further service in motor vessels on the main propelling machinery thereof.

Endorsements.

39. Candidates for the certificates of competency as Marine Engineering Assistant shall produce testimonials in respect of the qualifying periods of their service. Such testimonials shall show clearly the candidate's ability and conduct and state the kind of work on which he was engaged during his apprenticeship and the period of time spent in such branches of the work as fitting, erecting, turning, machine work, and so on, and also the time spent onboard operational craft showing the horse-power, make and type of the main propelling machinery or boilers or both.

Testimonials.

40. In the case of candidates for a certificate of competency as Marine Engineering Assistant, no workshop training time devoted to apprenticeship or service afloat before the age of 15 years can be accepted.

Minimum age for engineering assistant.

PART III—ADMISSION TO EXAMINATIONS AND AWARD OF CERTIFICATES

CHAPTER 5

Candidates to be Commonwealth citizens.

41. No candidate other than a commonwealth citizen shall be examined for any certificate of competency in Nigeria. The onus of proving nationality in any cases of doubt lies with the candidate.

This requirement may be waived by the Government Inspector of Shipping in agreement with the Consular officer of the country to which the candidate belongs.

Knowledge of English.

42. All candidates for First, Second and Third Class and Marine Engineering Assistant certificates shall be literate in the English language. Candidates for the Motorman's certificate may not be required to be able to read or write English but they shall be required to speak it sufficiently well in order to answer the questions in the oral examination.

Naval personnel.

43. Engineer Officers, Officers of the Engineering Specialisation, Artificer Engineers, Chief Engine Room Artificers, Engine Room Artificers, Chief Mechanicians and Mechanicians who have served or are serving in any of the Commonwealth Navies may be examined for certificates of competency on the same conditions as Engineers in the Merchant Navy. Applications for examination shall be made in the usual manner, except that naval officers shall furnish a statement of service together with testimonials on the official Admiralty forms in respect of all sea-going service and of the last active appointment. Ratings furnish their Naval Service Certificates.

Issue of certificate.

44.—(1) If the candidate passes the examination, he may receive from the examiner a provisional certificate of competency valid for a period of two months. A copy of such provisional certificate shall be sent to the Government Inspector of Shipping who shall in due course issue a proper certificate of competency through the examiner. If a successful candidate desires that his proper certificate be delivered through an examiner other than the one at the place of examination, he shall so inform the examiner at the time of receiving the provisional certificate and the examiner shall endorse such certificate accordingly.

(2) If the candidate is partially successful or unsuccessful, he may receive from the examiner a form to that effect. The candidate shall retain this form and produce it to the examiner when he next presents himself for examination.

Insufficient service.

45. If, after a candidate has passed the examination, it is discovered that his service is insufficient or that he was at the time otherwise unqualified to sit the examination, the certificate of competency to which he would have been entitled by virtue of passing the examination shall not be issued, or, if already issued, shall be withdrawn until such time as the deficiency in service or qualification has been made good.

Replacement of lost, stolen, etc., certificates.

46.—(1) If any certificate issued under these regulations is lost, stolen, destroyed or defaced, the person to whom it was issued may apply to any examiner for a replacement thereof. The examiner shall issue a replacement of same in accordance with regulation 44 and on payment to him of the fee specified in the Merchant Shipping (Fees) Regulations, 1963.

(2) No replacement of a lost or stolen certificate shall be issued by an examiner unless a report of the loss or theft has been made by the owner to the police and his application has attached to it an extract of such report from the station diary.

(3) A defaced certificate shall be returned to the examiner with the application for replacement.

(4) No replacement fee shall be charged if the holder can prove that his certificate was lost through shipwreck or fire on board ship.

(5) If the holder of a certificate changes his name he must at once return his certificate to an examiner for renewal in the new name.

47. A candidate may ordinarily present himself for re-examination at any time after one month has elapsed since his previous attempt, but if a candidate for a First or Second Class certificate fails three times in Part A or three times in Part B within any period of three months, he shall be debarred from re-examination for a period of up to six months.

Re-examination.

48.—(1) It is evident that ignorance of those subjects which form a vital part of a marine engineer's daily work, (e.g., manipulation and reading of the water-gauge, the danger of fire and explosion in steam and motor vessels, etc.) can easily cause acts or omissions which would seriously endanger a ship. In particular, candidates shall be very familiar with the water-gauge (*see* Second Schedule). A failure in one of these subjects shall be regarded as failure in practical knowledge, and any candidate so failing shall not be allowed to present himself for re-examination until he can produce proof of further service at sea in a qualifying capacity. The period of further service required shall be assessed in each individual case by the examiner, but shall not exceed six months.

Failure to pass examination.

(2) Should a candidate fail through ignorance of fundamental principles, or on account of general defectiveness, he shall not be allowed to present himself for re-examination until a period of time to be fixed by the examiner has elapsed. Such period shall not usually exceed three months, but in the case of a subsequent failure on such grounds, the period may be increased to a maximum of six months.

PART IV—EXAMINATIONS AND EXEMPTIONS

CHAPTER 6

49. The Ministry's examinations for Certificates of Competency (First and Second Class) are divided into two parts as set out in regulations 54 and 55 and candidates who have attended approved courses of instruction during their apprenticeship and have obtained certificates showing that they have passed the appropriate examinations at the termination of the course shall be granted exemption from the whole or part of Part A as shown in regulations 54 and 55.

Exemptions.

50.—(1) The Ministry has approved certain courses of instruction recognised by the Joint Committee of the Institution of Mechanical Engineers and the Education Departments of the United Kingdom as leading to the Ordinary and Higher National Certificates and Diplomas in Mechanical Engineering in the United Kingdom. No exemption shall be granted in respect of the paper on Heat and Heat Engines of Part A of either the First or Second Class examinations on the strength of an Ordinary National Certificate or Diploma unless the institution at which the course was taken also offered a recognised course in this subject for the Higher National Certificate or Diploma. No exemption shall be granted in respect of paper (iv) of Part A of the Second Class examination (Drawing) except to the holder of—

Approved courses.

- (a) a Higher National Diploma ;
- (b) a Higher National Certificate and an Ordinary National Certificate with Drawing at the S.2 level ;
- (c) an Ordinary National Certificate with Drawing at the S.3 level ; or
- (d) an Ordinary National Diploma granted under the U.K. Ministry's scheme set out in regulation 11.

(2) The Ministry may also recognise university degrees and university college diplomas in engineering provided that the candidates who submit such degrees or diplomas produce evidence that the course of study has satisfied the Ministry's requirements. Candidates may similarly be allowed either complete or partial exemption from Part A of the Ministry's examinations for First and Second Class Certificates if they satisfy the Ministry that they have obtained suitable degrees or similar qualifications in appropriate subjects at a university or other higher technical institution within the Commonwealth.

(3) Candidates for either the Second or First Class Certificates who have satisfactorily completed the Alternative Scheme for the training of marine engineers as described in regulation 11 and have, after the completion of the sea service required in the second phase of that scheme, to the satisfaction of the Ministry attended part-time instruction during their workshop service, and obtained the group endorsement in Naval Architecture, Electrotechnology and Power Plant Operation and Management, shall be exempted from Section 1 of Part B of the examination.

Motorman examination.

51. The examination as a Motorman is purely oral and designed to test the candidate's practical knowledge of operating an engine with which he is familiar and the general safety precautions connected therewith.

Engineering Assistants examination.

52. The examination as an Engineering Assistant shall normally consist of a written paper on general engineering knowledge and an oral examination. If the candidate is unable to express himself sufficiently well on paper he shall be given a more rigorous oral examination. The syllabus for the examination is given in the Second Schedule to these regulations.

Third Class examination.

53. The examination for a Third Class Certificate shall consist of the same subjects as for a Second Class Certificate but at a lower level. The minimum standard required shall, in general, be that of the Ordinary National Certificate at the S.2 level.

Second Class examination.

54.—(1) The examination for Second Class Certificates is divided into two parts as follows :—

PART A

- (i) Applied Mechanics (one paper of three hours)
- (ii) Heat and Heat Engines (one paper of three hours)
- (iii) Mathematics (one paper of three hours)
- (iv) Drawing (one paper of six hours).

PART B

- (i) (a) Electrotechnology (one paper of three hours)
- (b) Elementary Naval Architecture (one paper of three hours)
- (ii) (a) Engineering Knowledge (two papers, each of three hours)
- (b) Oral.

In the examination for a combined Steam and Motor Certificate a third three-hour paper in Engineering Knowledge shall be set.

(2) Candidates may be exempt from Part A or some portion of it and may take the examination in separate parts as follows :—

(a) a candidate who has attended an approved course of instruction (*see* regulations 48 and 49) covering not less than three or four subjects included in Part A, and has obtained a certificate stating that he passed the appropriate examination at the termination of the course, will be granted exemption from the subjects in Part A covered by the certificate ;

(b) a candidate may present himself either for the whole of Part A of the examination, or, if exempt under (a) above from three subjects of the examination, for the remaining subject at any time after he has completed the necessary workshop service ;

(c) a candidate who is exempt under (a) above from Part A or a part of it, and who, when taking Part A of the examination, passes in one subject only, must sit for the whole Part on re-examination. If he passes in two or three subjects, he may not be required to take those subjects again and may present himself for re-examination in the remaining subject or subjects ;

(d) a candidate may take Part B or that part of it from which he is not exempt at any time after he has completed the necessary periods of qualifying workshop and sea service, if he also takes at the same time the whole of Part A of the examination or such subjects, if any, in that Part, in which he has not already passed or from which he is not exempt under (a) above.

(e) a candidate shall not be given a "Pass" in Part B or in either section of Part B unless he completes Part A at the same time as Part B or has previously completed Part A or he is exempt from it ; and

(f) a candidate who when taking Part B passes in section (i) (Electrotechnology and Elementary Naval Architecture), but fails in section (ii) (Engineering Knowledge and Oral), will be given a pass in section (i) and may sit for re-examination in section (ii).

(g) a candidate who, when taking Part B, passes in section (ii) but fails in section (i), will be given a pass in section (ii) and may sit for re-examination in section (i).

55.—(1) The examination for First Class Certificates is divided into two Parts as follows—

First Class
examination.

PART A

- (i) Applied Mechanics (one paper of three hours).
- (ii) Heat and Heat Engines (one paper of three hours).

PART B

- (i) (a) Electrotechnology (one paper of three hours).
- (b) Elementary Naval Architecture (one paper of three hours).
- (ii) (a) Engineering Knowledge (two papers, each of three hours).
- (b) Oral.

In the examination for a combined Steam and Motor Certificate, a third three-hour paper in Engineering Knowledge shall be set.

(2) Candidate may be exempt from Part A or a part of it and may take the examination in separate parts as follows :—

(a) a candidate who is exempt from the Second Class examination in Applied Mechanics or Heat and Heat Engines, or both, may also be exempt from this examination in either or both these subjects ;

(b) a candidate possessing a Second Class Certificate is allowed to take either the whole of Part A or, if exempt under (a) above from one subject, the remaining subject ;

(c) a candidate who is exempt under (a) above from Part A or part of it and who, when taking Part A, passes in one subject only, shall not be required to take that subject again and may sit for the remaining subject ;

(d) a candidate may take Part B or that part of it from which he is not exempt at any time if he holds a Second Class Certificate and has completed the necessary period of qualifying sea service, and if he also takes at the same time either the whole of Part A of the examination or such subject in that Part, if any, which he has not already passed or from which he is not exempt under (a) above ;

(e) a candidate shall not be given a pass in Part B or in either section of Part B unless he completes Part A at the same time as Part B or has previously completed Part A or he is exempt from it ;

(f) a candidate who, when taking Part B, passes in section (i) (Electrotechnology and Elementary Naval Architecture) but fails in section (ii) (Engineering Knowledge and Oral), shall be given a pass in section (i) and may sit for re-examination in section (ii) ; and

(g) a candidate who, when taking Part B passes in section (ii) but fails in section (i) shall be given a pass in section (ii) and he will be re-examined in section (i).

Endorsement.

56.—(1) The examination for an endorsement of a Certificate of Competency in the First, Second and Third Class grades shall consist of—

- (a) one written paper in Engineering Knowledge ; and
- (b) Oral.

(2) The examination for an endorsement of Certificate of Competency as Motorman shall be purely oral.

Marks required for a pass.

57.—(1) Candidates shall, to secure a pass, obtain in each subject in the written examinations a minimum number of marks not less than one half of the overall total of the marks obtainable.

(2) In the oral examinations candidates shall, to secure a pass, obtain at least 70 per cent of the marks obtainable.

Syllabuses.

58. The syllabuses for the examinations shall be as set out in the second and third Schedules to these regulations.

Conduct of examinations.

59. Examinations shall, in general, be conducted in accordance with the provisions relating to same of the Examinations for Certificates of Competency (Deck) Regulations, 1963.

PART V.—PERMITS

CHAPTER 7

Permits in lieu of sea-going certificates.

60.—(1) The Government Inspector of Shipping may, at his discretion, and subject to such conditions as he may think fit to impose, issue to any person who, in his opinion is sufficiently competent, a permit to act in the capacity of First, Second and Third Class Engineer. Such permit shall, subject to the conditions and for the period stated therein be deemed to have

the same force as an equivalent certificate of competency granted under these regulations. Such permit however, shall only be issued in cases where a ship is liable to be detained for the reason that she has insufficient certificated officers on board, and it shall not be issued for a longer period than is reasonably necessary to enable the owner to obtain the services of a properly certificated officer.

(2) The owner, master or agent of any ship, the officers of which require to have such permits in order that the ship may not unreasonably be delayed, shall submit details of the professional service of the persons' concerned and of any professional qualifications held by them if any.

61.—(1) The Government Inspector of Shipping may, at his discretion, and subject to such conditions as he may think fit to impose, issue to any person who is not fully qualified but who has been proved competent by examination, a permit to act as Marine Engineering Assistant. Such permit shall, subject to the conditions and for the period stated therein, be deemed to have the same force as an equivalent certificate of competency issued under these regulations. Such permit may be issued for such period as the Government Inspector of Shipping may think fit, but in any case it shall not be issued for a period longer than five years.

Permits in lieu of inland waters certificates.

(2) Examiners, on receiving application for such a permit, shall submit all details of the applicant's service and training to the Government Inspector of Shipping who shall decide whether or not the candidate may be issued with such permit after examination.

62. The Certificates of Competency Regulations, 1959, are hereby repealed.

Repeal.

FIRST SCHEDULE

(Reg. 13)

1. SPECIMEN FORM OF TESTIMONIAL FOR WORKSHOP SERVICE

Name and Address of Engineering Works.....

I certify that the following is a full and true statement of the Workshop Service performed by.....under my supervision at the above works.

<i>Period of Service. Dates</i>		<i>Total Period</i>	<i>Nature of Duties. For appropriate description see below</i>	<i>Particulars of weekly release periods to permit apprentice to pursue technical studies (if any)</i>
<i>From</i>	<i>To</i>			

Report as to ability.....

Report as to conduct.....

Remarks (if any).....

Signature of employer.....

Date.....

DESCRIPTION OF DUTIES

- I. (a) Installation or repair of substantial machinery in the machinery spaces of new and existing ships (nature of duties must be specified).
- (b) Fitting, erecting or maintenance of machinery other than the above suitable for the training of Marine Engineers (nature of duties must be specified).
- II. Fitting on machinery other than at I.
- III. Metal turning.
- IV. Machine work (Other than lathe).
- V. Work in drawing office, as draughtsman or engineer.
- VI. Other work, the nature of which should be specified.

Note.—The use of the appropriate numerals is sufficient except in cases I (a), I (b) and VI.

2. SPECIMEN FORM OF TESTIMONIAL FOR SEA SERVICE.

(Reg. 31)

Name and Address of.....

Shipowner or Company.....

I certify that the following is a full and true statement of the Sea Service performed by.....

under my supervision on board the.....

<i>Period of Service. Dates</i>		<i>Rank of officer and actual seniority on watch</i>	<i>Type of main engines and boilers. Single or twin screw</i>	<i>Nature of duties. For appropriate description see below</i>
<i>From</i>	<i>To</i>			

Report as to ability.....

Report as to conduct.....

Report as to sobriety.....

Signature of Chief Engineer.....

Date.....

Remarks (if any).....

Signature of Owner or Employer's Representative.....

DESCRIPTION OF DUTIES

- I. On fitters' work either by day or regular watch.
 - (a) Within main engine and boiler spaces.
 - (b) Outside main engine and boiler spaces.
- II. (a) On refrigeration or other machinery not essential to the propulsion of the vessel.
 - (b) On auxiliary engines separated from main propelling units but worked in conjunction therewith.
- III. On regular watch on main engines as—
 - (a) First engine room assistant under the senior in full charge.
 - (b) Second engine room assistant.
 - (c) Junior engine room assistant.
- IV. On regular watch on main boilers.
 - (a) In charge of all stokeholds.
 - (b) In charge of a section or one stokehold only.
 - (c) As boiler room assistant.
- V. On regular watch on main engines and boilers simultaneously.
 - (a) In full charge of the entire watch.
 - (b) As first assistant to the senior in full charge.
 - (c) As junior assistant.

Note.—It is recommended that this form should be used when the Engineer reported on, or when the Chief Engineer leaves, a ship.

SECOND SCHEDULE

(Reg. 36)

SYLLABUSES FOR INLAND WATERS CERTIFICATES

1. *Motorman.*—Oral examination only
 - (a) Operation of engine—starting, stopping, accelerating, decelerating, stalling, etc.
 - (b) Maintenance of engine.
 - (c) Minor repairs of engine.
 - (d) Fuel properties and dangers, spontaneous combustion, etc.
 - (e) Use of fire extinguishers.
 - (f) Auxiliaries.
2. *Marine Engineering Assistant (Motor)*—Or Motor Endorsement
 - (a) A thorough knowledge of the working of internal combustion engines, both diesel and petrol.
 - (b) Maintenance of such engines. A knowledge of the defects common to such engines and to be able to rectify failures.
 - (c) To be conversant with the starting, stopping and reversing arrangements and the various operations connected therewith.
 - (d) Understand the use of all valves, pipe connections and safety devices required for the operation of the engines.

- (e) Understand the precautions to be taken against fire or explosion due to leakage of oil or accumulation of gas, and to be able to deal effectively with an outbreak of fire.
 - (f) Be competent to keep an engine room log-book and tally and measure stores and fuel.
 - (g) Be able to understand mechanical drawings such as are given in instruction books supplied by the makers of engines.
3. *Marine Engineering Assistant (Steam)*—Or Steam Endorsement
- (a) Be able to give a satisfactory description of the use and management of steam boilers and engines.
 - (b) Understand the use of water pressure and vacuum gauges, the operation of double shut-off on water gauges of main boilers, the use and operation of safety valves and salinometer. Precautions necessary when raising steam and operating stop valves.
 - (c) Be able to adjust the various working parts of an engine, alter and set slide valves, test shafts for fairness and to adjust them.
 - (d) Understand the use and operation of the various auxiliaries including feed filters and heaters and the attention required by the different parts of machinery on board ship.
 - (e) Be able to explain how a breakdown may be repaired.
 - (f) Be competent to keep an engine room log-book, tally stores and measure coal and oil fuel.
 - (g) Be able to read and understand technical drawings.

THIRD SCHEDULE

SYLLABUS FOR THIRD CLASS EXAMINATIONS

FUNDAMENTAL KNOWLEDGE SUBJECTS (PART A)

NOTES

1. The problems may require a knowledge of the C.G.S. and M.K.S. systems, but will be such as can be solved by the knowledge of elementary algebra, geometry and plane trigonometry.
2. A knowledge of the use of logarithms will be required.
3. Graphical solutions will be acceptable where the analytical solution is not expressly stated to be required.
4. Candidates may, if they wish, use slide rules for their calculations, but in each case a full statement of the steps leading to the calculations must be shown.

THIRD CLASS MATHEMATICS

(One paper of three hours. Six questions only out of nine to be attempted.)

- (a) ARITHMETIC.—Conversion of physical quantities involving length, area, volume or force from one system of units to another. Ratio and proportion. Percentages.

(b) ALGEBRA.—Indices. Use of common logarithms for multiplication, division, power and roots. Simplification of algebraic expressions. Addition, subtraction, multiplication and division of algebraic functions. Re-arrangement of formulae. Factorisation. Algebraic fractions. Squares and cubes of polynomials such as $(a + b)^3$. Simple equations.

(c) GRAPHICAL WORK.—Simple graphs of statistics. The graph $y = ax + b$ either from calculated values or from experimental results. Calculation of constants from graph.

(d) TRIGONOMETRY.—Measurement of angles in degrees and radians. Complementary and supplementary angles. Sine, cosine and tangent of angles up to 360° . Solution of right-angled triangles. Proof of sine and cosine rules. Solution of triangles by these rules. Solution of simple trigonometric equations.

(e) GEOMETRY.—Properties of triangles. Sum of the angles. Relation between exterior and interior angles. Isosceles and equilateral triangles. The circle.

THIRD CLASS APPLIED MECHANICS

(One paper of three hours. Six questions only out of nine to be attempted.)

(a) GENERAL.—Applications of areas and volumes to problems such as the weight of engine components. Specific gravity.

(b) STATICS.—Force. Gravitational units. Force as a vector. Triangle and polygon of forces. Equilibrium of three coplanar forces. Moment of a force.

(c) FRICTION.—Laws of friction for dry surfaces. Coefficient of friction. Friction angle.

(d) KINEMATICS.—Linear motion. Graphs and equations for displacement, speed, velocity and uniform acceleration. Simple cases of vector change of velocity and the acceleration produced.

(e) DYNAMICS.—Work and power. Horse-power. Energy. Conservation of energy. Potential energy.

(f) MACHINES.—Simple lifting machine. Graphs of load-effort and load efficiency. Velocity ratio, mechanical advantage and efficiency.

(g) JOINTS.—Strength of the following joints :—Single, double and treble riveted lap and butt joints.

(h) HYDROSTATICS.—Archimedes' principle. Equilibrium of floating bodies. Specific gravity. Constant weight hydrometer. Variation of fluid pressure with depth. Total force due to liquid pressure on immersed plane surfaces, horizontal or vertical.

THIRD CLASS HEAT AND HEAT ENGINES

(One paper of three hours. Six questions only out of nine to be attempted.)

(a) ELEMENTS.—Temperature and thermometric scales. Conversion from Centigrade to Fahrenheit and *vice versa*. Linear and volumetric expansion due to temperature changes.

(b) HEAT AND HEAT TRANSFER.—Heat units : B.Th. U., C.H.U., gram-calorie. Specific heat. Mechanical equivalent of heat. Heat equivalent of horse-power. Heat transfer by conduction, convection and radiation.

(c) BOYLE'S AND CHARLE'S LAWS FOR PERFECT GASES. Absolute temperature. Characteristic equation. Constant R and its use in simple problems.

THIRD CLASS ENGINEERING KNOWLEDGE

NOTES :

1. The Engineering Knowledge to be shown by candidates is that which is required for the use, operation and maintenance of the machinery, equipment and ship structure usually in the charge of the Engineer. A knowledge of the methods of manufacture of the various components is also required.

2. Candidates for certificates and endorsements are required to take a written examination followed by an oral examination.

3. The written examination for a Steam or Motor Certificate consists of two papers of three hours each, six questions only to be attempted out of nine in each paper.

4. The written examination for a combined Steam and Motor Certificate consists of three papers of three hours each, six questions only to be attempted out of nine in each paper.

5. The written examination for a Steam or Motor Endorsement consists of one paper of three hours, six questions only to be attempted out of nine in the paper.

6. Candidates may be required to illustrate their answers by means of freehand sketches.

(a) The general effects of various treatments on the physical properties of materials commonly used in the construction of marine engines and boilers.

(b) Heat and Combustion. The properties of Steam, fuel, lubricants and other liquids, gases and vapours used in machinery on board ship.

(c) The principles involved in the action of the pressure gauge, thermometer, pyrometer, barometer, salinometer, hydrometer and other meters, commonly used by engineers on board ship.

(d) The causes, effects and usual remedies for incrustation and corrosion. Feed water and blow densities, and scale formation.

(e) (1) The working principles of marine engines.

(2) The methods of dealing with wear and tear of machinery and boilers. The alignment of machinery parts. The correction of defects due to flaws in material or accident. Temporary or permanent repairs in the event of derangement or total breakdown.

(f) The principles of action of pumps fitted in ships. The general requirements concerning feed, fuel, bilge and ballast pumping systems.

(g) The working of steering-engines and gears, hydraulic and other auxiliary machinery, and such steam and internal combustion engines as are used for emergency and auxiliary machinery on board ship.

(h) Precautions against fire or explosions due to oil or gas. Flash point. Explosive properties of gas or vapour given off by fuel or lubricating oils when mixed with a quantity of air. The danger of leakage from

oil tanks, pipes, gas producers and vaporisers, particularly in bilges and other unventilated spaces. The action of wire gauze diaphragms and the places in which such devices should be fitted.

(i) Spontaneous combustion of coal. Explosive properties of gas given off by coal.

(j) Fire detection. Methods of dealing with fire. Action and maintenance of mechanical and chemical fire extinguishers and other fire-fighting appliances, respirators and safety lamps.

(k) The constructional details and working of evaporators, feed water heaters and feed water filters.

(l) Marine boilers ; the manner of staying them, and also the prevention of movement of boilers when vessels are pitching or rolling.

(m) The use and management of boiler fittings and *mountings with special reference to water-gauges and safety valves*. Precautions necessary when raising steam and operating stop valves, with particular reference to the danger arising from water-hammer action.

(n) The nature and properties of the fuel and lubricating oils generally used in internal combustion engines. The supply of air and fuels to cylinders of engines of different types. The working of apparatus for carburetting or atomising the fuel. The means of cooling the cylinders and pistons. The working of compressors.

(o) Elementary electrical knowledge. Units ampere, ohm and volt. Small generators, switchboards, wiring diagrams.

(p) Elementary ship construction and naval architecture. Knowledge of names of principal parts of a ship.

ORAL EXAMINATION

The oral examination will be largely based upon the practical knowledge subjects of the examination and will include questions on the management of engines and boilers at sea, the duties of the supervising engineer, the work to be done to engines, boilers and auxiliary machinery in port and the periodical examination of the working parts.

Candidates should also be well acquainted with machinery and boiler casualties which may occur at sea and be able to state how these may be prevented and remedied.

FOURTH SCHEDULE

SYLLABUSES FOR THE FIRST AND SECOND EXAMINATIONS

FUNDAMENTAL KNOWLEDGE SUBJECTS (PART A)

NOTES

(1) The problems may require a knowledge of the C.G.S. and M.K.S. systems, but will be such as can be solved by the knowledge of elementary algebra, geometry and plane trigonometry.

(2) A knowledge of the use of logarithms will be required.

(3) Formulae involving higher mathematics or constants required for the solution of any problem will be given.

(4) Graphical solutions will be acceptable where the analytical solution is not expressly stated to be required.

(5) Candidates may, if they wish, use slide rules for their calculations, but in each case a full statement of the steps leading to the calculations must be shown.

1. SECOND CLASS MATHEMATICS

(One paper of three hours. Six questions only out of nine to be attempted.)

(a) ARITHMETIC. Conversion of physical quantities involving length, area, volume or force from one system of units to another. Ratio and proportion. Percentages.

(b) ALGEBRA. Indices including fractional and negative types. Use of common logarithms for multiplication, division, powers and roots. Use of Napierian logarithms. Simplification of algebraic expressions. Addition, subtraction, multiplication and division of algebraic functions. Rearrangement of formulae. Factorisation. Algebraic fractions. Squares and cubes of polynomials such as $(a \pm b)^2$ and $(a \pm b)^3$. Simple equations. Quadratic equations and solution by factorisation or by completing the square, proof of general formula for solution. Simultaneous equations, either two linear equations or one linear and one quadratic. Variation, direct and inverse.

(c) GRAPHICAL WORK. Simple graphs of statistics. The graph $y = ax + b$ either from calculated values or from experimental results. Calculation of constants from graph. Graphical solution of simple simultaneous equations involving two unknowns. Graph of $y = ax^2 + bx + c$ and graphical solution of equation $ax^2 + bx + c = 0$.

(d) TRIGONOMETRY. Measurement of angles in degrees and radians. Complementary and supplementary angles. Sine, cosine and tangent of angles up to 360° . Solution of right-angled triangles. Proof of sine and cosine rules. Solution of triangles by these rules. Solution of simple trigonometric equations. Expansion of $\sin(A \pm B)$ and $\cos(A \pm B)$.

(e) GEOMETRY. Properties of triangles. Sum of the angles. Relation between exterior and interior angles. Isosceles and equilateral triangles. Similar and congruent triangles.

The circle. Properties of chords and tangents. Angles in the same segment. Angles at centre and circumference.

MENSURATION. Areas of triangle, polygon, parallelogram, trapezium, circle, sector and segment of a circle and ellipse. Areas of oblique sections of regular solids of uniform cross-section. Area and mean height by mid-ordinate rule and by Simpson's first rule. Ratio of areas of similar figures. Volumes and surface areas of prisms, pyramids, frustums, spheres, cylinders and cones. Ratio of volumes of similar solids. Solids of revolution.

2. SECOND CLASS APPLIED MECHANICS

(One paper of three hours. Six questions only out of nine to be attempted.)

(a) GENERAL. Applications of areas and volumes to problems such as the weight of engine components. Specific gravity. Simpson's first rule as applied to areas and volumes.

(b) STATICS. Force. Gravitational units. Force as a vector. Triangle and polygon of forces. Resultant and equilibrant of a system of concurrent and coplanar forces. Equilibrium of three coplanar forces. Moment of a force. Couples, Moments of areas and volumes. Centroids and centres of gravity (limited to geometrical shapes). Conditions of equilibrium of solids. Inclined plane. Necessary force applied parallel to the plane to pull a body up or down the plane or to hold it stationary (including effect of friction). Work done at uniform speed up the plane.

(c) FRICTION. Laws of friction for dry surfaces. Coefficient of friction. Friction angle. Energy and power lost due to friction in simple bearings.

(d) KINEMATICS. Linear motion. Graphs and equations for displacement, speed, velocity and uniform acceleration. Simple cases of vector change of velocity and the acceleration produced. Relative velocities in one plane only. Angular motion. Equations for displacement, velocity and uniform acceleration.

(e) DYNAMICS. Work and power. Horse-power. Problems with constant force or force with linear variation. Energy. Conservation of energy. Potential energy. Kinetic energy of translation. Newton's laws of motion. Momentum and rate of change of momentum. Centrifugal force and its application to conical pendulum, unloaded governor, curved tracks and machine parts. Stress in thin rim due to centrifugal action.

(f) MACHINES. Simple lifting machine. Graphs of load-effort and load-efficiency. Linear law. Velocity ratio, mechanical advantage and efficiency of the following machines :

wheel and axle, differential wheel and axle, rope pulley blocks, differential pulley blocks, screw jack, Warwick screw, hydraulic jack, worm-driven chain blocks and single and double purchase crab winches. Reduction gearing.

(g) STRESS AND STRAIN. Direct stress and strain. Shear stress. Hooke's law. Modulus of elasticity. Ultimate tensile stress. Yield stress. Limit of proportionality. Percentage elongation and reduction of area. Working stress. Factor of safety. Stress due to restricted expansion or contraction of single members.

(h) BEAMS. Cantilevers and simple supported beams with concentrated or uniformly distributed loads. Shearing force and bending moment diagrams. Stress due to bending given the fundamental bending equation and the second moment of area of the section.

(i) TORSION. Twisting moment due to engine crank mechanism. Strength and stiffness of solid or hollow shafts of circular cross-section given the fundamental torsion equation and the polar second moment of area. Power transmitted by shafts. Coupling bolts.

(j) THIN SHELLS. Circumferential and longitudinal stress in thin cylindrical and spherical shells subject to internal pressure.

(k) JOINTS. Strength of the following joints :—

single, double and treble riveted lap and butt joints and butt welded joints.

(l) HYDROSTATICS. Archimedes' principle. Equilibrium of floating bodies. Specific gravity. Constant weight hydrometer. Variation of fluid pressure with depth. Total force due to liquid pressure on immersed plane surfaces, horizontal or vertical. Centre of pressure on a rectangular vertical plane surface or triangular plane surface, both with one edge parallel to the surface of the liquid.

FIRST CLASS APPLIED MECHANICS

(One paper of three hours. Six questions only out of nine to be attempted.)

(a) STATICS.—Laws of equilibrium. Moments and couples. Polygon of forces. Rapson's slide.

(b) FRICTION.—Law of dry friction. Friction angle. Friction clutches. Friction on inclined plane. Friction on threads. Work done against friction.

(c) KINEMATICS.—Linear and angular motion with constant acceleration. Gravitational acceleration. Velocity-time graphs.

(d) RELATIVE VELOCITY AND ACCELERATION.—Effect of a current on the velocity and course of a ship. Relative velocity between bodies moving in different planes.

(e) DYNAMICS.—Newton's law of motion. The force equation. Atwood machine, acceleration of connected bodies. Effect of simple air resistance on motion under the effect of gravity. The torque equation. Conservation of momentum. Kinetic energy of translation and of rotation. Flywheels. Potential energy. Conservation of energy. Impulsive forces. Centrifugal force. Porter governor with sleeve friction. Simple harmonic motion. Simple pendulum. Simple vibrations. Dynamic balancing of masses rotating in one plane. Basic dynamics of the engine mechanism. Use of piston velocity and acceleration formulae. Derivation of piston displacement formula.

(f) MACHINES.—Velocity ratio. Mechanical advantage. Efficiency.

(g) STRESS AND STRAIN.—Direct stress and strain and modulus of elasticity. Shear stress and strain and modulus of rigidity. Stresses on oblique planes. Strength of simple connections such as cottered or screwed joints. Resilience due to direct stress. Suddenly applied loads.

(h) COMPOUND BARS.—Effects of direct loading and of temperature changes.

(i) BEAMS.—S.F. and B.M. diagrams for cantilevers and simply supported beams. Stresses in beams of simple section. Use of simple deflection formulae.

(j) TORSION.—Torsion equations for solid and hollow round shafts. Torsion of shaft fitted with liner. Horse-power transmitted. Close coiled helical spring.

(k) STRUTS.—Eccentric loading of short columns. Use of strut formulae.

(l) THIN SHELLS.—Stresses in thin shells. Design of riveted joints. Use of boiler shell design formulae.

(m) HYDROSTATICS.—Flotation in two liquids of different specific gravities. Total force and centre of pressure on immersed surfaces such as tanks and bulkheads.

(n) HYDRAULICS.—Bernouilli's equation applied to simple flow problems. Venturi meter. Flow through orifices under constant head. Force exerted by a jet on a flat surface perpendicular to the jet. Blade angle diagrams for a centrifugal pump.

4.—SECOND CLASS HEAT AND HEAT ENGINES

(One paper of three hours. Six questions only out of nine to be attempted.)

(a) ELEMENTS.—Temperature and thermometric scales. Conversion from Centigrade to Fahrenheit and *vice versa*. Linear and volumetric expansion due to temperature changes. Coefficients and the relationship between them.

(b) HEAT AND HEAT TRANSFER.—Heat units: B.Th.U., C.H.U., gram-calorie. Specific heat. Mechanical equivalent of heat. Heat equivalent of horse-power. Heat transfer by conduction, convection and radiation. Laws of conduction and radiation and simple applications with given formulae.

(c) MIXTURES.—Heat and temperature problems involving not more than three substances. Water equivalent.

(d) GASES.—Boyle's and Charles' laws for perfect gases. Absolute temperature. Characteristic equation. Constant R and its use in simple problems. Isothermal and adiabatic expansion and compression. Relation between P, V and T when $PV^n = \text{constant}$. Specific heats C_p and C_v and the relationship between them.

(e) I.C. ENGINES AND AIR COMPRESSORS.—Elementary principles and cycles of operation. Calculation of work done from given formulae. Cam diagrams for I.C. engines, angles of cam peak centre lines relative to crank.

(f) PROPERTIES OF STEAM.—Change of state. Sensible heat. Latent heat. Wet, dry-saturated and superheated steam and the quantities of heat involved. Use of abridged steam tables. Specific volume of steam under various conditions. Throttling. Separating and throttling calorimeters. Boiler efficiency. Equivalent evaporation. Use of steam tables in simple problems referring to condensers. Effect of air leakage.

(g) RECIPROCATING STEAM ENGINE.—Hypothetical and actual indicator diagrams. Diagram factor. Mean effective pressure and work done (assuming $PV=C$). Indicated and brake horse-power. Advantages of using steam expansively and of compounding. Mean referred pressure. Steam consumption per hour and per horse-power-hour. Thermal, mechanical and overall efficiencies of simple and compounded engines. Heat balance for engine and boiler trials.

Simple slide and piston valves with outside or inside steam admission. Use of valve diagrams to determine angle of advance, lap, lead and port opening, for a given valve travel.

(h) STEAM TURBINE.—Elementary principles. Simple velocity diagrams. Thermal, mechanical and overall efficiency.

(i) COMBUSTION.—Solid and liquid fuels. Higher and lower calorific values. Chemical equations for complete combustion. Theoretical minimum air required. Excess air.

(j) REFRIGERATION.—Vapour-compression cycle. Refrigerating effect. Capacity of a machine expressed as "tons of ice per 24 hours from and at 32°F ".

(k) BOILERS AND EVAPORATORS.—Change of density due to contaminated feed.

5. FIRST CLASS HEAT AND HEAT ENGINES

(One paper of three hours. Six questions only out of nine to be attempted.)

(a) ELEMENTS.—Expansion of solids and liquids including coefficient of apparent cubical expansion. First law of thermodynamics and its application to steady flow conditions. Formulae for work done associated with the formula $PV^n=C$.

(b) HEAT TRANSFER.—Conduction (excluding log mean temperature difference). Radiation.

(c) PROPERTIES OF STEAM.—Sensible heat; latent heat; enthalpy; internal energy; volume. Use of steam tables and entropy. Throttling and separating calorimeter.

(d) MIXTURES.—Heat and temperature problems involving two or more substances.

(e) GASES.—Boyle's law. Charles' law. Characteristic equation. Relations between P , V and T when $PV^n=C$. Determination of n from graph connecting.

P and V . Proof of the formula $C_p - C_v = \frac{R}{J}$. Calculations for expansions and compressions on air compressors, internal combustion engines, air pumps and air storage. Simple application of Dalton's law of partial pressures.

(f) GAS CYCLES.—Use of entropy charts. Constant volume cycle. Diesel cycle. Open and closed cycles for gas turbines. Indicated and brake thermal efficiencies. Mechanical efficiency. Overall efficiency. Morse test.

(g) EXPANSION OF STEAM.—Throttling. Hypothetical PV diagrams. Work done, m.e.p., diagram factor, including effect of clearance. Compounding. Mean referred pressure. Total power. Combined diagrams. Reuleaux valve diagram.

(h) STEAM CYCLE.—Use of entropy charts. Basic Rankine cycle. Heat drop in reciprocating engines and in turbines. Effect on thermal efficiency of such modifications as superheating. Exhaust turbine and regenerative feed heating. Equivalent evaporation. Efficiencies.

(i) DENSITY AND SCALE.—Basic calculations on the effect of condenser leakage and impure feed on the density and scale in boilers. Basic calculations on evaporator performance.

(j) TURBINES.—Basic cycle and its modifications. Flow through nozzles (excluding proof of critical pressure ratio). Blade diagrams for impulse and reacting turbines. Force on blades. Work done on blades. Use of total heat charts to determine steam condition at various stages.

(k) COMBUSTION.—Combustion equations. Calculation of theoretical air required. Determination of calorific value. Avogadro's hypothesis. Basic analysis of exhaust gases. Relation between volumetric and weight analysis of a gas mixture. CO_2 content of exhaust gases.

(l) REFRIGERATION.—Reversed Carnot cycle. Vapour compressor cycle. Use of vapour tables. Coefficient of performance.

6. DRAWING

(This subject is to be taken by candidates for Second Class Certificates only)
(One paper of six hours. A choice of two drawings will be given).

The Drawing Paper will consist of a test of the ability to apply the principles of projection and candidates will be asked to draw a plan, elevation or section or a combination of these views of a piece of marine machinery from information supplied. All the required information for the completion of the drawing will be given in the question paper.

PRACTICAL KNOWLEDGE SUBJECTS—PART B

N.B.—The notes under "Fundamental Knowledge Subjects" Part A apply equally to Part B.

7.—SECOND CLASS ELECTROTECHNOLOGY

(One paper of three hours. Six questions only out of nine to be attempted.)

(a) GENERAL.—Effects of electric current, chemical, magnetic, thermal and production of light. Production of e.m.f. by chemical, magnetic, thermal and light means.

(b) THE ELECTRIC CIRCUIT.—Units—ampere, ohm and volt. Ohm's law. Series and parallel circuits of sources of e.m.f. and of resistances. Current distribution in simple circuits. Difference between e.m.f. and p.d. Power and energy. Relationships between heating, mechanical and electrical units. Joule's equivalent. Conductor resistance, effect of length, area, material and temperature. Specific resistance. Temperature coefficient of resistance. Types of insulation. Wheatstone network bridge, slide wire bridge. Applications to steering gears, resistance pyrometers, strain gauges, etc.

(c) ELECTROLYTIC ACTION.—Theory of electrolytic dissociation applied to common solutions, etc., acidulated water, copper sulphate and salt water. Uses of electrolysis. Faraday's laws. Electro-chemical equivalent.

(d) CELLS.—Primary (wet or dry Leclanché) and secondary (acid or alkaline) types. Construction and principles. Maintenance, charging. Watt-hour and ampere-hour efficiencies.

(e) MAGNETISM AND ELECTROMAGNETISM.—Simple magnetic theory. Magnetic field. Lines of force. Field strength. Field intensity. Magnetic fields due to current in straight conductors, loops, coils and solenoids. Relative directions of current and field. Effect of iron. Flux density. Total flux. Permeability. Typical B/H and u/B curves.

(f) ELECTRO-MAGNETIC INDUCTION.—Faraday's and Lenz's laws. Magnitude and direction of induced e.m.f. Force produced on a current carrying conductor.

(g) ALTERNATING CURRENT THEORY.—The sinusoidal wave, frequency maximum r.m.s. and average values. Vector representation of a.c. quantities. Phase difference. The a.c. circuit. The inductor. Inductance and its effect on the circuit. The capacitor. Capacitance and its effect on the circuit. The general series circuit. Relationship between resistance, reactance and impedance. Simple treatment of power factor.

(h) INSTRUMENTS.—Principles and function of switchboard indicating instruments. Moving-coil, moving-iron and dynamometer types. Uses of shunts and series resistances to increase the range. The current transformer and potential former for instrument work (description and simple explanation).

(i) TESTING METHODS AND MEASUREMENTS.—Resistance measured by ammeter-voltmeter, by bridge and by instrument. Simple ohmmeter and insulation testing. General insulation, continuity and millivolt-drop testing. Fault tracing. Temperature measurement by resistance.

(j) CIRCUITS.—Single-wire, 2-wire, 3-wire and ring main systems for d.c. Use of fuses and circuit-breakers. Use of earth lamps. Simple reference to the balancer. Simple explanation of the alternator as a generating unit. Parallel running and synchronising procedure.

(k) ELECTRICAL MACHINES.—Constructional details of the d.c. generator and motor. Action of commutator. Simple approach to lap and wave windings. Methods of supplying the field—separate excitation, shunt, series and compound windings.

(l) D.C. GENERATORS.—Constructional details. Protection. E.m.f. and load voltage equation. Brief treatment of theory of self-excitation. Load characteristics. Methods of voltage control. Parallel operation procedure.

(m) D.C. MOTORS.—Constructional details. Need for starters. Types of starter. Speed and torque equations. Load characteristics. Speed control.

(n) ELECTRIC IGNITION FOR I.C. ENGINES.—Coil and magneto systems. Starting arrangements. Maintenance requirements.

8. FIRST CLASS ELECTROTECHNOLOGY

(One paper of three hours. Six questions only out of nine to be attempted.)

(a) UNITS.—C.G.S. system. M.K.S. system.

(b) THE MAGNETIC CIRCUIT.—B-H and B-AT/cm curves. Their effect on the design of simple magnetic circuits involving an air gap. Hysteresis. Electromagnetism. Mutual induction.

(c) THE ELECTRIC CIRCUIT.—Kirchoff's laws.—Parallel operation of batteries with unequal e.m.f.s. and differing internal resistances.

Distribution problems. Volt-drop. Single and doubly fed distributors. Ring mains.

Distribution systems. D.C. 2-wire and 3-wire. A.C. single phase and three-phase 3-wire and 4-wire. Comparison of copper required.

Balancer in 3-wire d.c. system.

(d) MOTOR STARTERS.—Automatic types—reference to time and current control. The drum controller for series motors.

(e) APPLICATIONS, ETC.—Parallel operation of shunt and compound generators. Equalising bar. Load sharing treated qualitatively. Applications to Ward Leonard systems. Steering gear. Suitability of d.c. motors for the various types of work.

Faults and maintenance of machines. Overheating due to mechanical and electrical defects. Sparking at brushes. Loss of residual magnetism, etc. Testing machines—use of the megger.

Simple calculations on starters.

(f) GENERAL.—A.C. Production of an alternating waveform. The sine law. Frequency; amplitude, instantaneous and maximum values. Relation between frequency, number of poles and speed of a machine. R.M.S. and average values. Form factor.

Representation of an alternating quantity by means of vectors to give instantaneous and R.M.S. values.

(g) THE SERIES CIRCUIT.—Resistance, inductance and impedance. Current and voltage relationships. Use of vectors. Power, apparent power (VA) reactive volt-amp and power factor. The impedance triangle. Reactive and active components of current.

(h) THE PARALLEL CIRCUIT.—Treatment by vectors only of fairly simple circuits. Capacitance and the application of capacitors to power factor improvement. The desirability of high power factors.

(i) THREE-PHASE SYSTEMS.—Star and delta (mesh) connections for supplies and loads. Phase and line relationships. Power. Three-phase 4-wire distributor. The application to the rotating magnetic field.

(j) ALTERNATORS. Construction. E.m.f. equation. Synchronising and reference to load sharing.

(k) INDUCTION MOTORS.—Construction. Slip Reference to rotor E.m.f. and frequency. Typical torque-speed curves. Wound, slip ring and cage types. Description of double wound type. Starting methods.

(l) SYNCHRONOUS MOTORS.—Construction. Starting methods. Reference to use for power factor correction.

(m) COMPARISON.—General comparison of single and three-phase systems bringing out the saving in cost of a three-phase system.

(n) PROPULSION.—Types using d.c. and a.c. machines. Turbo-electric drivers; starting methods; speed changing. Advantages and disadvantages of electrical propulsion.

(o) SINGLE-PHASE MOTORS.—Description of general common types. Starting.

(p) TRANSFORMERS.—Elementary principles and general description.

(q) INSTRUMENTS.—Simple treatment (qualitative) of dynamometer, wattmeter, frequency meter, power factor meter, rotary synchroscope.

9. SECOND CLASS ELEMENTARY NAVAL ARCHITECTURE

(One paper of three hours. Six questions only out of nine to be attempted.)

(a) GENERAL.—Displacement. Wetted surface. Block, mid-section, prismatic and water-plane area coefficients. Tons per inch immersion. Application of Simpson's first rule to areas and volumes.

(b) **DRAUGHT AND BUOYANCY.**—Alteration of mean draught due to change in density of water. Buoyancy and reserve buoyancy. Effect of bilging amidship compartments.

(c) **TRANSVERSE STABILITY.**—Shift of centre of gravity due to addition or removal of ballast, fuel or cargo. Stability at small angles of heel (given the second moment of area of the waterplane or formulae). The inclining experiment.

(d) **RESISTANCE AND PROPULSION.**—Comparison of skin frictional resistance of hull with model at different speeds. $R_f = f.S.V^n$. Admiralty and fuel coefficients. Relation between speed of vessel and fuel consumption with constant displacement and assuming that resistance varies as (speed)ⁿ. Elementary treatment of propeller. Pitch, apparent slip, real slip, wake, thrust and power.

(e) **STRUCTURAL STRENGTH.**—Simple problems on strength of structural members to resist liquid pressure. Loading due to head of liquid.

(f) **SHIP CONSTRUCTION.**—Common terms used in the measurement of steel ships, *e.g.*, length between perpendiculars, breadth overall, moulded depth, draught and freeboard. Definitions of shipbuilding terms in general use. Descriptions and sketches of structural members in ordinary types of steel ships. Machinery seating arrangements. Watertight doors, Hatches. Rudders. Propellers. Stern tubes. Watertight bulkheads. Double bottoms. Anchors and cables. Precautions necessary before entering empty oil fuel or ballast tanks.

The preservation in good condition of the ship's structure, in particular the bilges, bunkers, tanks under boilers and watertight doors.

Ventilation arrangements (natural and mechanical) for pump rooms in tankers and for holds, coal bunkers and oil fuel tanks.

Storage of coal. Spontaneous combustion. Danger of explosion from gas given off by coal.

Fire detection and extinction arrangements for passenger and cargo spaces. Fire precautions in port and dry dock.

Fore and aft peak tanks, double bottom and deep tank filling and pumping arrangements. Compartmental drainage. Levelling arrangements for damaged side compartments.

Dry docking and maintenance of underwater fittings.

10.—FIRST CLASS ELEMENTARY NAVAL ARCHITECTURE

(One paper of three hours. Six questions only out of nine to be attempted.)

(a) **GENERAL.**—Form coefficients. Wetted surface formulae. Simpson's first rule applied to areas, moment of areas, second moments of areas, volumes, moments of volumes, centroids and centres of pressure.

(b) **TRANSVERSE STABILITY.**—Centre of gravity. Centre of buoyancy. Metacentre. Moment of statical stability. GZ curves. Cross curves of stability. Hydrostatic curves commonly supplied to ship. Effect of free liquid surface and subdivision of tanks. Dangers due to water accumulation during fire-fighting. Effect of suspended weights. Practical requirements to ensure stability at sea. Management of water and fuel tanks. Filling and emptying tanks at sea.

(c) LONGITUDINAL STABILITY.—Longitudinal BM and GM and statical stability. Centre of flotation and its calculation. Moment to change trim by one inch.

(d) DRAUGHT, TRIM AND HEEL.—Changes due to adding or removing fuel ballast or cargo. Changes due to alteration in density of sea water. Changes due to bilging of compartments, using the lost buoyancy and added weight methods. Forces on rudder and stress in rudder stock. Heel when turning, including effect of centrifugal force and of rudder.

(e) RESISTANCE AND PROPULSION.—Derivation of Admiralty and fuel coefficients. Consideration of total resistance as the sum of frictional and residuary resistance. The law of corresponding speeds. Froude's law of comparison. Simple problems on the prediction of full scale resistance from model experiments. Simple problems involving the use of E.H.P., D.H.P., and Q.P.C. Simple problems on propellers. Pitch ratio. Wake factor. True slip. Apparent slip. Thrust and power. Cavitation.

(f) SHIP CONSTRUCTION.—Forces on ship under various conditions, including the effect of panting and pounding. Construction of all parts of steel ships. Structural fire protection arrangements. Fire detection and extinction arrangements. Fire precautions in port and in dry dock. Storage and ventilation of coal. Danger of explosion of gas given off by coal. Bilge and ballast arrangements. Levelling arrangements for damaged side compartments. Dry docking. Ventilation of holds and oil fuel tanks.

(g) SHIP MEASUREMENT AND CLASSIFICATION.—Meaning of "classed" and "unclassed" ships. Three island and shelter deck vessels. Common terms used in measurement of modern steel ships. Common terms used in tonnage measurement, *e.g.*, gross tonnage, net tonnage, propelling power allowance, tonnage hatch.

11.—ENGINEERING KNOWLEDGE

(Second-class and First-class)

Candidates for a combined Steam and Motor Second-class Certificate must be prepared to be examined in all the items (a) to (w), but those for a Steam Certificate or the Steam Endorsement of a Motor Certificate will not be examined in items (q) to (w) and those for a Motor Certificate or the Motor Endorsement of a Steam Certificate will not be examined in items (j) to (p).

Candidates for First-class Certificates or First-class Endorsements will be expected to display a fuller knowledge of the different items in the Syllabus than candidates for a Second-class Certificate or Second-class Endorsement and will also be liable to be examined in items (x) and (y).

NOTES :

1. The Engineering knowledge to be shown by candidates is that which is required for the use, operation and maintenance of the machinery, equipment and ship structure usually in the charge of the Engineer. A knowledge of the methods of manufacture of the various components is also required.

2. Candidates for certificates and endorsements are required to take a written examination followed by an oral examination.

3. The written examination for a Steam or Motor Certificate consists of two papers of three hours each—six questions only to be attempted out of nine in each paper. One question in the morning paper will be compulsory for First-class candidates.

4. The written examination for a combined Steam and Motor Certificate consists of three papers of three hours each—six questions only to be attempted out of nine in each paper. One question in the morning paper will be compulsory for First-class candidates.

5. The written examination for a Steam or Motor Endorsement consists of one paper of three hours—six questions only to be attempted out of nine in the paper.

6. Candidates may be required to illustrate their answers by means of freehand sketches :

(a) The general effects of various treatments on the physical properties of materials commonly used in the construction of marine engines and boilers, and the mechanical tests to which these materials are normally subjected.

(b) Heat and Combustion. The properties of steam, fuel lubricants and other liquids, gases and vapours used in machinery on board ship.

(c) The use, constructional details and principles involved in the action of the pressure gauge, thermometer, pyrometer, barometer, salinometer, hydrometer and other meters commonly used by engineers on board ship.

(d) The causes, effects and usual remedies for incrustation and corrosion. Feed water and blow densities, and scale formation.

(e) (1) Constructional details and working principles of marine engines ; methods of determining their B.H.P. The principles of working and methods of calibration of dynamometers and torsion meters.

(2) The methods of dealing with wear and tear of machinery and boilers. The alignment of machinery parts. The correction of defects due to flaws in material or accident. Temporary or permanent repairs in the event of derangement or total breakdown.

(f) Constructional details and principles of action of pumps fitted in ships. The general requirements concerning feed, fuel, bilge and ballast pumping systems.

(g) The Constructional arrangement, details and working of steering-engines and gears, refrigerating machinery, hydraulic and other auxiliary machinery, and such steam and internal combustion engines as are used for emergency and auxiliary machinery on board ship.

(h) Application of the indicator. Calculation of mean pressure and horse-power. Fluctuation of pressure in the cylinder as shown by indicator diagrams.

(i) (1) Precautions against fire or explosions due to oil or gas. Flash point. Explosive properties of gas or vapour given off by fuel or lubricating oils when mixed with a quantity of air. The danger of leakage from oil tanks, pipes, gas producers and vaporisers, particularly in bilges and other unventilated spaces. The action of wire gauze diaphragms and the places in which such devices should be fitted.

(2) Spontaneous combustion of coal. Explosive properties of gas given off by coal.

(3) Fire detection. Methods of dealing with fire. Action and maintenance of mechanical and chemical fire extinguishers and other fire-fighting appliances, respirators and safety lamps.

(j) The methods of constructing marine steam engines and boilers, the processes to which the several parts are submitted, or which are incidental to their manufacture, and the methods employed in fitting the machinery on board ship.

(k) The various types of propelling and auxiliary machinery now in use, the functions of each important part and the attention required by the different parts of the machinery on board ship.

(l) The methods of testing and altering the setting of the steam admission and exhaust valves, and the effect produced in the working of the engine by definite alterations in the setting of the valves.

(m) The constructional details and working of evaporators, feed water heaters and feed water filters.

(n) Marine boilers of various modern designs; the manner of staying them, and also the prevention of movement of boilers when vessels are pitching or rolling. The determination by calculation of suitable working pressures for boilers of given dimensions.

(o) The use and management of boiler fittings and mountings with special reference to water-gauges and safety valves. Precautions necessary when raising steam and operating stop valves, with particular reference to the danger arising from water-hammer action.

(p) Constructional details, operation and maintenance of installations generally employed for assisting draught, super-heating steam and burning coal or oil fuel.

(q) The principles underlying the working of internal combustion engines. The differences between various types of engines. Constructional details of internal combustion engines in general use.

(r) The nature and properties of the fuel and lubricating oils generally used in internal combustion engines. The supply of air and fuels to cylinders of engines of different types. The constructional details of apparatus for carburetting or atomising the fuel. The means of cooling the cylinders and pistons. Constructional details and working of air compressors.

(s) The methods of constructing marine internal combustion engines. The processes to which the several parts are submitted or which are incidental to their manufacture, and the methods employed in fitting the machinery on board ship.

(t) Starting and reversing arrangements and the various operations connected therewith.

(u) Enumeration and description of defects arising from working of machinery. The remedy for such defects.

(w) Constructional details and management of auxiliary steam boilers, their fittings and mountings, with special reference to water-gauges and safety valves. Constructional details and management of auxiliary machinery. Draught, combustion equipment, oil fuel equipment.

12. CANDIDATES FOR FIRST CLASS CERTIFICATES AND ENDORSEMENTS ONLY

(x) The administrative duties of a Chief Engineer: organisation of his staff for emergency duties and the use of safety equipment: organisation of repairs and surveys. Reports to owners.

(y) The recognition of irregularity in the running of engines from indicator diagrams. The rectification of these irregularities. Illustration by means of sketches of the change produced in the diagram due to an alteration in the setting or working of the valves or any other factors.

13. ORAL EXAMINATION

The oral examination will be largely based upon the Practical Knowledge subjects of the examination and will include questions on the management of engines and boilers at sea, the duties of the supervising engineer, the work to be done to engines, boilers and auxiliary machinery in port and the periodical examination of the working parts.

Candidates should also be well acquainted with machinery and boiler casualties which may occur at sea and be able to state how these may be prevented and remedied.

FIFTH SCHEDULE

LIST OF CERTIFICATES GRANTED BY GOVERNMENTS OUTSIDE NIGERIA

WHICH ARE RECOGNISED AS HAVING THE SAME FORCE AS THOSE GRANTED BY
THE MINISTER OF TRANSPORT

UNITED KINGDOM

CANADA

Before 1st April, 1949, when the territory became part of Canada, Newfoundland issued equivalent certificates.

NEW ZEALAND

AUSTRALIA

Up to and including 30th September, 1923, equivalent certificates were issued by the following states now comprised in the Commonwealth of Australia :—Victoria, New South Wales, South Australia, Tasmania, Queensland.

INDIA

Up to and including 31st March, 1929, equivalent certificates were issued by the Provincial Governments of Bengal and Bombay.

HONG KONG

*FEDERATION OF MALAYA

*SINGAPORE

*The territories formerly known as the Straits Settlements were re-constituted by Orders in Council and now form the Colony of Singapore (1st April, 1946) and part of the Federation of Malaya (1st February, 1948).

REPUBLIC OF IRELAND

SOUTH AFRICA

Certificates which were issued prior to 31st May, 1962.

The above authorities issue certificates as First and Second Class Engineer and First and Second Class Motor Engineer which are recognised as having respectively the same force as Steam and Motor certificates granted by Nigeria.

SIXTH SCHEDULE

READING THE WATER-GAUGE

Notwithstanding that the reading of the water-gauge is made a special feature in the examination of engineers, many boiler casualties result from the Engineer of the watch either not understanding the construction of the water-gauge fittings or not satisfying himself by actual trial that the cocks pipes, etc., are clear.

Unless a candidate under examination is able to prove that he understands how to verify the indications of the water-gauge, he will not be passed in practical knowledge. Failure in practical knowledge involves a candidate going to sea for further experience before re-examination.

The sketches. Figures 1, 2, 3 and 4, Plate, represent the usual methods of attaching water-gauge mountings to marine boilers the smoke boxes being omitted, for convenience, from Figures 3, 4 and 5. The important features in each gauge and the method of verifying its indications are dealt with separately in the following notes.

Referring to Figure 1 only

In this case the water-gauge cocks are attached direct to the boiler, and the accuracy of the gauge when the boiler is under steam can be tested as follows—

First—Let B remain open, then close cock D and open cock E, and if steam issues it proves that cock B and the passage through the top fitting and gauge glass are clear. If no steam or water issues, either cock B and or the passage through the top fitting and gauge glass is choked and the gauge cannot act properly until the obstruction is removed.

Second.—Close cock B and open D and E, and if water issues, cock D is clear. If no water or steam issues, either cock D or the passage from the boiler through the lower fitting is choked and must be cleared before the gauge can act properly.

Referring to Figure 2 only

In this case the gauge cocks are attached to a bent pipe of comparatively large diameter (at least 3 inches in the bore), the upper end of which communicates with the steam space, and the lower end with the water space of the boiler. Owing to the bore of the pipe being large, it is not likely to become choked or stopped under the ordinary conditions of working. The water-gauge is, therefore, in practically the same condition as if it were attached direct to the boiler, as in figure 1. This gauge, when at work, is tested in precisely the same manner as the one shown in Figure 1.

Screw plugs are inserted at P.P. and Q.Q., by the removal of which the apertures in the pipe can be cleared, if necessary by the insertion of a wire or rod when steam is down.

Referring to Figure 3 only

In this gauge there is an open communication from A to C through the column Y., and in order to "blow through the glass" it is only necessary to shut cocks D and B alternately, keeping E open. But to "blow through the water-gauge" including the pipes H and I, it is necessary, after blowing through the glass as described above to shut A and C alternately, at the same time keeping B, D and E open for such time as will ensure the complete discharge of the contents of the gauge and its connections. When B, D and C are clear and A choked the steam lodging in the glass and in the pipe I leading from column Y to A becomes condensed and the water flowing through C to take its place rises in column Y and in the glass to a level above that of water in the boiler. In other words, the gauge shows a false level above that of the water in the boiler. If now E be opened and water is blown out, then on E being again closed the water in the gauge will rise higher than before and be still further misleading.

On the other hand, when B, D and A are clear and C choked, the water, if any, in the glass is trapped and no longer rises and falls with the water in the boiler or with the motion of the vessel; it, however slowly rises in the glass owing to the condensation of the steam in the upper part of the gauge until such time as E is opened, when the whole of the water in the glass is blown out; and on E being closed, the glass does not show any proper level. When the test cocks T.T.T. are attached to column Y, as shown in Figure 3, they cease to be reliable when either cock A or C or the pipe in connection therewith is choked, or nearly choked; hence it is desirable that test cocks should be fitted direct to the boiler and not to the column as shown.

Referring to Figure 4 only

Sometimes the water-gauge fittings are arranged as shown in Figures 4 and 5, with no passage up the column, the central portion (N) of the column being simply a pillar or connecting piece of any convenient section between the upper and lower portions to which the cocks B and D are attached.

By this arrangement double communications are obviated and there is no need for what is known as "double shut off" in testing the accuracy of the gauge. When, however, the gauges are constructed in this manner, the cocks B and D are unreliable as test cocks in the event of there being no glass in the gauge. This feature should be carefully noted. Moreover, when in working condition, the reduction of pressure in the glass which arises when E is opened causes the water in the pipe H to rise above its normal level. This objectionable feature should also be noted.

Referring to Figure 5 only

Sometimes there is a bend, L, in the steam pipe I leading from cock A to cock B. This has occasionally escaped observation when new boilers have been fitted on board ship. In most cases this bend arises from the pipe being led in an abnormal direction to escape other pipes, beams or fittings near the smoke-box. With such a bend the condensed steam collects in the pipe and falls to the bottom of the bend, and in time it completely fills the pipe from J to K. The steam from K down to the level of the water in the glass is thereby trapped and, as condensation proceeds, leads to a reduction of pressure in the pipe below that of the boiler and an equivalent rise of the water in the bend and also in the glass. When the vessel is quiescent the water in the gauge glass increases in height until cock E is opened or until the pressure in the boiler is so much in excess of that in the lower part of pipe I as to cause the water in the bend to be blown into the gauge glass. In either case instantaneous change of water level in the glass ensues.

In the ordinary course of working, the phenomenon described above is more or less modified by the presence of air in the upper part of the gauge and by the rise and fall of the water in the boiler and gauge and by the rise and fall of the water in the boiler and gauge glass arising from the rolling or pitching motions of the vessel.

Other Special Points to be noted

When cocks A and C are omitted, as in Figure 2, this is owing to the bore of the stand pipe being sufficiently large to enable it to be regarded as part of the boiler. Such pipes require, however to be examined and cleared at intervals by passing a rod through the holes provided for the purpose at P.P. and Q.Q.

Cocks at A and C are not necessary for the testing of gauges arranged as shown in Figures 4 and 5. Candidates however should be fully aware of the impossibility of testing the reliability of the indications of water-gauges arranged as in Figure 3 when the cocks A and C are absent, and of the effect which the choking of cock A or C, or pipe H or I, has on the indications of the test cocks T.T.T. when attached to column Y.

Many ships afloat are fitted with water-gauges as shown in Figures 3 and 4, and it is therefore specially important that engineer candidates should thoroughly understand their construction, the principle on which they act, and the steps which must be taken to keep them in an efficient condition.

When fitting a glass into its place, it is specially important that it should not be placed so high as to prevent a clearing rod being inserted at G, Figures 1, 2, 3, 4, and 5. This defect, especially if it occurs in a water-gauge attached to a boiler subject to priming permits a rapid accumulation of scum around the top of the glass and results in the choking of the orifice leading from cock B to the gauge glass in each of the figures.

When a gauge glass is too short, or is placed either too high or too low in the fittings, it is also liable to become choked by the packing material being forced over its ends by the glands while being screwed up.

The use of unsuitable or insecure internal pipes in connection either with the ordinary glass gauge cocks of the description shown in Figure I, or with test cocks which are jointed to the boiler itself, should also be carefully guarded against.

Boiler casualties have resulted from the cocks B and D having the parts wrongly placed as shown in Figure 6, Plate II. In one case of that kind, which forms the subject of Report No. 208 under the Boiler Explosions Acts, United Kingdom the engineer in testing the water-gauge omitted to see that the passages in the cocks B and D were clear when the handles were in their proper working position. This defect could easily have been discovered if proper attention had been paid to the condition of the cocks. A defect of this nature may be due to faulty construction originally, or to the handle of the cock having been overstrained, and the neck twisted. Whether the passages in the plugs are fair and clear can, however, be verified in a few minutes. As an illustration, the water cock D, Figure 6, Plate II, can be verified by blowing through E with B shut and then moving the handle of D to one side until it is just closed, and then to the other side until it is again just closed; the proper working position of the handle is about equally distant from each of the above positions. The other cocks can be verified in the same manner.

Another serious casualty occurred through the handle of the cock A, Figure 3, having been twisted from its original position relatively to the orifice of the cock, resulting in the cock being shut when apparently open.

When a water-gauge, that is clear in all its parts, has been thoroughly blown through, the water in the glass rises above the level at which it formerly stood, immediately the drain cock E is closed, but if left undisturbed for a time it gradually falls to its former position. The amount of rise which occurs on these occasions depends chiefly on the temperature of the contents of the boiler and on the length of the pipes by which column Y is connected top and bottom to the boiler, but in cases where the gauge is of the description illustrated in Figures 3, 4, and 5, it amounts in high pressure boilers to

about 4 inches, while the time occupied by the water in returning to its former level ranges from 30 to 40 minutes. The cause of this rise is twofold, namely, (a) the displacement of the comparatively cold water in the pipe H by hotter and proportionately lighter water from the boiler and (b) a slight condensation of the steam and a corresponding fractional reduction of pressure in pipe I. The cause of the gradual subsidence of the water in the glass to its former level is also of a dual character, namely, (a) the cooling of the water in pipe H, and (b) the diminution in the condensation of steam in pipe I owing to the collection therein of air released from the steam condensed.

These results will, however, be somewhat modified if the water in the boiler is of higher density than in pipe H, and this will nearly always be the case owing to the condensation of the steam in the glass and upper fittings of the water-gauge, causing the water in the lower part to be fresher than that in the boiler.

Candidates should understand the necessity for periodically blowing through the water-gauge on each boiler (no matter what the form may be) in a systematic and thorough manner, and in cases where a boiler is fitted with two water-gauges, of keeping both in constant use ; finally, they should realise the necessity for keeping the water-gauges well-lighted, clean, and in all respects efficient.

Fig. 1.

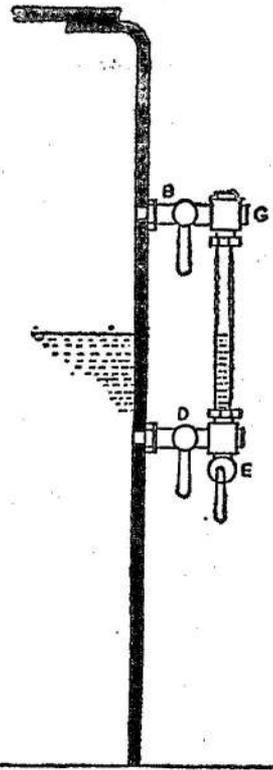


Fig. 2.

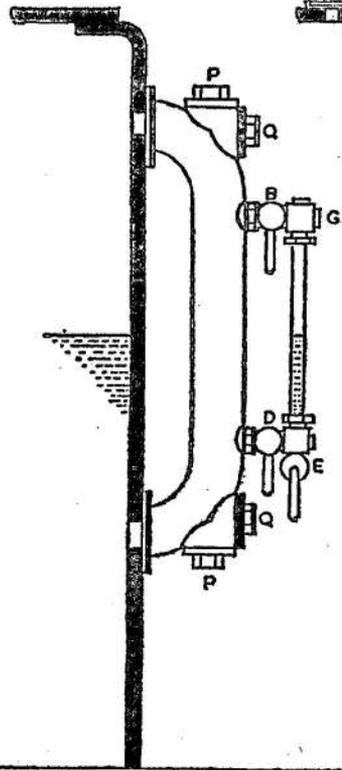


Fig. 3.

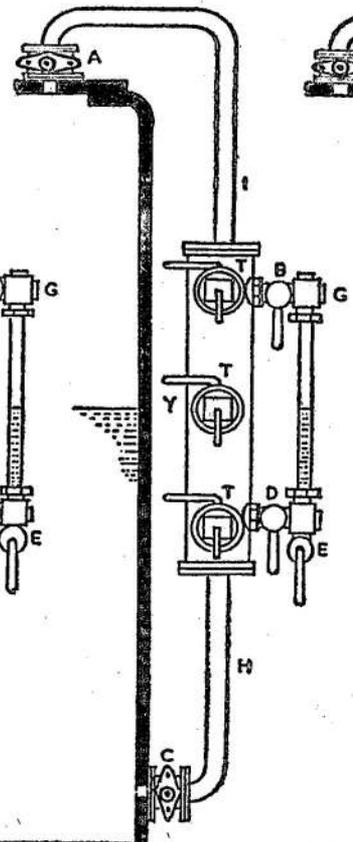


Fig. 4.

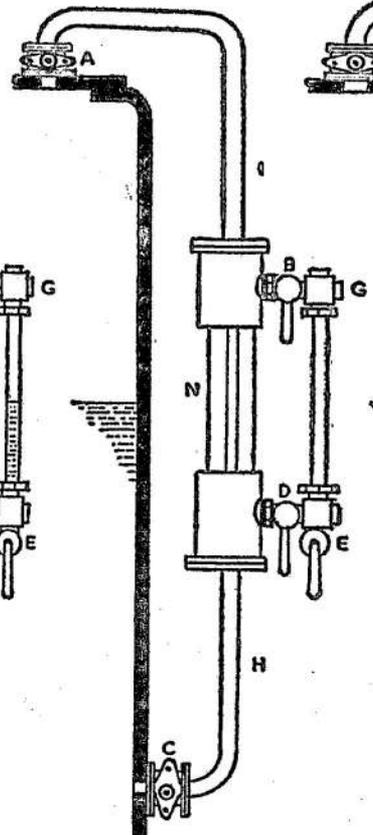


Fig. 5.

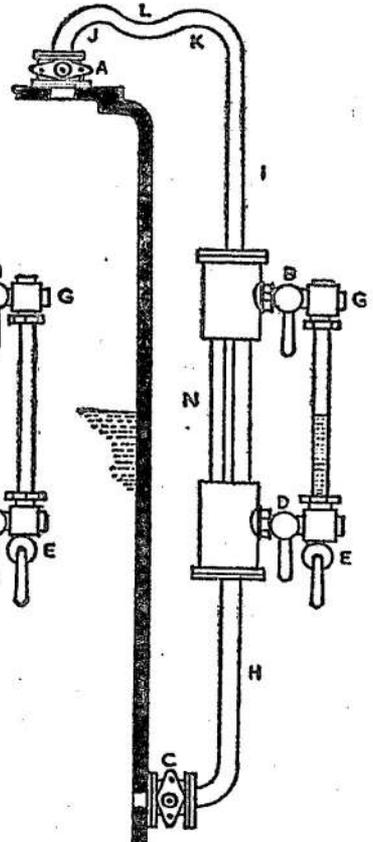
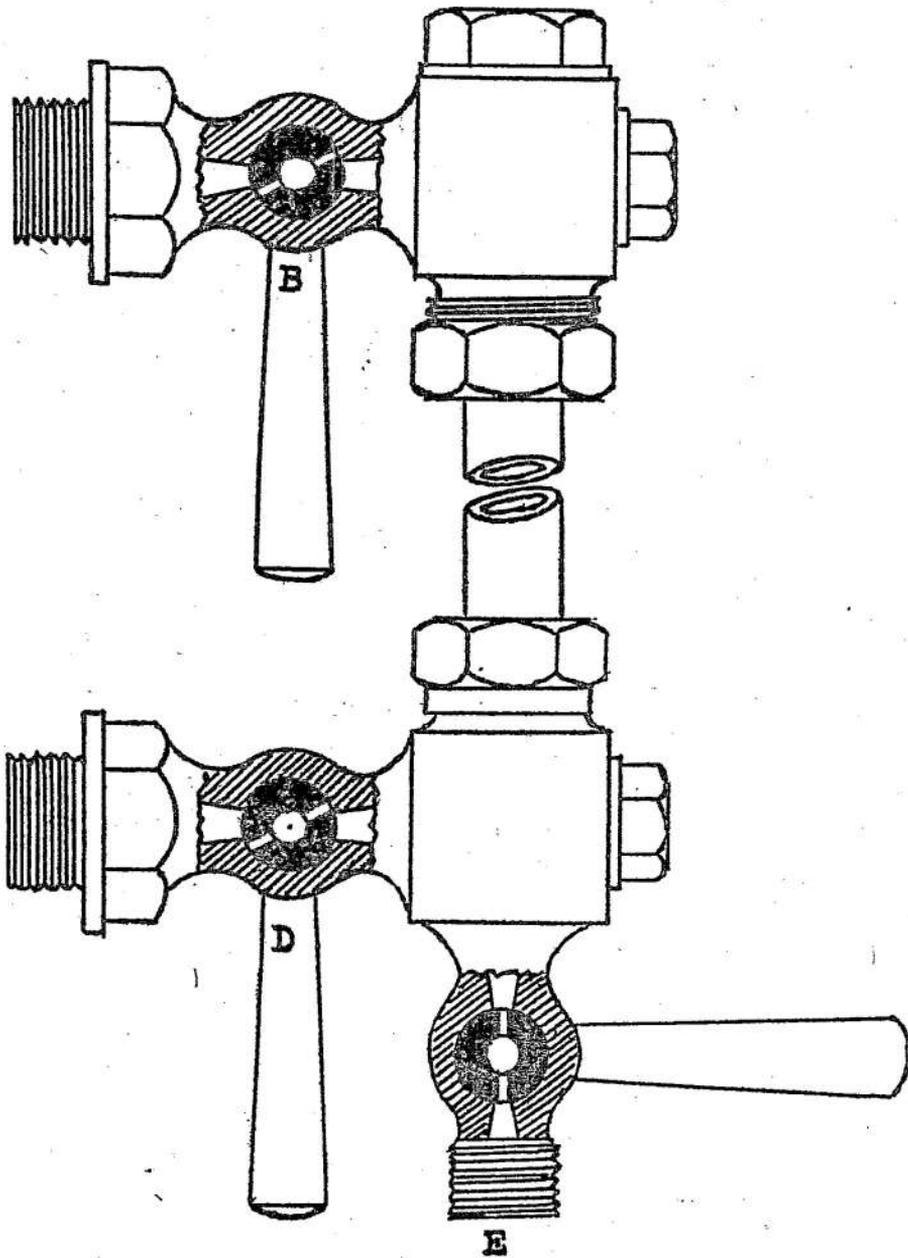


Fig. 6



The following is a list of Approved Workshops:—

- Inland Waterways Department Dockyards at Lokoja and Warri.
- Nigerian Ports Authority Dockyards at Apapa and Port Harcourt.
- Elder Dempster Agencies Ltd., Engineering Department at Wilmot Point, Lagos and Calabar.
- Holt's Transport Ltd., Dockyard at Warri.
- Holland West Africa Lijn Dockyard at Meridian Point, Lagos.
- The Societe Commerciale de L'Ouest Afrique, Motor Department, Lagos.
- The Compagnie Francaise de L'Afrique Occidentale, Motor Department, Lagos.
- A. Leventis and Co. Ltd., Motor Department, Lagos.
- J. Allen and Co. Ltd., Motor Department, Lagos.
- The United Africa Co. Motors Ltd., Lagos.
- The Union Trading Co. Ltd., Motor Department, Lagos.
- The Trade Centre, Yaba, Lagos (Fitter Mechanics only).
- The Shell Petroleum Development Co., Port Harcourt.
- United Africa Company Dockyard at Burutu.
- The Trade Centre, Enugu (Fitter Mechanics only)
- The Trade Centres Kaduna, Bukuru and Kano (Fitter Mechanics only).
- The Trade Centre, Ombe River (Fitter Mechanics only)
- Aiyetoro Community Workshop, Aiyetoro.
- Army Base Workshop Yaba (Fitter Mechanics only).

MADE at Lagos this 24th day of October, 1963.

R. A. NJOKU,
Federal Minister of Transport

EXPLANATORY NOTE

These Regulations provide for the examinations for Certificates of Competency required to be held by engine-room officers and ratings holding responsible posts on board ship. The previous Certificates of Competency Regulations, 1959, only provided for certificates required on inland waters vessels, but these new regulations provide for ocean-going ships as well. They include such requirements as appear to the Minister to implement the various International Conventions relating to the safety and proper manning of ships.